

Order MALLOPHAGA Nitzsch, 1818

(mallos, lock of wool; phagein, to eat)

- Aptera* Linnaeus, 1758, in part.
Parasita Latreille, 1802, in part.
Anoplura, family *Nirmides* Leach, 1815.
Mallophaga Nitzsch, 1818.
Mandibulata Latreille, 1825.
Lipoptera Shipley, 1904.

Biting Lice

Body elongate to rotund, depressed, soft, integument tough. Head large, exposed, usually broader than prothorax, porrect; mouth parts on underside, fitted for biting; labrum well developed; mandibles large, tridentate; maxillae with single lobes, maxillary "rods" present in some forms, palpi four-segmented or absent; labium with greatly reduced or obsolete palpi; anterior part of oesophagus sclerotized to form the "oesophageal sclerite"; hypopharynx complex, well developed, most forms with associated "rod-like stalks"; antennae three-, four- or five-segmented, shorter than head; eyes reduced; ocelli absent. Thorax with prothorax usually free, but meso- and metathorax united or separated by a suture; with one pair of ventral prothoracic spiracles. Wings or wing rudiments absent. Legs with one- or two-segmented tarsi; tarsi usually with paired claws, but there may be one pair or none. Abdomen apparently nine-segmented in the adult; cerci absent; spiracles on segments three to eight, two to seven or three to seven; male genitalia large, usually with strongly sclerotized parts; female without an ovipositor, vaginal orifice situated behind ventrite seven. Metamorphosis incomplete; eggs cemented singly to feathers or hairs of host; four instars. Non-bloodsucking, ectoparasites of birds and mammals, but principally on birds. Size range from 0.5 mm. to 10.0 mm.

There are more than 2,000 species of biting lice described from all parts of the world. No fossil forms are known.

In contrast to the Anoplura, the members of the Mallophaga do not suck blood, and none is a parasite of man. By far the greatest numbers are ectoparasites of birds. The food of this group of lice consists principally of feathers, dead skin and hair of the host. The injury done by biting lice is largely the result of severe surface irritation. Heavy infestations are known to cause the death of certain hosts. Severe injury can also be done to the feathers, hair or wool of the host. It has been thought that biting lice did not feed upon blood, but studies by Crutchfield and Hixson (1943) show that at least some lice take blood meals regularly. They say (1943:66):

Barbs and barbules of feathers and blood comprise the food of the chicken body louse (*Menacanthus stramineus*) and a species of *Menacanthus* unrecognized, heretofore, as a pest of poultry in the United States. These species obtain blood by gnawing through the epidermis of the skin and rupturing the quills of pinfeathers. The diet of the shaft louse (*Menopon gallinae*) consists of barbs and barbules. The wing louse (*Lipeurus caponis*) feeds on hooklets of the flight feathers; occasionally, barbs and barbules form a part of the diet. The large chicken louse (*Goniocotes gigas*) and the fluff louse, (*Goniocotes hologaster*) feed largely on barbs and to some extent on barbules.

Clay and Meinertzhagen (1943) have summarized the data concerning the transportation of lice from one host to another through the agency of hippoboscid flies. The lice attach themselves to the flies and may be transferred to abnormal hosts. Some lice are able to escape from dead hosts by riding on the flies when they quit the cold host.

This order has received little attention in Hawaii. The only extensive paper on our species is the partial report of Kellogg and Chapman (1902, reprinted 1904; the types of the species described from Hawaii in that paper should be at Stanford University). There has never been an over-all survey. Only one species was recorded from domestic fowl prior to 1927. Perhaps some light could be thrown upon the drepaniid bird problem if an adequate number of species of lice from that avian family were available for study. It is a pity that the lice collected from the native birds by Perkins were not worked up. (See discussion under Mallophaga in chapter 3 of volume 1 for additional comment.)

Lice can be collected easily if birds and mammals are wrapped completely in cotton as soon as killed. The lice on the animals will leave the cold, dead bodies and migrate into the cotton where they will become trapped and die and may later be picked out. The cotton wrapping from each animal may be placed in a paper bag on which data are written and stored for future study by a louse specialist. Bird collectors should keep this in mind.

The hosts listed hereinafter are those reported for Hawaii only, and I have not made a general listing of the hosts of the various species listed from without the islands. A number of the local host records are obviously from straggler specimens—possibly having been transferred from one host to another in collectors' bags.

I have had much difficulty in writing the following outline, not only because of the confused state of mallophagan taxonomy and the lack of certain literature, but because there has been no adequate collection of lice available for study. I have seen Hawaiian specimens of only a few of the commonest species listed. This is probably the most unsatisfactory chapter in this book.

Miss Theresa Clay has given some constructive criticism and has aided me with the text in several places. Dr. E. W. Stafford has been especially helpful with the Philopteridae; his aid in the construction of the key to the genera and his notes on the generic position of various species have been particularly useful in strengthening the work.

TABULAR ANALYSIS OF THE HAWAIIAN MALLOPHAGA

FAMILY	GENERA	ENDEMIC GENERA	NON-ENDEMIC GENERA	SPECIES	ENDEMIC SPECIES	INDIGENOUS SPECIES	ADVENTIVE SPECIES
Gyropidae	2	0	2	2	0	0	2
Boopiidae	1	0	1	1	0	0	1
Menoponidae	7	0	7	14	3	5	6
Trichodectidae	3	0	3	5	0	0	5
Philopteridae	19	0	19	30	2(?)	12	16
Totals	32	0	32	52	5(?)	17	30

Percentage of endemism in native group: genera 0 percent; species 28 percent (?).

Percentage of present-day fauna native: 43 percent.

Percentage of present-day fauna adventive: 57 percent.

Average number of species per genus in native group: 1.5.

Average number of species per genus in adventive group: 1.4.

This group is so poorly known that these figures may not be very accurate. Bird lice are generally widespread insects, and this is especially true of those attached to the widely wandering sea and shore birds; such a large percentage of indigenous species is not found in other orders of Hawaiian insects.

KEY TO THE SERIES OF MALLOPHAGA

1. Antennae clavate or capitate, four- or five-segmented, concealed in ventro-cephalic scrobes; maxillary palpi present, two-, three-, four- or five-segmented; line of division between meso- and metathorax usually distinct.....**Amblycera.**
2. Antennae filiform or seriform, three- or five-segmented, not concealed in ventral scrobes, but normally visible and extended; maxillary palpi absent; meso- and metathorax always fused with dividing suture obsolete.....**Ischnocera.**

Series AMBLYCERA (Kellogg, 1896)

KEY TO THE FAMILIES OF AMBLYCERA FOUND IN HAWAII

1. Mid and hind tarsi each with a single claw, or tarsal claws absent; our species on guinea pigs.....**Gyropidae.**
Tarsal claws paired; not ectoparasites of guinea pigs..... 2
2. Antennae five-segmented; body hairs mostly stiff and spiniform; ectoparasites of marsupials and dogs; male genitalia with accessory sac.....**Boopiidae.**
Antennae four-segmented; body hairs fine; ectoparasites of birds; male genitalia without accessory sac.....**Menoponidae.**

Family GYROPIDAE Kellogg, 1908

The Biting Guinea Pig Lice

This family is endemic to America (principally South America), but a few of the species have become widespread because of the activities of man. Almost all the species of the family (which totaled about 30 in 1924) are restricted to rodents, and only a few species have been found on primates, ungulates and on a sloth.

The eggs of the two species recorded hereafter are laid singly at the bases of the hair on guinea pigs. Ewing (1924:3) said that "The food of both these species consists in part of cutaneous secretions and excretions and in the case of *G. porcelli* of serum in addition. . . ." Sodium fluoride or a 2 to 5 percent rotenone dust is suggested to control these lice.

KEY TO THE SUBFAMILIES AND GENERA OF GYROPIDAE FOUND IN HAWAII

1. Short, broad species; maxillary palpi four-segmented; tarsal claws developed; meso- and metathoracic legs with femora fitted with a forked and grooved tenaculum for reception of tarsus when closed into it; tarsus with segment two elongate, transversely furrowed. **Gyropus** of the Gyropinae.
2. Slender species; maxillary palpi two-segmented; tarsi greatly reduced, claws absent; meso- and metathoracic legs with femora and tibiae arcuate and transversely striate.
 **Gliricola** of the Gliricolinae.

Subfamily GYROPINAE Ewing, 1924:9

Genus **GYROPUS** Nitzsch, 1818**Gyropus ovalis** Nitzsch.

Gyropus ovalis Nitzsch, 1818:304 (I have not confirmed this reference). Ewing, 1924:13, fig. 6. Genotype.

The oval guinea pig louse.

Oahu.

Immigrant. Not recorded heretofore, but I took it in Honolulu in 1944. It is normally found on guinea pigs wherever the host is taken by man.

Host: guinea pig.

Subfamily GLIRICOLINAE Ewing, 1924:29

Genus **GLIRICOLA** Mjoeberg, 1910**Gliricola porcelli** (Linnaeus).

Pediculus porcelli Linnaeus, 1758:611. Ewing, 1924:33, figs. 15, 17; pl. 1, fig. 8.

Oahu (and probably on some of the other islands).

Immigrant. Widespread from South America by man. First found by me in Honolulu in 1943 (1944:200).

Host: guinea pig.

Family BOOPIIDAE Mjoeberg, 1910

The Biting Kangaroo Lice

This family is endemic to Australia where its species are ectoparasites of marsupials, with the exception of the species listed below. One species represents the family in Hawaii, and, because it is a parasite of dogs, it has been widely spread artificially. No search has been made for lice on the wallabies and kangaroos introduced into Hawaii, and perhaps other members of this louse family are also established in the Territory.

Subfamily BOOPIINAE Harrison and Johnson, 1916:345

Genus **HETERODOXUS** Le Souëf and Bullen, 1902

Paine, 1912:359, figs. a-g, note.

Heterodoxus spiniger (Enderlein).

Menopon spiniger Enderlein, 1909:80, figured.

Heterodoxus longitarsus, of authors, as recorded from dogs.

Oahu (and other islands?).

Immigrant. Widespread; described from South Africa. First recorded from Hawaii by Carpenter in Honolulu in 1933.

Host: dog.

In some regions, this louse is considered a serious pest of dogs and is so abundant as to cause the death of its canine hosts. It has not, to my knowledge, caused much trouble in Hawaii. It has been referred to as *Heterodoxus longitarsus* (Piaget, 1880:504, pl. 41, figs. 7, 7a-c), the kangaroo louse, but Werneck (1941:46) has shown that it is distinct.

Control: A dust made from one part sodium fluoride powder and three to five parts ordinary wheat flour by weight, or equal parts powdered derris and flour rubbed thoroughly into the fur is recommended. A 2 to 5 percent rotenone dust may also be useful.

Family MENOPONIDAE Mjoeberg, 1910

KEY TO THE SUBFAMILIES

1. Prothorax much smaller than head; lateral margins of temples rounded **Menoponinae.**
2. Prothorax very large, about as large as head; temples angulate **Ancistrinae.**

Subfamily MENOPONINAE

KEY TO THE GENERA FOUND IN HAWAII

1. Ventral side of posterior femora without a condensed patch of setae; second, third, or fourth abdominal sternites without patches of setae or asters of heavy spines. **Colpocephalum** Nitzsch.
- Ventral side of posterior femora with a condensed patch of setae; second, third or fourth abdominal sternites with a condensed patch of setae and/or an aster of heavy spines on either side 2
- 2(1). Lateral margin of head with a deep emargination just before the eye (ocular emargination) **Actornithophilus** Ferris.
- Lateral margins of head not so emarginate, continuous to eye, but a slit or fracture is present in front of eyes in *Menopon* 3
- 3(2). Ventral surface of head with a sclerotized, hook-like process near base of each mandible. **Eomenacanthus** Uchida.
- Without such processes 4
- 4(3). Forehead with a fracture-like slit in margin near eyes; oesophageal sclerites heavily sclerotized **Menopon** Nitzsch.
- Forehead without such a marginal slit 5
- 5(4). Second abdominal ventrite with asters of spines; without a conspicuous gular plate. **Myrsidea** Waterston.
- Second abdominal ventrite without asters of spines; gular plate conspicuously pigmented. **Machaerilaemus** Harrison.

Genus **EOMENACANTHUS** Uchida, 1926:30

Eomenacanthus stramineus (Nitzsch) (fig. 138).

Liotheum (Menopon) stramineum Nitzsch, 1818:300; 1874:291.

Menopon biseriatum Piaget, 1880:469, pl. 37, fig. 2.

Eomenacanthus biseriatum (Piaget) Uchida, 1926:31.

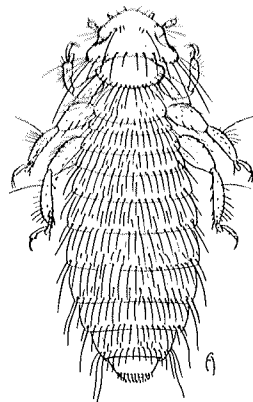


Figure 138—*Eomenacanthus stramineus* (Nitzsch), the chicken body louse. (Abernathy drawing.)

The chicken body louse; Hawaiian name: "uku-moa."

Oahu, Molokai, Hawaii.

Immigrant. Cosmopolitan. First recorded from Hawaii by Illingworth from specimens collected on Oahu in 1926.

Hosts: chicken, California valley quail (recorded elsewhere also on turkey, guinea hen and pigeon).

I have records only from Oahu, Molokai and Hawaii, but I assume that it is present on the other islands.

Control may be obtained by the use of sodium fluoride or pyrethrum dusts.

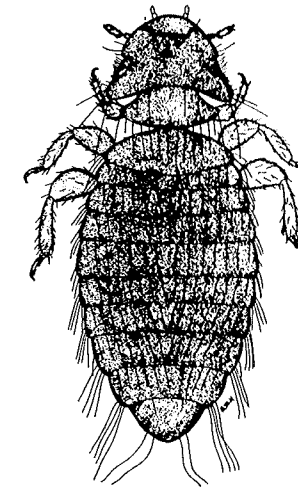


Figure 139—*Menopon gallinae* (Linnaeus), the common hen louse. (After Herrick, 1915.)

Genus **MENOPON** Nitzsch, 1818

Menopon gallinae (Linnaeus) (fig. 139).

Pediculus Gallinae Linnaeus, 1758:613.

Menopon pallidum Nitzsch, 1874:291.

The common hen louse; Hawaiian name: "uku-moa."

Kauai, Oahu. Not recorded from the other islands, but certainly present on poultry throughout the Territory.

Immigrant. Cosmopolitan. First recorded from Hawaii by Illingworth in 1928, but established here much earlier.

Hosts: chicken, duck, guinea hen, pigeon, turkey.

Sodium fluoride dusts give good control.

Menopon phaeostomum Nitzsch.*Menopon phaeostomum* Nitzsch, 1866:391.

Oahu.

Immigrant. Cosmopolitan. First collected in the Territory by Illingworth in 1926 at Honolulu.

Hosts: guinea hen and peafowl.

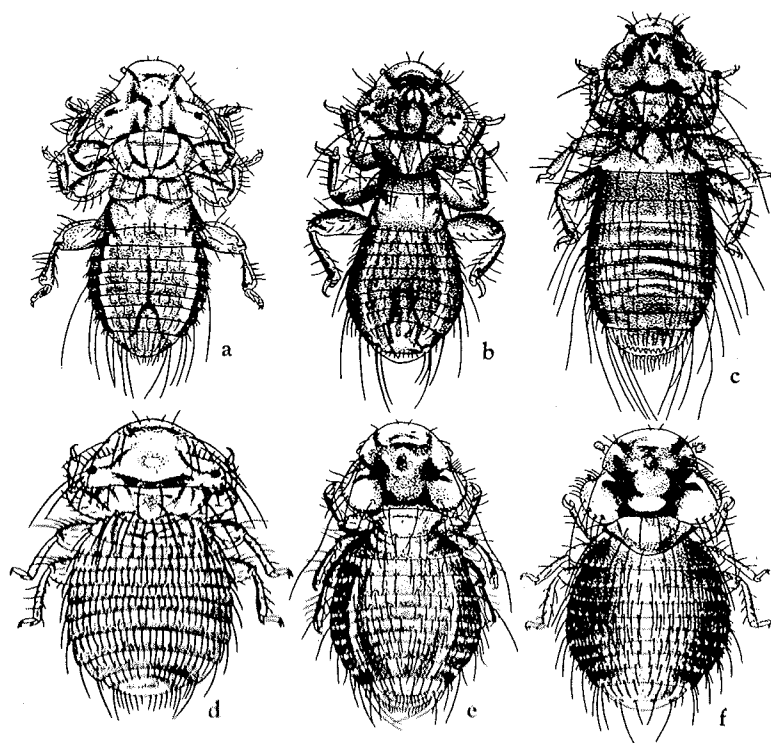


Figure 140—Hawaiian bird lice: a, *Myrsidea conspicua* (Kellogg and Chapman), male; b, *Myrsidea cyrtostigma* (Kellogg and Chapman), male; c, *Myrsidea invadens* (Kellogg and Chapman), female; d, *Machaerilaemus hawaiiensis* (Kellogg and Chapman), female; e, *Colpocephalum brachysomum* Kellogg and Chapman, female; f, *Colpocephalum discrepans* Kellogg and Chapman, female. (Rearranged from Kellogg and Chapman, 1904.)

Genus **MYRSIDEA** Waterston, 1915**Myrsidea conspicua** (Kellogg and Chapman) (fig. 140, a).*Colpocephalum conspicuum* Kellogg and Chapman, 1902:163, pl. 14, fig. 4;

1904:315, pl. 10, fig. 9.

Myrsidea conspicua (Kellogg and Chapman) Ferris, 1916:308.

Maui (type material from Kahului and "Pau [?] Olai").

Immigrant (from America?).

Host: *Carpodacus mexicanus obscurus* (house finch).

This species has thus far only been recorded from Maui, but, because it was taken from an introduced bird, I presume that it is most certainly an immigrant species. When the lice are better known, this species will probably prove to be a synonym of some American louse.

Myrsidea cyrtostigma (Kellogg and Chapman) (fig. 140, b).*Menopon cyrtostigmum* Kellogg and Chapman, 1902:165, pl. 15, fig. 3; 1904:318, pl. 10, fig. 12.*Myrsidea cyrtostigma* (Kellogg and Chapman) Ferris, 1916:308.

Endemic. Maui, Hawaii (type material from both islands).

Hosts: *Chlorodrepanis virens* ("amakihī"), *Himatione sanguinea* ("apapane"), *Vestiaria coccinea* ("iīwi"). All these recorded hosts are endemic Hawaiian birds (Drepaniidae).

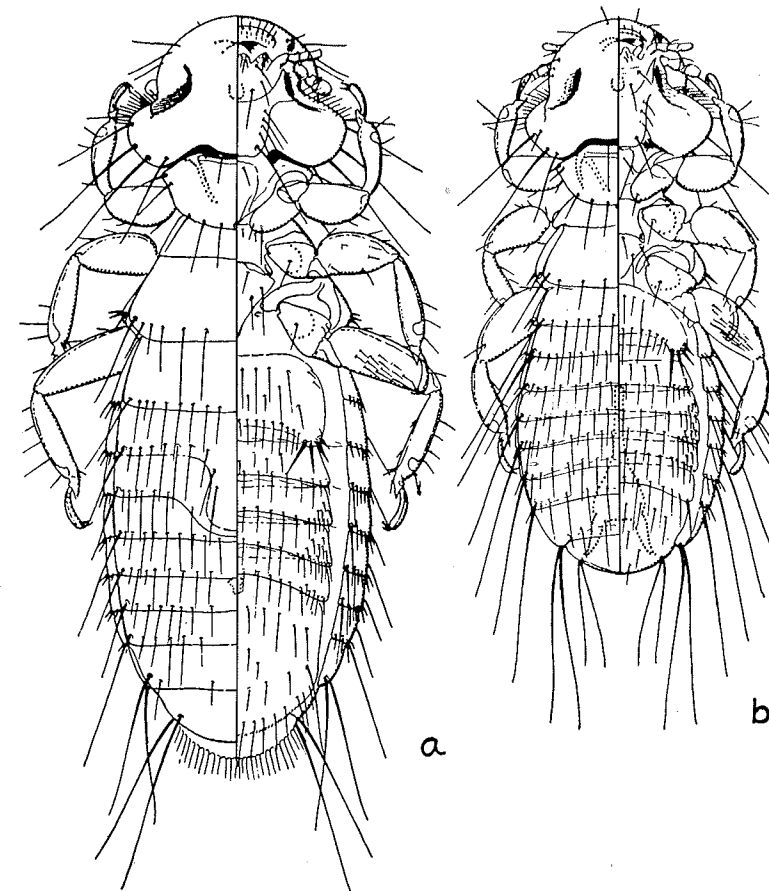


Figure 141—*Myrsidea invadens* (Kellogg and Chapman): a, female; b, male. (After Ferris, 1932:10.)

Myrsidea invadens (Kellogg and Chapman) (fig. 140, c; 141, a-b).

Menopon invadens Kellogg and Chapman, 1902:167, pl. 15, fig. 5; 1904:320, pl. 10, fig. 14.

Myrsidea invadens (Kellogg and Chapman) Ferris, 1916:308; 1932:10, figs. 3, 4.

Molokai, Maui (type locality: Maui).

Immigrant. Recorded from the mynah at Tahiti by Ferris in 1932, but certainly with a much wider distribution, although it is unrecorded elsewhere.

Hosts: *Acridotheres tristis* (mynah), *Streptopelia* (*Spilopelia*, *Turtur*) *chinensis* (Chinese dove) (straggler?).

I have seen records from Maui and Molokai only, but I assume that the species is found wherever the mynah bird is distributed about the islands, but it has not been searched for.

Genus **MACHAERILAEMUS** Harrison, 1915

Machaerilaemus hawaiiensis (Kellogg and Chapman) (fig. 140, d).

Menopon hawaiiensis Kellogg and Chapman, 1902:165, pl. 15, fig. 2; 1904:317, pl. 10, fig. 11.

Endemic. Maui (type locality: Iao Valley).

Host: *Chlorodrepanis virens* (native drepaniid "amakihii").

Genus **COLPOCEPHALUM** Nitzsch, 1818

Colpocephalum brachysomum Kellogg and Chapman (fig. 140, e).

Colpocephalum brachysomum Kellogg and Chapman, 1902:162, pl. 14, fig. 3; 1904:314, pl. 10, fig. 8.

Indigenous (?). Maui (type series from Kahului and Iao Valley).

Hosts: *Asio flammeus sandwichensis* (*Asio accipitrinus*) (the Hawaiian owl), and *Pluvialis dominica fulva* (*Charadrius dominicus fulvus*) (Pacific golden plover). Thompson (1938:206) believes that *Asio* is the true host.

Colpocephalum discrepans Kellogg and Chapman (fig. 140, f).

Colpocephalum discrepans Kellogg and Chapman, 1902:164, pl. 14, fig. 1; 1904:316, pl. 10, fig. 10.

Indigenous. Maui (type locality: Kahului).

Hosts: *Anous stolidus pileatus* (noddy tern), *Carpodacus mexicanus obscurus* (house finch or linnet).

Colpocephalum hilensis (Kellogg and Chapman) (fig. 145, a).

Menopon hilensis Kellogg and Chapman, 1902:166, pl. 15, fig. 4; 1904:319, pl. 10, fig. 13.

Endemic. Hawaii (type locality: Hilo).

Host: *Vestiaria coccinea* (the beautiful black and red native drepaniid "iwi").

Colpocephalum turbinatum Denny.

Colpocephalum turbinatum Denny, 1842:209.
Oahu.

Immigrant. A widespread species. First found in Hawaii in 1945 by members of the armed forces, but not recorded in Hawaiian literature heretofore.

Host: pigeon.

Genus **ACTORNITHOPHILUS** Ferris, 1916:303

Actornithophilus epiphanes (Kellogg and Chapman) (fig. 145, b).

Colpocephalum epiphanes Kellogg and Chapman, 1902:161, pl. 14, fig. 2; 1904:313, pl. 10, fig. 7.

Actornithophilus epiphanes (Kellogg and Chapman) Ferris, 1916:304.

Indigenous. Maui (type locality: Kahului).

Host: *Anous stolidus pileatus* (noddy tern).

Actornithophilus kilauensis (Kellogg and Chapman) (fig. 145, c).

Colpocephalum kilauensis Kellogg and Chapman, 1902:161, pl. 14, fig. 1; 1904:312, pl. 10, fig. 6.

Actornithophilus kilauensis (Kellogg and Chapman) Ferris, 1916:304.

Indigenous. Hawaii (type locality: Hilo).

Host: *Heterocelus* (*Heteractitis*) *incanus* (wandering tattler).

Subfamily **ANCISTRONINAE**

Genus **ANCISTRONA** Westwood, 1874

Ancistrona vagelli (Fabricius).

Pediculus vagelli Fabricius, 1787:369.

Ancistrona gigas Piaget, 1883:152, pl. 9, fig. 1.

The giant bird louse.

Laysan.

Indigenous. Widespread about the world. First recorded from the Territory by Kellogg and Paine (1910:125).

Host: *Pterodroma leucoptera hypoleuca* (*Aestrelata hypoleuca*) (Bonin Island petrel).

Essig (1929:130) says that this is the broadest known louse.

Series ISCHNOCERA (Kellogg, 1896)

KEY TO THE FAMILIES OF ISCHNOCERA FOUND IN HAWAII

1. Tarsi with single claws; antennae three-segmented (at least in male); ectoparasites of mammals..... **Trichodectidae.**
2. Tarsi with paired claws; antennae five-segmented; ectoparasites of birds..... **Philopteridae.**

Family TRICHODECTIDAE Kellogg, 1908

This family contains a number of pests which are of major economic importance elsewhere, but they have caused little concern in Hawaii.

KEY TO THE GENERA OF TRICHODECTIDAE FOUND IN HAWAII

1. Forehead triangular, almost straight on sides; with fewer than six abdominal spiracles; ectoparasites on cats.... **Felicola** Ewing.
Forehead rounded, broader than long; with six abdominal spiracles; not found on cats..... 2
2. Ectoparasites of goats, sheep, cattle and horses; parameres of male genitalia free; antennae of male and female similar; forehead without hair-groove..... **Bovicola** Ewing.
Ectoparasites of dogs; parameres of male genitalia united distally; antennae of male and female dissimilar; hair-groove present on forehead..... **Trichodectes** Nitzsch.

Genus TRICHODECTES Nitzsch, 1818

According to Ewing (1929:121), this genus includes, in its restricted sense, those species of the family which have the "antennae three segmented in both sexes but of different shape; temporal lobes without posterior processes; forehead rounded; all of the abdominal segments with pleural plates."

Trichodectes canis (Degeer).

Ricinus canis Degeer, 1778:81, pl. 4, fig. 16.

Trichodectes latus Nitzsch, 1838:436. Piaget, 1880:384, pl. 31, fig. 6.

The biting dog louse.

Oahu. Not recorded from the other islands; probably present on all of the main islands, but not yet searched for.

Immigrant. Cosmopolitan. First recorded from Hawaii by Swezey from specimens taken in Honolulu in 1929, but no doubt here at an early date.

Host: dog.

This species has apparently not caused much concern to keepers of dogs in the Territory, for it has been infrequently called to the attention of local entomologists. However, in other localities, severe infestations, especially in young animals, have been reported.

Control: sodium fluoride dusts are effective.

In the late 1860's, Melnikoff and Leuckart found that this louse served as an intermediate host for the common double-pored dog tapeworm, *Dipylidium caninum* (Linnaeus). This discovery is said to be the first to show that an arthropod was involved as an intermediate host of a parasitic worm. The tapeworm is common in dogs and cats and occasionally is recorded from human beings. Most of the human cases have been young children. Human infestation occurs by ingesting an infested louse or flea or crushed parts of these insects. Putting one's fingers in one's mouth after crushing a louse or flea, or handling a pet or allowing a dog, which may have bitten a louse or a flea, to lick one are routes of possible infection. The eggs of the tapeworm are expelled with the host's feces and those which become lodged on the hair or body of the dog or cat may be ingested by the lice. When the tapeworm eggs reach the intestines of the louse, they hatch, and the larval tapeworms bore through the intestines and develop into the cystocercoid stage in the body cavity of the louse. When the cystocercoid stage is reached, the tapeworms are capable of infesting their mammalian hosts. The mature tapeworm reaches a length of about 12 inches. Its mature proglottids are sub-ovate or pumpkin-seed-shaped and have a double reproductive system with a genital pore at about the middle of each side—hence the name double-pored tapeworm.

Genus BOVICOLA Ewing, 1929:123

This genus can be readily distinguished from *Felicola* because of the shape of its forehead, which is rounded and much broader than long. It was separated from *Trichodectes* principally because the antennae of the males and females are similarly shaped and the shape of the head is different.

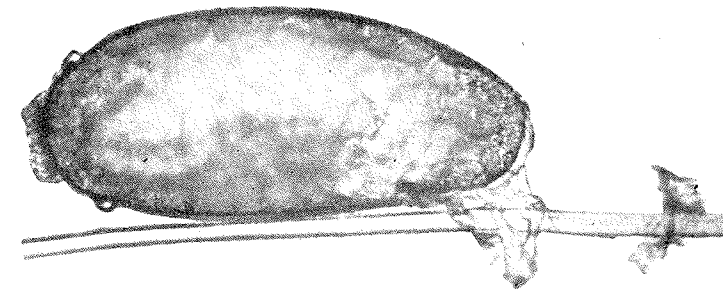
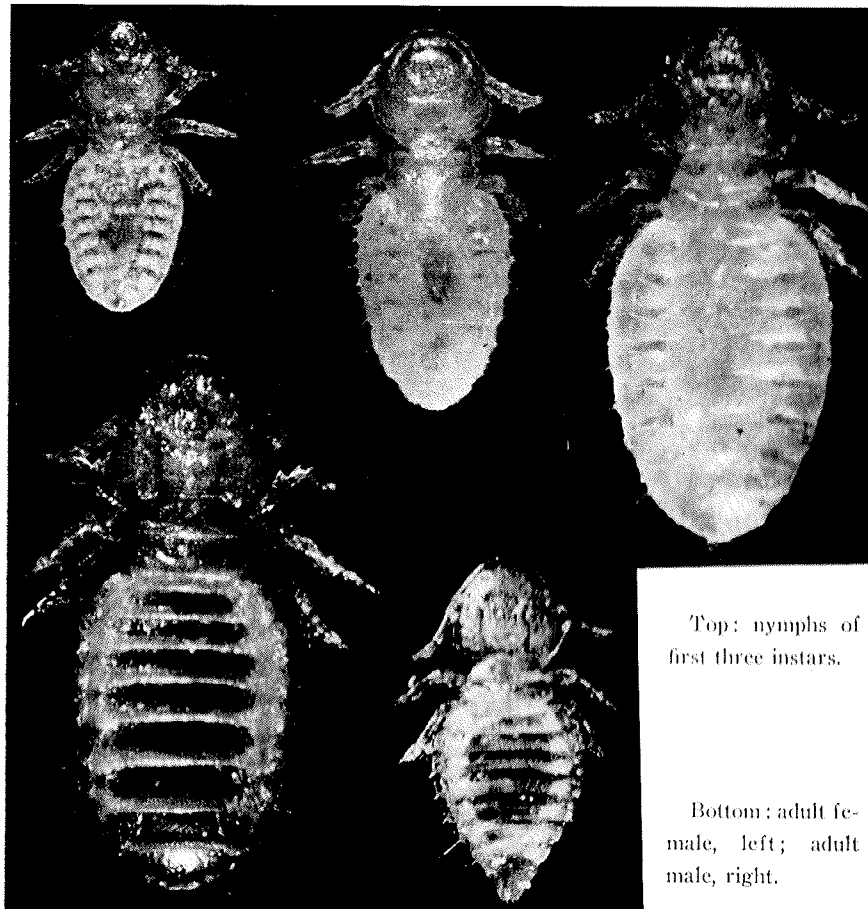


Figure 142—Egg of *Bovicola bovis* (Linnaeus) on a cattle hair. (Photograph kindly furnished by J. G. Matthyse.)

KEY TO THE SPECIES OF BOVICOLA FOUND IN HAWAII

1. Ectoparasitic on cattle *bovis* (Linnaeus).
2. Ectoparasitic on goats *caprae* (Gurlt).
3. Ectoparasitic on horses *equi* (Linnaeus).
4. Ectoparasitic on sheep *ovis* (Linnaeus).



Top: nymphs of first three instars.

Bottom: adult female, left; adult male, right.

Figure 143—*Bovicola bovis* (Linnaeus), the biting ox louse. (I am indebted to Dr. J. G. Matthyse for supplying the photographs for this plate.)

***Bovicola bovis* (Linnaeus) (figs. 142, 143).**

Pediculus Bovis Linnaeus, 1758:611.

Trichodectes scalaris Nitzsch, 1818:269 (I have not checked this reference).

The biting ox louse; the cattle red louse.

Molokai, and probably all of the main islands.

Immigrant. Cosmopolitan. First found in Hawaii in 1943 by me on a cow from Molokai examined in Honolulu.

Control: the same as for the biting horse louse, as outlined below. Raw (not boiled) linseed oil applied with a brush is also a good and cheap method of control (keep the treated animal quiet and under cover for at least 12 hours after treatment).

It appears that this species usually reproduces parthenogenetically, but males are known to occur. It is found most abundantly on the back of the host from the neck to the base of the tail. High temperature and high humidity are unfavorable for the development of the louse.

"The instars can readily be distinguished by both head capsule measurements and morphological characters. The first instar nymphs are completely light colored, unchitinized, along the lateral margins of the abdomen. In the second instar the lateral margins of the first visible abdominal segment are partly chitinized, brownish. In the third instar the first visible segment is completely chitinized along the lateral margin, the second segment also partly chitinized, brownish." (Matthyse, 1944:439.)

***Bovicola caprae* (Gurlt).**

Trichodectes caprae Gurlt, 1842:3, pl. 1, fig. 2.

Trichodectes climax Nitzsch, 1818:296.

Bovicola caprae (Gurlt) Ewing, 1929:123. Genotype.

The biting goat louse.

Oahu, and probably all of the main islands.

Immigrant. Cosmopolitan. I have seen specimens collected in Honolulu in 1920, and these were recorded by me in 1943 (1944:200).

Host: goat.

***Bovicola equi* (Linnaeus).**

Pediculus Equi Linnaeus, 1758:612.

Trichodectes equi (Linnaeus), of authors.

Bovicola equi (Linnaeus) Ewing, 1929:123.

The biting horse louse.

Oahu (and the other main islands?).

Immigrant. Cosmopolitan. Not heretofore recorded from Hawaii, but reported to me as being present on army horses at Schofield Barracks in 1943.

Host: horse.

Control: local infestations may be controlled by sodium fluoride dusts, but if infestations are heavy and extensive the following standard dip solution has been recommended: white arsenic, 4 pounds; sal soda, 12 pounds; pine tar, 2 quarts; water, 250 gallons. The recently developed DDT dusts and sprays will probably replace the older control methods.

Bovicola ovis (Linnaeus).*Pediculus Ovis* Linnaeus, 1758:611.*Trichodectes ovis* (Linnaeus), of authors.*Bovicola ovis* (Linnaeus) Ewing, 1929:123.

The biting sheep louse.

This cosmopolitan species has not been reported in literature from Hawaii, but circumstantial evidence leads me to believe that it will be found, especially on the island of Hawaii, if searched for. In some mainland localities when active dipping for sheep scab is not carried on, it is said that these lice build up occasionally in troublesome numbers, but that the usual dipping of the flocks keeps the louse under control.

Genus **FELICOLA** Ewing, 1929:122, 192

This genus can be recognized among the other Trichodectidae most easily because of its anteriorly pointed head.

Felicola subrostrata (Nitzsch).*Trichodectes subrostrata* Nitzsch, 1818:296.*Felicola subrostrata* (Nitzsch) Ewing, 1929:122. Genotype.

The biting cat louse.

Oahu, and probably on the other islands.

Immigrant. Cosmopolitan. This species was first recorded by me from specimens from Honolulu in 1943 (1944:200), but it has been here for a long while.

It is said that cats may become heavily infested with this louse, but no records of severe infestation in the Territory have come to my attention.

Control: sodium fluoride diluted in three or four parts of flour gives good control and will not irritate the cat's tender skin as will straight sodium fluoride.

Family PHILOPTERIDAE Burmeister, 1838

The Biting Bird Lice

This is the largest family of lice. All our species can be distinguished easily from the only other family of lice of the Ischnocera found in Hawaii because of their two-segmented tarsi and five-segmented antennae. This family is in a state of taxonomic chaos. The following key is poor, but I am unable to improve it with the material and data at hand. It appears that some of these genera exist more in the minds of certain taxonomists than in nature.

KEY TO THE GENERA OF PHILOPTERIDAE FOUND IN HAWAII

1. Inner margin of each eighth abdominal pleuron of female with a process bearing one or more spines; head not broader than long, each temple with only one very long seta and not produced into processes nor angulate in our species, which is found on the Hawaiian coot.....
.....**Rallicola** Johnston and Harrison.
Not such species 2
- 2(1). Forehead without a complete marginal band, rarely rounded; clypeal suture and signature usually present.... 3
Forehead rounded and surrounded by a narrow, unbroken marginal band; usually without a clypeal suture or signature12
- 3(2). Body elongate; trabecula small or absent..... 4
Body rotund; trabecula usually large and movable..... 7
- 4(3). First three antennal segments of male distinctly elongated, especially second segment, and different from those of female; our species on albatrosses.....
.....**Docophoroides** Giglioli.
Not such species; antennae alike in the sexes..... 5
- 5(4). Clypeal region completely surrounded by a subcircular, hyaline margin; with a pair of small, peg-like, dorsal spines behind clypeal suture.....**Anotoecus** Cummings.
Not such forms 6
- 6(5). Male genitalia with basal plate uniformly sclerotized; parameres short**Philopterus** Nitzsch.
Male genitalia with only lateral margins of basal plate sclerotized; parameres long, heavy, saber-shaped.....
.....**Saemundsonia** Timmerman.
- 7(3). Antennae similar in the sexes..... 8
First antennal segment of male larger and different from that of female, first and third segments may have appendages 9
- 8(7). Signature and clypeal suture absent; antennal bands interrupted medianly**Brüelia** Kéler.
Signature and clypeal suture present.....
.....**Quadriceps** Clay and Meinertzhagen.
- 9(7). Large species, 8 to 9 mm. long; signature broader than long; first antennal segment of male with an appendage**Harrisoniella** Bedford.
Much smaller, 2 to 4 mm. long; signature not transverse; first segment of male antenna usually without an appendage10
- 10(9). Clypeus armed with two pairs of small, stout spines, these lying near apex, anterior pair directed forward and slightly downward, posterior pair directed upward and slightly backward; on pigeons.....**Columbicola** Ewing.
Clypeus without such spines in addition to usual fine setae; not characteristic of pigeons.....11

- 11(10). Sclerotized band behind clypeal suture interrupted in middle where each half turns backward..... *Pectinopygus* Mjoeberg.
Clypeus without such a band..... *Perineus* Harrison.
- 12(2). Temples rounded 13
Temples angulate 16
- 13(12). Males with intertergital abdominal plates.....
..... *Cuclotogaster* Carriker.
Males without such plates..... 14
- 14(13). Head with frontal rim with thickenings (with "preantennal chitinized processes") *Oxylipaurus* Mjoeberg.
Frontal rim without such processes..... 15
- 15(14). Head with clypeal suture and pale transverse band present *Lagopoecus* Waterston.
Head without clypeal suture or pale transverse band *Lipeurus* Nitzsch.
- 16(12). *Goniodes* Nitzsch, *Goniocotes* Burmeister, *Chelopistes* Kéler.
These "genera" are in a state of confusion in literature.

Genus ANOTOECUS Cummings, 1916

Anotoecus dentatus (Scopoli) (fig. 144).

Pediculus dentatus Scopoli, Entomol. Carniol., p. 383, 1763 (I have not seen this reference).

Philopterus (Docophorus) icterodes Nitzsch, 1818:290 (920, by error in original work).

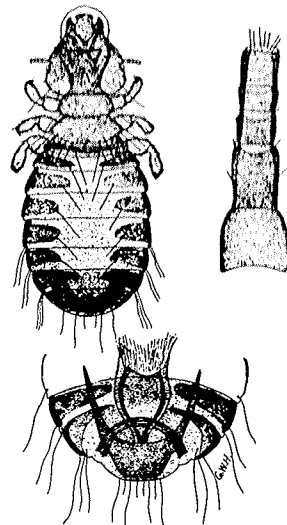


Figure 144—*Anotoecus dentatus* (Scopoli): female, female antenna and apex of male abdomen. (After Herrick, 1915.)

Kellogg, 1896:96, pl. 4, fig. 1.

Philopterus dentatus (Scopoli), of authors.

The red duck louse.

This species has not been recorded from Hawaii, but because it is a common, widespread louse of ducks, both wild and domesticated, I presume that it will be found in the islands if searched for. "This species is easily recognizable by its conspicuously rounding, uncolored clypeus with colored signature, and on each side of it the triangularly-headed anterior projection of the antennal band." (Kellogg, 1896:96-97.)

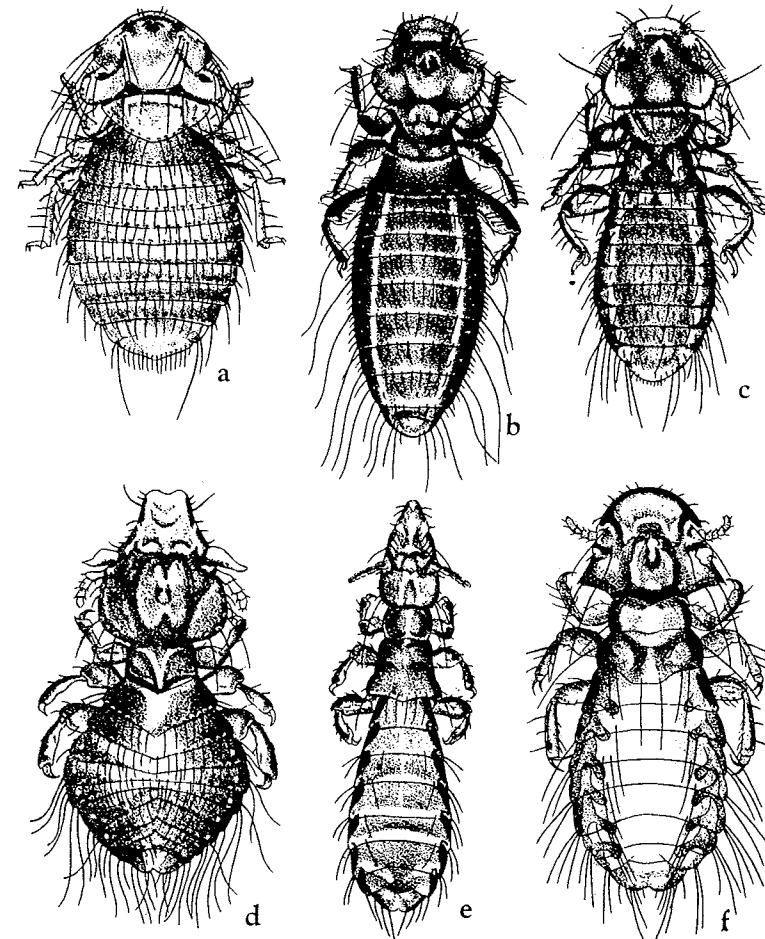


Figure 145—Some Hawaiian bird lice: a, *Golpocephalum hilensis* (Kellogg and Chapman), male; b, *Actornithophilus epiphanes* (Kellogg and Chapman), female; c, *Actornithophilus kilauensis* (Kellogg and Chapman), female; d, *Philopterus macgregori* (Kellogg and Chapman), female; e, *Brüelia stenozona* (Kellogg and Chapman), female; f, *Goniocotes chinensis* Kellogg and Chapman, female. (Rearranged from Kellogg and Chapman, 1904.)

Genus **DOCOPHOROIDES** Giglioli, 1864**Docophoroides brevis** (Dufour).*Philopterus Brevis* Dufour, 1835:674, pl. 31, fig. 3.*Lipeurus taurus* Nitzsch, 1866:385.*Eurymetopus taurus* (Nitzsch) Taschenberg, Kellogg and Paine, 1910:125.
Kellogg, 1908:51, pl. 2, fig. 16.

Laysan.

Indigenous. Cosmopolitan. First recorded from the Territory from Laysan by Kellogg and Paine in 1910.

Hosts: *Diomedea nigripes* (black-footed albatross), *Diomedea (Thalassarche) immutabilis* (Laysan albatross).Genus **SAEMUNDSSONIA** Timmerman, 1936:100**Saemundssonina conicus** (Denny).*Docophorus conicus* Denny, 1842:90, pl. 5, fig. 2.*Docophorus fuliginosus* Kellogg, 1896:80, pl. 3, fig. 2.*Docophorus fuliginosus* variety *hawaiiensis* Kellogg and Chapman, 1902:157;
1904:307 (type series from Kahului, Maui, and Hilo, Hawaii).*Docophorus wallacei* Johnston and Harrison, 1912:369, figs. 5, 6.*Philopterus conicus* (Denny) Harrison, 1916:92.

Maui, Hawaii.

Indigenous. A widespread species. First recorded from Hawaii by Kellogg and Chapman in 1902.

Hosts: *Pluvialis (Charadrius) dominicus fulvus* (plover), *Heterocelus (Heteractitis) incanus* (wandering tattler).**Saemundssonina snyderi** (Kellogg and Paine) (fig. 146, a-d).*Docophorus snyderi* Kellogg and Paine, 1910:124, figs. 1, 2.*Philopterus snyderi* (Kellogg and Paine) Harrison, 1916:104. Ferris, 1932:71,
fig. 20, a-d.*Saemundssonina snyderi* (Kellogg and Paine) Thompson, 1939:74.

Laysan (type locality).

Indigenous. Also known from the Marquesas Islands.

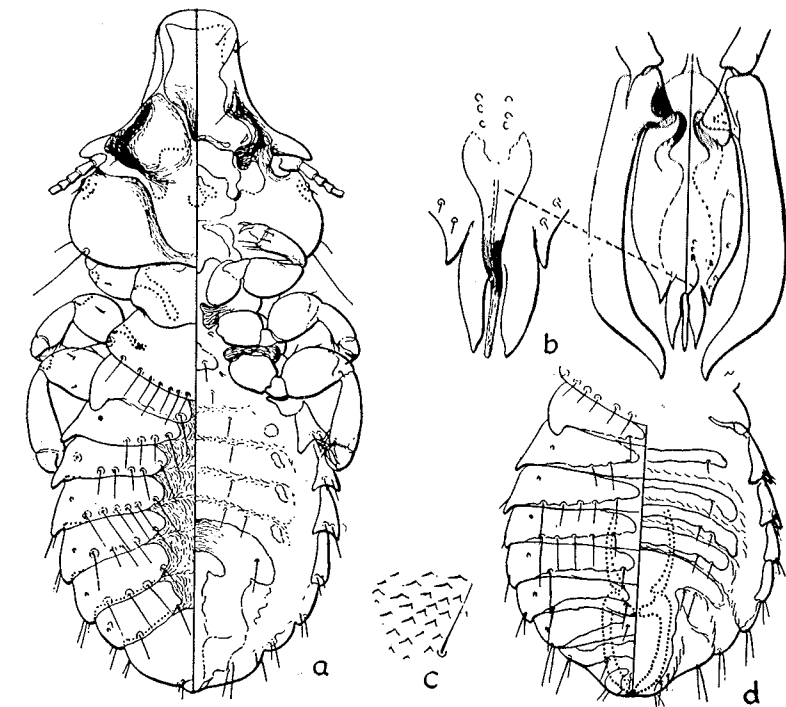
Hosts: *Sterna lunata* (gray-backed tern) in Hawaii, *Sterna fuscata* (sooty tern) in the Marquesas.Ferris (1932:71) says that this species may be the same as the Galapagan *Saemundssonina (Philopterus) melanocephala* (Nitzsch).

Figure 146—*Saemundssonina snyderi* (Kellogg and Paine): a, female; b, male genitalia; c, ornamentation of derm of venter of female; d, male abdomen, drawn to larger scale than female. (After Ferris, 1932:71.)

Genus **PHILOPTERUS** Nitzsch, 1818*Docophorus* Nitzsch, 1818.**Philopterus macgregori** (Kellogg and Chapman) (fig. 145, d).*Docophorus macgregori* Kellogg and Chapman, 1902:156, pl. 13, fig. 1; 1904:306,
pl. 10, fig. 1.

Endemic(?). Maui (type series from Kahului and Iao Valley).

Host: *Chlorodrepanis virens* ("amakihī").**Philopterus subflavescens** (Geoffroy).*Pediculus subflavescens* Geoffroy, 1762:599.*Docophorus communis* Nitzsch, 1838:425.*Philopterus subflavescens* (Geoffroy) Harrison, 1916:105.

Maui, Hawaii.

Immigrant. First recorded from Hawaii by Kellogg and Chapman in 1902. Known also from the Galapagos Islands.

Hosts in Hawaii: *Carpodacus mexicanus obscurus* (linnet); *Munia nisoria* (Chinese sparrow).

Genus **RALLICOLA** Johnston and Harrison, 1911

Rallicola advena (Kellogg).

Oncophorus advena Kellogg, 1896:133, pl. 11, figs. 1, 2. Kellogg and Chapman, 1902:160; 1904:311.

Rallicola advena (Kellogg) Harrison, 1916:126.

Maui, Hawaii.

Indigenous. Also found in California, where it was described from the American coot.

Hosts: *Fulica americana alai* (Hawaiian coot), *Vestiaria coccinea* ("iiwi"),

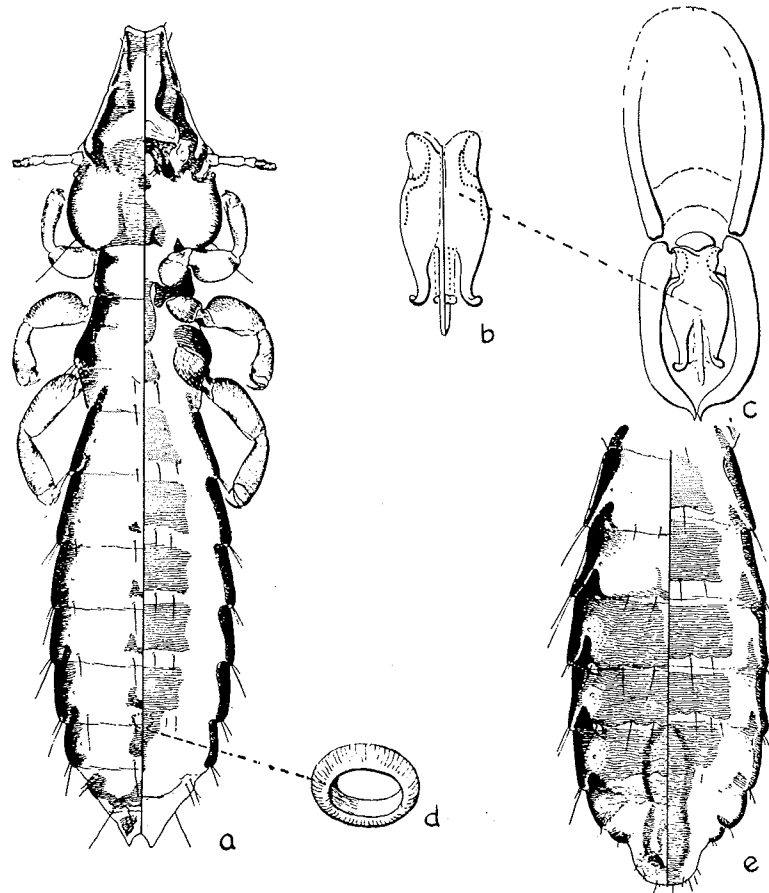


Figure 147—*Quadraceps birostris* (Giebel): a, female; b, endomerical complex of male genitalia; c, male genitalia; d, spermatheca of female; e, abdomen of male, drawn to larger scale than female. (After Ferris, 1932:68.)

Heterocelus (*Heteractitis*) *incanus* (wandering tattler). These two latter records appear to be erroneous. Thompson (1939:122) believes that the coot is the true host.

Genus **QUADRACEPS** Clay and Meinertzhagen

Quadraceps birostris (Giebel) (fig. 147, a-e).

Nirmus birostris Giebel, 1874:174.

Nirmus gloriosus Kellogg and Kuwana, 1902:467, pl. 29, fig. 1, in part.

Degeeriella gloriosa (Kellogg and Kuwana) Harrison, 1916:114. Ferris, 1932:68, fig. 18, a-e.

Degeeriella birostris (Giebel) Bedford, 1936:88.

Laysan.

Indigenous. Widespread. First recorded from Hawaii by Kellogg and Paine in 1910.

Host: *Sterna lunata* (gray-backed tern).

Quadraceps oraria (Kellogg).

Nirmus orarius Kellogg, 1896:104, pl. 5, fig. 104.

Nirmus orarius hawaiiensis Kellogg and Chapman, 1902:159; 1904:310 (type from Kahului, Maui).

Degeeriella oraria (Kellogg) Johnston and Harrison, 1912:368.

Maui.

Indigenous. Widespread. First recorded from the islands in 1902 by Kellogg and Chapman.

Hosts: *Pluvialis* (*Charadrius*) *dominicus fulvus* (plover), *Fulica americana alai* (Hawaiian coot). Thompson (1939:120) says that the plover is the true host.

Quadraceps separata (Kellogg and Kuwana) (fig. 148, a-e).

Nirmus separatus Kellogg and Kuwana, 1902:472, pl. 29, fig. 6.

Nirmus gloriosus Kellogg and Kuwana, 1902:467, pl. 29, fig. 1, in part, through misidentification.

Nirmus gloriosus variety *emarginatus* Kellogg and Chapman, 1902:159 (type from Kahului, Maui); 1904:310.

Degeeriella separata (Kellogg and Kuwana) Harrison, 1916:123. Ferris, 1932:69, fig. 19, a-e.

Maui, Laysan.

Indigenous. Widespread. First recorded from the Territory by Kellogg and Chapman in 1902.

Host: *Anous stolidus pileatus* (noddy tern).

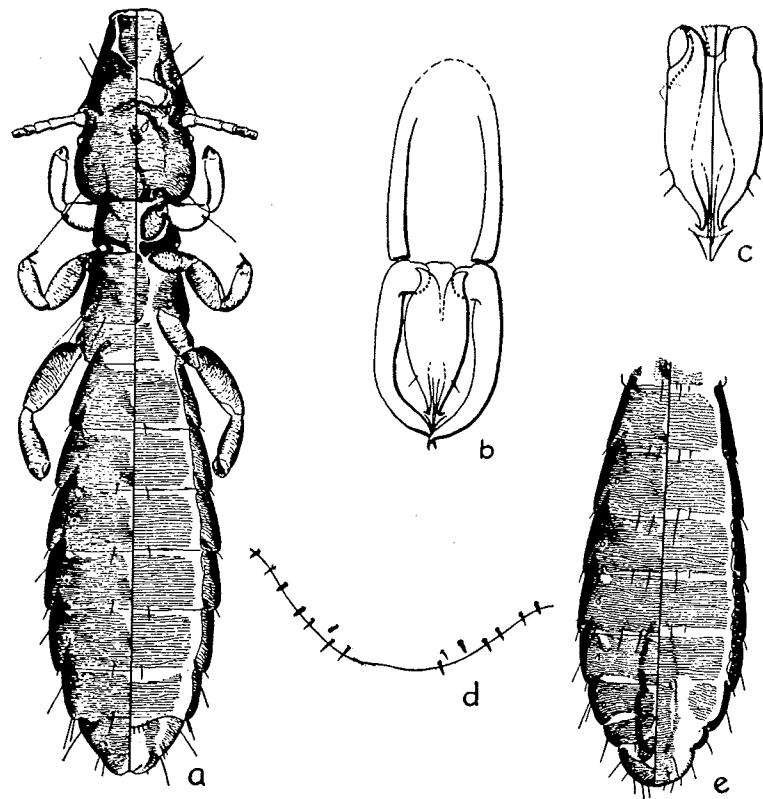


Figure 148—*Quadriceps separata* (Kellogg and Kuwana): a, female; b, male genitalia; c, endomerical complex of male genitalia; d, margin of vulva; e, abdomen of male, drawn to larger scale than female. (After Ferris, 1932:70.)

Genus **BRÜELIA** Kéler, 1936

Brüelia stenozona (Kellogg and Chapman) (fig. 145, e).

Nirmus stenozonus Kellogg and Chapman, 1902:158, pl. 13, fig. 3; 1904:308, pl. 10, fig. 3.

Degeeriella stenozona (Kellogg and Chapman), of authors.

Immigrant(?). Hawaii (type locality: Hilo).

Hosts: *Vestiaria coccinea* ("iwi"), *Munia nisoria* (Chinese sparrow).

Brüelia vulgata (Kellogg).

Nirmus vulgatus Kellogg, 1896:496, pl. 47, fig. 5.

Degeeriella vulgata (Kellogg), of authors.

Oahu, Gardner Island.

Immigrant. Widespread.

Host: *Passer domesticus* (English sparrow).

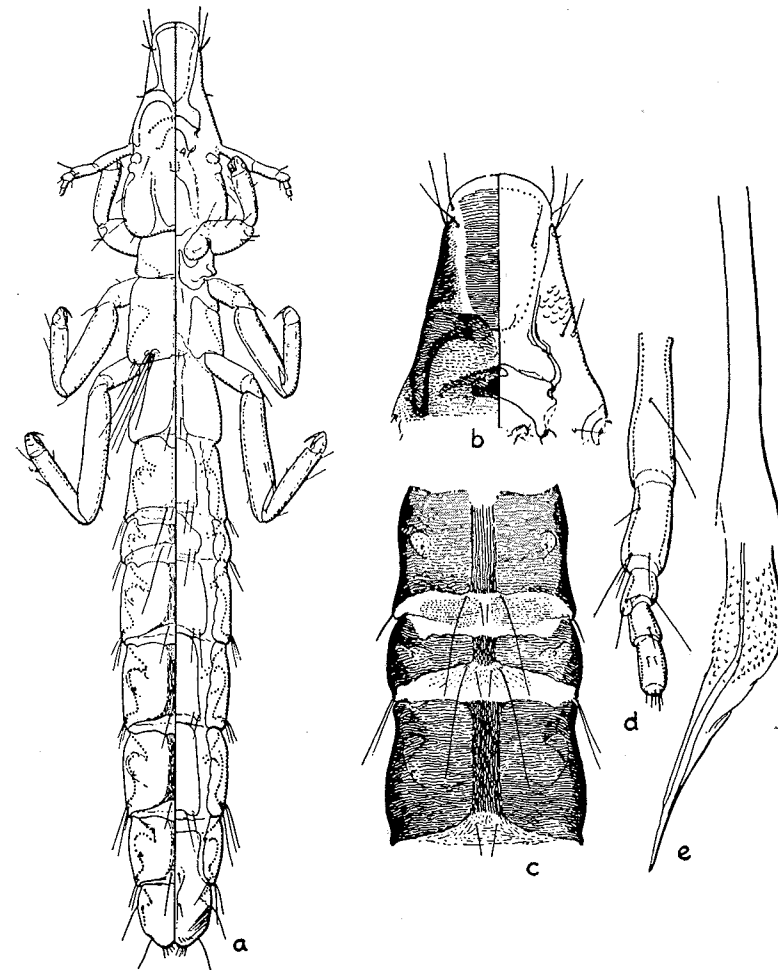


Figure 149—*Pectinopygus (Epifregata) gracilicornis* (Piaget): a, male; b, anterior part of head; c, flexing segment of abdomen; d, antenna of male; e, male genitalia. (After Ferris, 1932:61.)

Genus **PECTINOPYGUS** Mjoeberg, 1910

Thompson (1937:539) redefined this genus.

Pectinopygus (Epifregata) gracilicornis (Piaget) (fig. 149, a-e).

Lipeurus gracilicornis Piaget, 1880:309, pl. 25, fig. 6.

Esthiopterum gracilicornis (Piaget) Ferris, 1932:61, fig. 13, a-e.

Pectinopygus (Epifregata) gracilicornis (Piaget) Thompson, 1937:542.

Laysan, Necker.

Indigenous. First recorded from the leeward Hawaiian islands by Kellogg and Paine in 1910. Widespread.

Hosts: *Fregata minor palmerstoni* (aquila) (frigate bird), *Sterna lunata* (gray-backed tern).

Pectinopygus (Pectinopygus) sulae (Rudow) (fig. 150, a-b).

Lipeurus sulae Rudow, 1870:134.

Lipeurus gracilicornis variety *major* Kellogg, 1899:30, pl. 3, fig. 6.

Lipeurus potens Kellogg and Kuwana, 1902:477, pl. 30, fig. 1.

Pectinopygus (Pectinopygus) sulae (Rudow) Waterston, 1923:289. Ferris, 1932:64, figs. 16, a, b; 17, a-d.

See Thompson, 1939:211, for detailed synonymy.

Laysan, Necker.

Indigenous. First recorded from Laysan by Kellogg and Paine in 1910. Widespread.

Hosts: *Fregata minor palmerstoni* (aquila) (frigate bird), *Sterna lunata* (gray-backed tern), *Sula sula rubripes* (piscator) (red-footed booby).

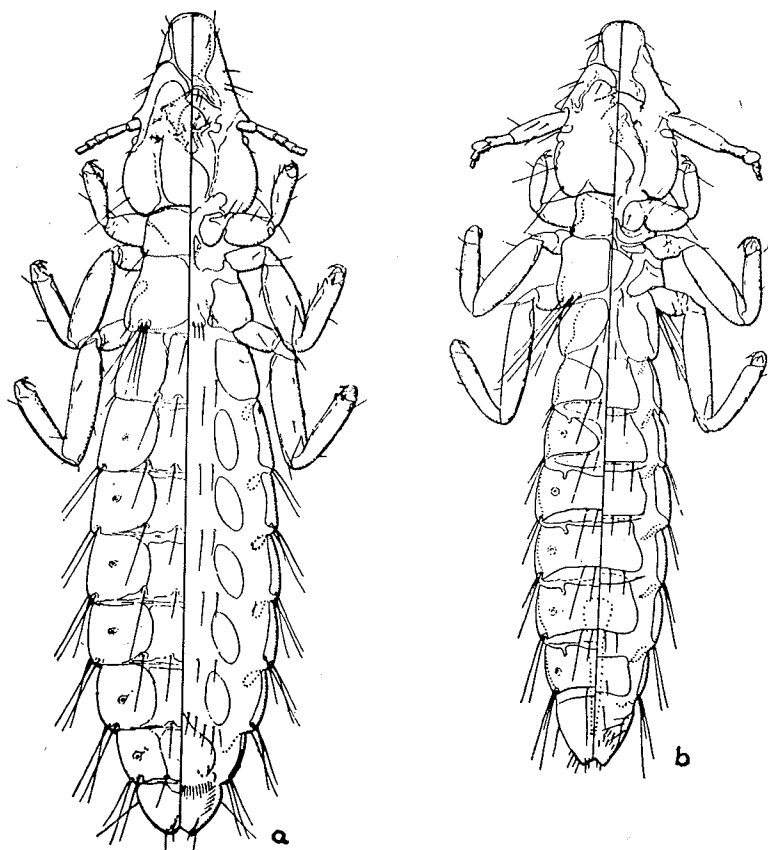


Figure 150—*Pectinopygus sulae* (Rudow): a, female; b, male. (After Ferris, 1932:65.)

Genus **HARRISONIELLA** Bedford, 1929

Harrisoniella ferox (Giebel).

Lipeurus ferox Giebel, 1867:196.

Lipeurus densus Kellogg, 1896:114, pl. 7, figs. 1, 2.

Esthiopterum diomediae (Fabricius) Harrison, 1916:133.

Harrisoniella diomediae (Fabricius) Bedford, 1929:529.

Harrisoniella ferox (Giebel) Clay, 1940:298; see also pp. 299-302 for discussion of synonymy. Fabricius' species *diomediae* is a *Perineus* and distinct from this form.

Laysan.

Indigenous. Widespread. First recorded from the Territory by Kellogg and Paine in 1910.

Hosts: *Diomedea nigripes* (black-footed albatross), *Diomedea (Thalassarche) immutabilis* (Laysan albatross).

Cope (1940:117-142, figs. 54-66) gives a detailed account of the morphology of this species.

Genus **PERINEUS** Harrison, in Thompson, 1936:41

Perineus concinnus (Kellogg and Chapman).

Lipeurus concinnus Kellogg and Chapman, 1899:97, pl. 7, fig. 2.

Perineus concinnus (Kellogg and Chapman) Harrison, 1937:29.

Laysan.

Indigenous. Described from California. First recorded from the Territory by Kellogg and Paine in 1910.

Host: *Diomedea (Thalassarche) immutabilis* (Laysan albatross).

Perineus giganticulum (Kellogg).

Nirmus giganticulum Kellogg, 1896:105, pl. 5, fig. 6.

Lipeurus confidens Kellogg, 1899:26, pl. 3, fig. 1.

Lipeurus miriceps Kellogg and Kuwana, 1902:480, pl. 30, fig. 4.

Perineus confidens (Kellogg) Thompson, 1936:42.

Laysan.

Indigenous. Widespread. First reported from the Territory in 1910 by Kellogg and Paine.

Hosts: *Diomedea nigripes* (black-footed albatross), *Sterna lunata* (gray-backed tern).

Genus **COLUMBICOLA** Ewing, 1929:116

Ewing separated this group of long, slender lice from *Esthiopteron* because the clypeus has on its dorsal surface two pairs of stout spines, one pair directed forward, the other pair directed upward and backward. The first antennal segment is enlarged in the male, is much larger than that of the female, and the third segment has its apex produced into a thumb-like process. The antennae of the female barely attain the hind margin of the head, whereas those of the male distinctly surpass it in length.

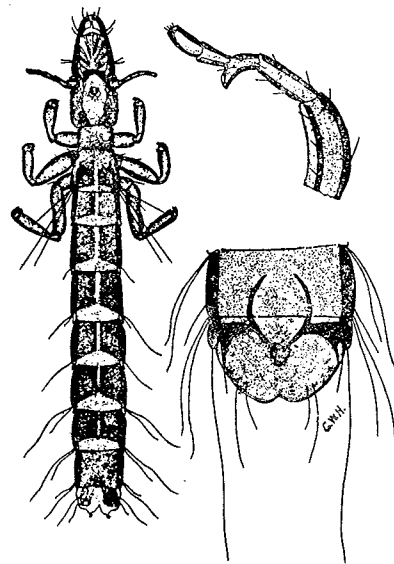


Figure 151—*Columbicola columbae* (Linnaeus), the pigeon louse: female, male antenna and apex of male abdomen. (After Herrick, 1915.)

Columbicola columbae (Linnaeus) (fig. 151).

Pediculus Columbae Linnaeus, 1758:614.

Lipeurus bacillus Nitzsch, 1874:215 (*baculus*, p. 216), pl. 16, figs. 8-9; pl. 20, fig. 3.

Columbicola columbae (Linnaeus) Ewing, 1929:117, fig. 66.

The pigeon louse.

Kauai, Oahu, Maui, Hawaii.

Immigrant. Widespread. First recorded in the Territory by me in 1944 from specimens collected in Honolulu in 1943.

Hosts: *Columba livia* (pigeon), *Geopelia striata striata* (barred-shoulder dove), *Streptopelia (Turtur) chinensis* (Chinese dove).

This is a common species on pigeons, and it may be found most abundantly on the flight feathers of the birds. Sodium fluoride dust will control it.

Martin (1934:6-16) has written an account of the biology of this louse. She found that the lice were dispersed, in part, by attaching themselves to the pigeon louse fly (*Pseudolynchia* [Hippoboscidae]). She reports that the lice feed almost exclusively on feather barbules, that the egg stage is about 4 days, and that the three nymphal instars have a duration of about 6.75 days. She gives illustrations of the eggs, three larval instars and the adult.

In 1938 I collected this species from a native fruit pigeon shot in the jungle of Viti Levu, Fiji.

Genus **LIPEURUS** Nitzsch, 1818***Lipeurus caponis*** (Linnaeus) (fig. 152, a-f).

Pediculus Caponis Linnaeus, 1758:614.

The variable chicken louse.

Kauai, Oahu, Hawaii and probably the other islands.

Immigrant. Cosmopolitan. First recorded from the Territory by Illingworth in 1928 from specimens found in Honolulu in 1926.

Hosts: chicken, *Phasianus colchicus torquatus* (Chinese pheasant).

Control: sodium fluoride dust gives good control.

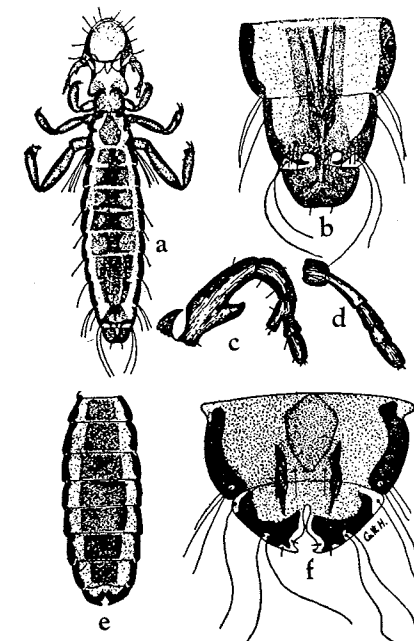


Figure 152—*Lipeurus caponis* (Linnaeus), the variable chicken louse: a, male; b, posterior end of female abdomen; c, male antenna; d, female antenna; e, female abdomen; f, two terminal abdominal segments of female. (After Herrick, 1915.)

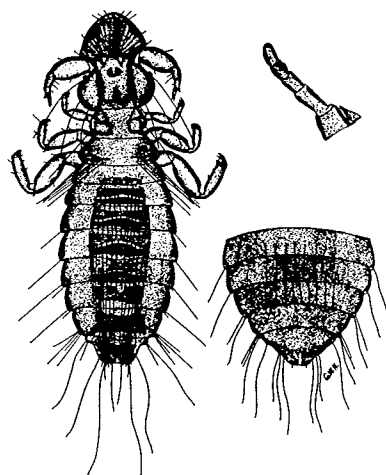


Figure 153—*Cuclotogaster heterographus* (Nitzsch): male, female antenna and end of female abdomen. (After Herrick, 1915.)

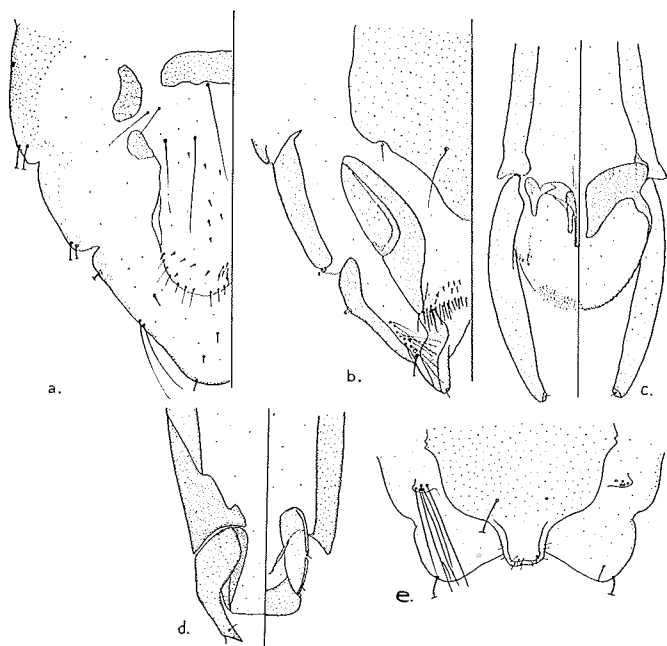


Figure 154—Details of the genitalia of some Mallophaga: a, *Cuclotogaster heterographus* (Nitzsch), posterior segments of female abdomen; b, the same of *Oxylipeurus polytrapezius* (Burmeister); c, genitalia of female of same species; d, *Lagopoecus docophoroides* (Piaget), male genitalia; e, *Oxylipeurus polytrapezius* (Burmeister), posterior abdominal segments of male. (Original drawings loaned by Miss Theresa Clay.)

Genus **CUCLOTOGASTER** Carriker, 1936

Gallipeurus Clay, 1938:135.

Cuclotogaster heterographus (Nitzsch) (figs. 153; 154, a).

Lipeurus heterographus Nitzsch, 1866:381.

Gallipeurus heterographus (Nitzsch) Clay, 1938:136, figs. 15, 16, 17, 18a.

Oahu and probably the other main islands.

Immigrant. Widespread. First recorded from the Territory in 1928 by Illingworth from specimens collected in Honolulu in 1926.

Host: chicken.

The usual control by the use of sodium fluoride is effective.

Genus **OXYLIPEURUS** Mjoeberg, 1910

Oxylipeurus polytrapezius (Burmeister) (figs. 154, b, c, e; 155).

Lipeurus polytrapezius Burmeister, 1838:434.

(*Pediculus galli-pavonis* Geoffroy, 1762:600, new edition, 1799:600, name used in our literature. The true *galli-pavonis* belongs to *Goniodes*; see Clay, 1938:181, pl. 12, fig. 4, text figs. 37a, c, 39b, for explanation.)

The turkey louse.

Oahu and probably other islands.

Immigrant. Widespread. First recorded from the Territory by Illingworth in 1928 from specimens collected in Honolulu in 1926.

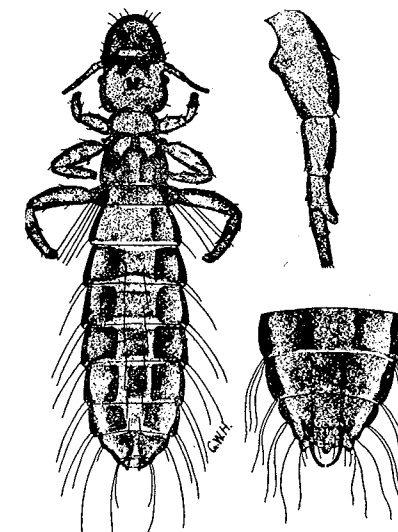


Figure 155—*Oxylipeurus polytrapezius* (Burmeister): female, male antenna and apex of male abdomen. (After Herrick, 1915.)

Host: turkey.

This species may become abundant on the flight feathers. Sodium fluoride dust is recommended for control.

Genus **LAGOPOECUS** Waterston, 1922

Lagopoecus docophoroides (Piaget) (fig. 154, d).

Lipeurus docophoroides Piaget, 1880:351, pl. 28, fig. 9.

Lipeurus docophoroides variety *minhaensis* Kellogg and Chapman, 1902:159; 1904:310. Described from Lahaina, Maui. First record for Hawaii.

Lipeurus minhaensis (Kellogg and Chapman) Thompson, 1939:16. Synonymy by Clay, 1938:195, fig. 43d.

Maui.

Immigrant. Described from California.

Host: Kellogg and Chapman gave the host as *Acridotheres tristis*, the mynah, but this must have been recorded from a straggler. The true host is evidently the quail. It was described from the California quail, *Lophortyx californica californica*. I have no further notes on this species.

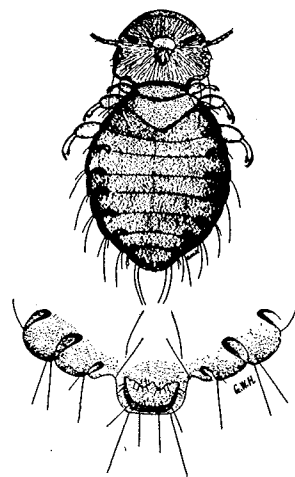


Figure 156—*Goniocotes hologaster* (Nitzsch), the fluff louse; male, above; enlarged sketch of apex of female abdomen, below. (After Herrick, 1915.)

Genus **GONIOCOTES** Burmeister, 1838

The members of this genus, together with those of *Goniodes*, have a characteristic, broad appearance. Most of the species are found on gallinaceous and columbine birds.

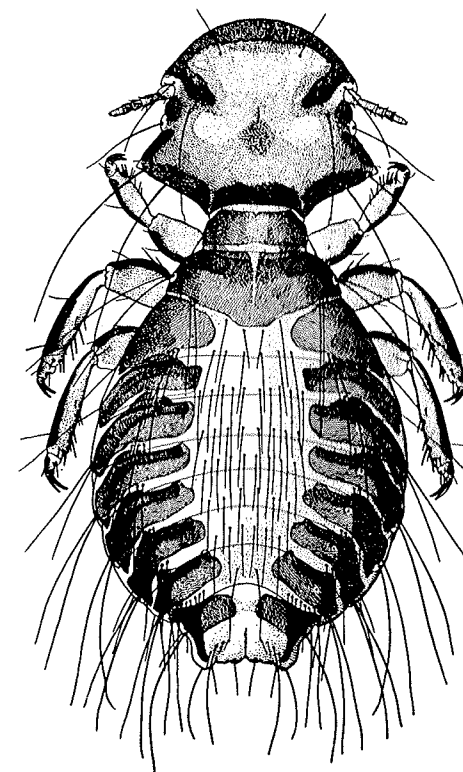


Figure 157—*Goniodes dissimilis* Denny, female. (After Clay, 1940; drawing by Terzi.)

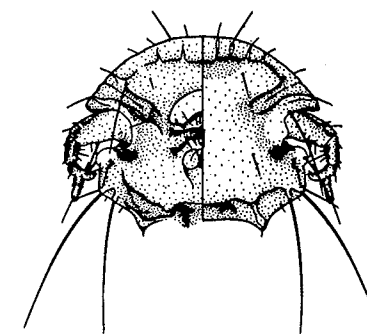


Figure 158—*Goniodes dissimilis* Denny, head of male. (After Clay, 1940.)

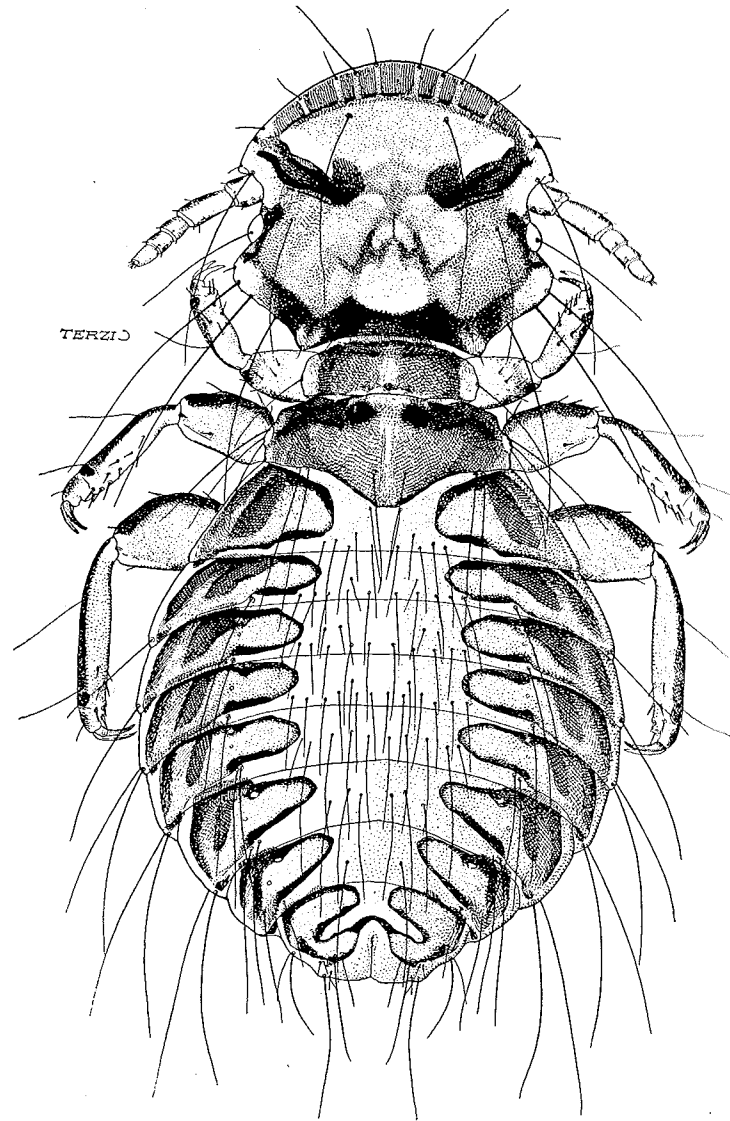


Figure 159—*Goniodes gigas* (Taschenberg), the large chicken louse, female. (After Clay, 1940.)

Goniocotes chinensis Kellogg and Chapman (fig. 145, f).

Goniocotes chinensis Kellogg and Chapman, 1902:160, pl. 13, fig. 5; 1904:311, pl. 10, fig. 5.

Kauai, Maui (type locality: Kahului), Hawaii.

Immigrant, but not recorded elsewhere.

Hosts: *Streptopelia (Turtur) chinensis* (Chinese dove), *Geopelia striata striata* (barred-shoulder dove).

Goniocotes hologaster Nitzsch (fig. 156).

Goniocotes hologaster Nitzsch, 1838:431.

The fluff louse.

Oahu, Hawaii and probably on the other islands.

Immigrant. First recorded from the Territory by Illingworth in 1928 from specimens collected in Honolulu in 1926.

Hosts: chicken, turkey, *Phasianus colchicus torquatus* (Chinese pheasant).

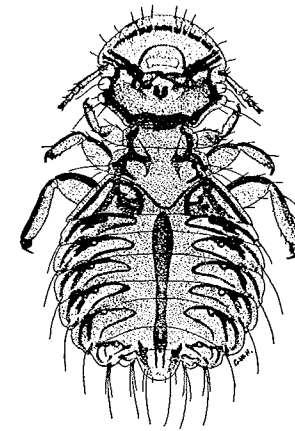


Figure 160—*Goniodes gigas* (Taschenberg) male. (After Herrick, 1915.)

Genus **GONIODES** Nitzsch, 1818

The members of this genus, like those of *Goniocotes*, are partial to gallinaceous birds.

In addition to the following four species, *Goniodes pavonis* (Linnaeus), on peafowl, may also be found in Hawaii, but it has not yet been recorded here.

Goniodes dissimilis Denny (figs. 157, 158).

Goniodes dissimilis Nitzsch, 1818:294.

Goniodes dissimilis Denny, 1842:57, 162, pl. 12, fig. 6. Clay, 1940:62, figs. 41-43.

Oahu.

Immigrant. Widespread. Not recorded from the Territory heretofore, but I have specimens before me which were taken from a chicken in Nuuanu Valley in 1932 and kindly identified for me by Mr. G. B. Thompson.

The illustrations serve to distinguish this species easily from *G. gigas*, the other *Goniodes* occurring on chickens in Hawaii. The third antennal segment of the male of this species has a prominent process, whereas that of *gigas* has no process.

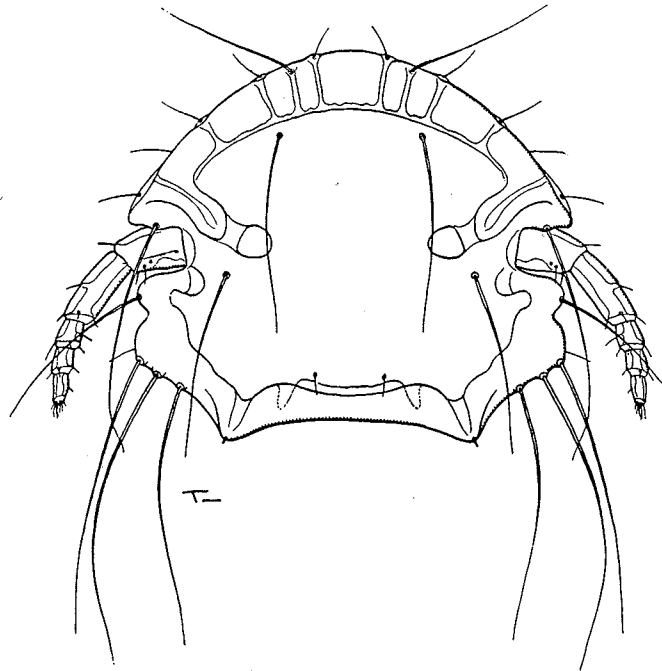


Figure 161—*Goniodes gigas* (Taschenberg), head of male. (After Clay, 1940.)

Goniodes gigas (Taschenberg) (figs. 159, 160, 161).

Goniocotes gigas Taschenberg, 1879:104, pl. 1.

Goniodes gigas (Taschenberg) Clay, 1940:33, figs. 21–22.

The large chicken louse.

Kauai, Oahu, and probably on the other main islands.

Immigrant. Widespread. First recorded from Hawaii by Illingworth in 1928 from specimens collected at Waipio, Oahu, in 1926.

Hosts: guinea fowl, domestic chicken. Thompson (1938:188) and Clay (1940:33) say that the guinea fowl is the normal host.

Goniodes lativentris Uchida.

Goniodes lativentris Uchida, 1916:81, figs. 1, 2.

Oahu.

Immigrant. Described from Japan. First found in Hawaii in 1945 by a member of the armed forces, but not recorded in Hawaiian literature heretofore.

Host: "dove." (The dove the Hawaiian specimens were obtained from was either *Streptopelia chinensis* or *Geopelia striata*; I do not know which).

Goniodes mammillatus Rudow (fig. 162, a–c).

Goniodes mammillatus Rudow, 1870:483. Clay, 1940:60, fig. 40.

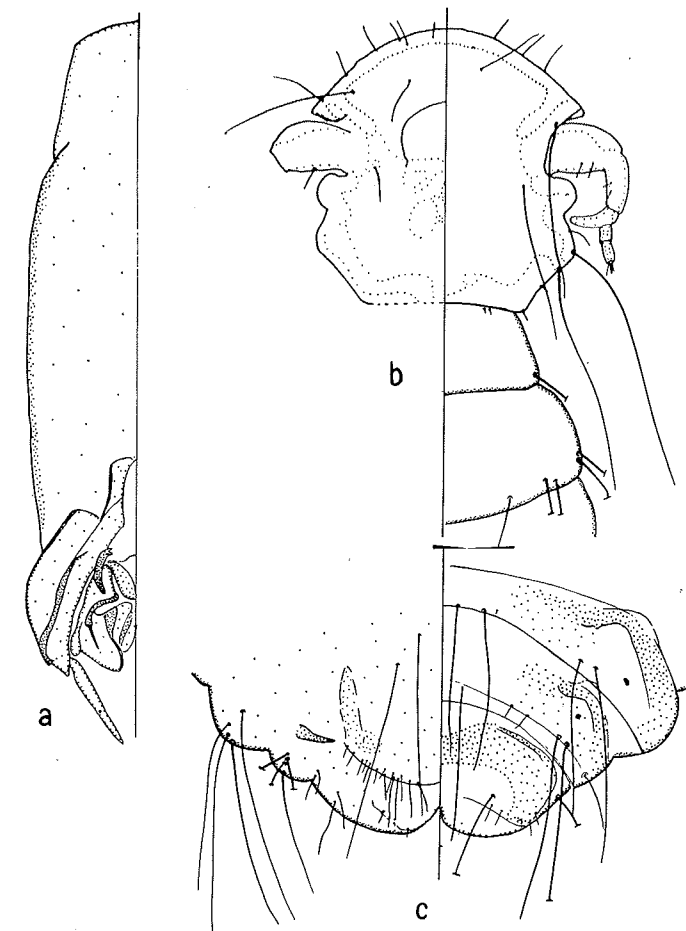


Figure 162—*Goniodes mammillatus* Rudow; a, male genitalia; b, head and thorax; c, apex of female abdomen. (Original drawings loaned by Miss Theresa Clay.)

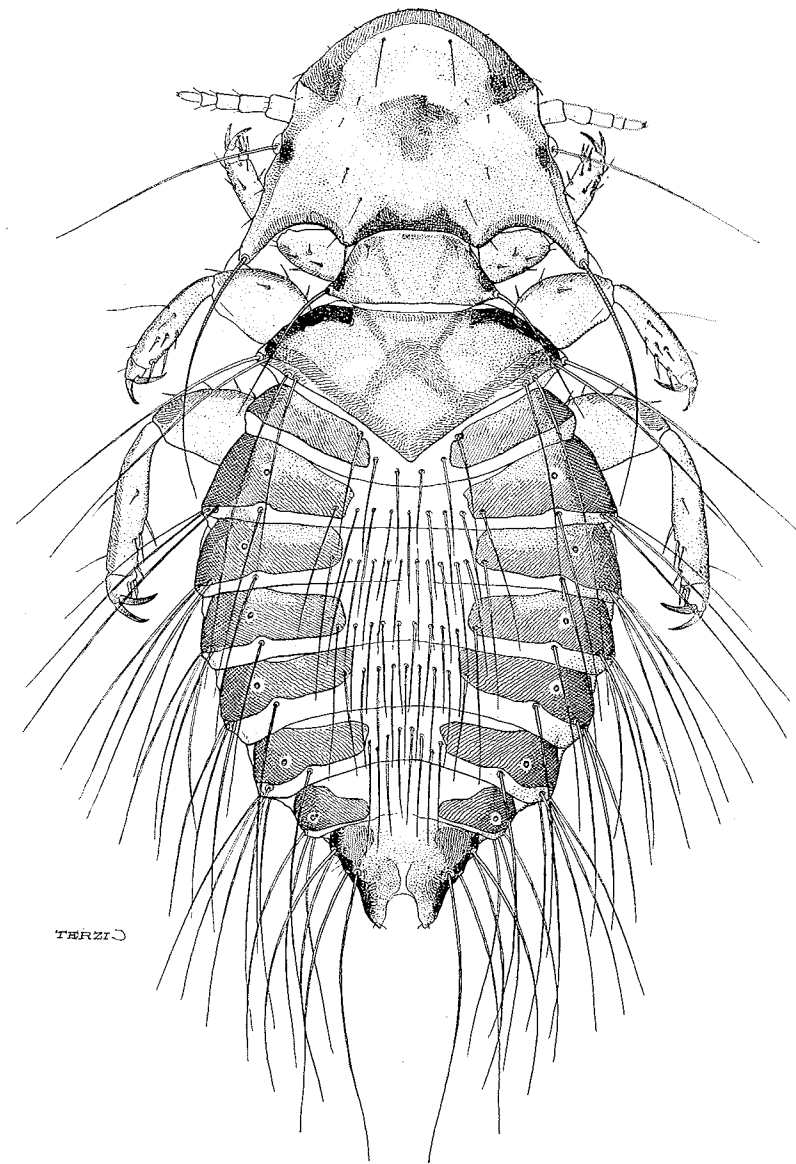


Figure 163—*Chelopistes meleagridis* (Linnaeus), the large turkey louse, female. (After Clay, 1941; cut loaned by *Parasitology*.)

Hawaii.

Immigrant. Widespread. First recorded from the Territory by me in 1943 (1944:200) from specimens collected by Paul Baldwin in Hawaii National Park in 1938. Described from Europe.

Host: *Lophortyx californica vallicola* (California valley quail). Essig (1929) records it from grouse and ptarmigans in western North America. I have seen an example from a pheasant from Hawaii.

Genus **CHELOPISTES** Kéler, 1939:180

Virgula Clay, 1941:119.

Chelopistes meleagridis (Linnaeus) (figs. 163; 164; 165, a-b; 166, a-c).

Pediculus Meleagridis Linnaeus, 1758:613.

Goniodes stylifer Nitzsch, 1838:432. Genotype of *Chelopistes*.

Virgula meleagridis (Linnaeus) Clay, 1941:119, figs. 1-4.

The large turkey louse.

Oahu, Molokai.

Immigrant. Widespread; described from Europe. First recorded from the Territory by Van Dine in 1909 from material collected on Molokai.

Hosts: turkey, chicken.

This common louse of turkeys will yield to control by sodium fluoride dust.

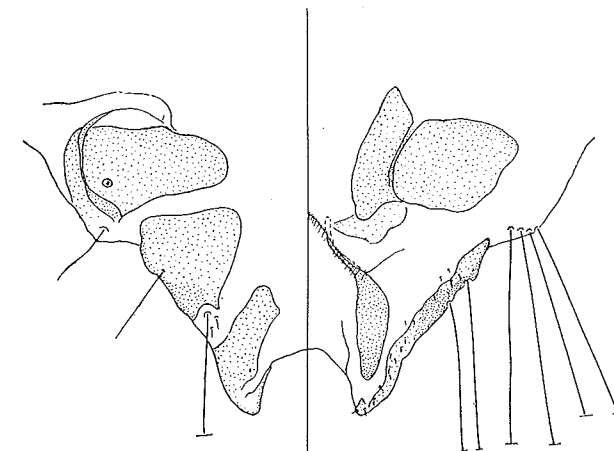


Figure 164—*Chelopistes meleagridis* (Linnaeus), terminal abdominal segments of female. (After Clay, 1941; cut loaned by *Parasitology*.)

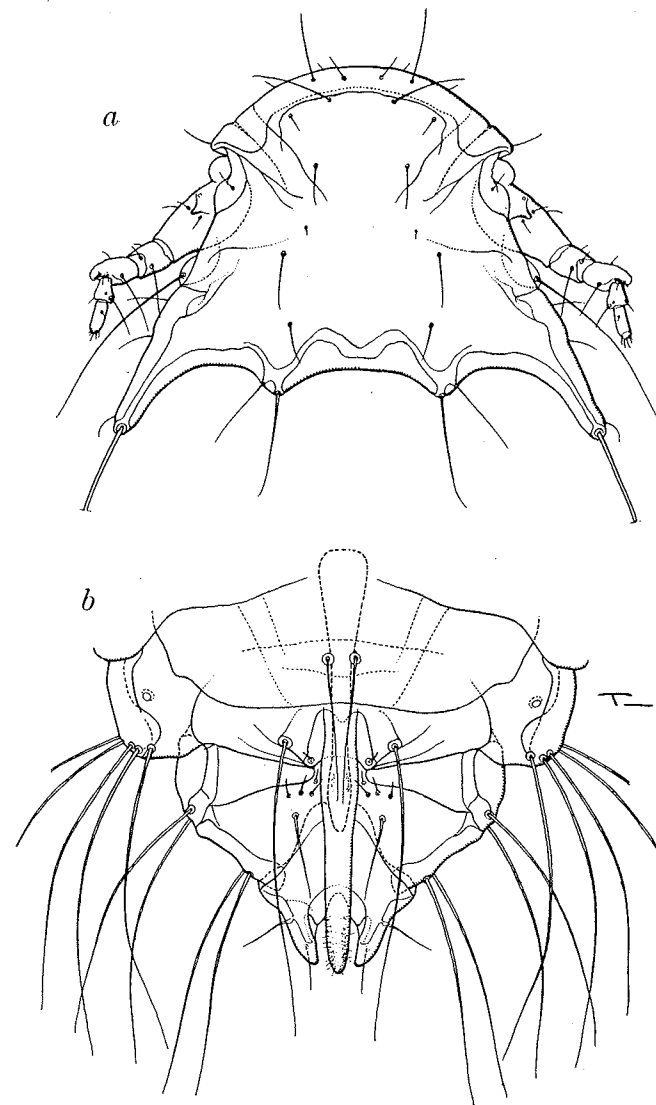


Figure 165—*Chelopistes meleagridis* (Linnaeus), male: a, head; b, terminal abdominal segments. (After Clay, 1941; cut loaned by *Parasitology*.)

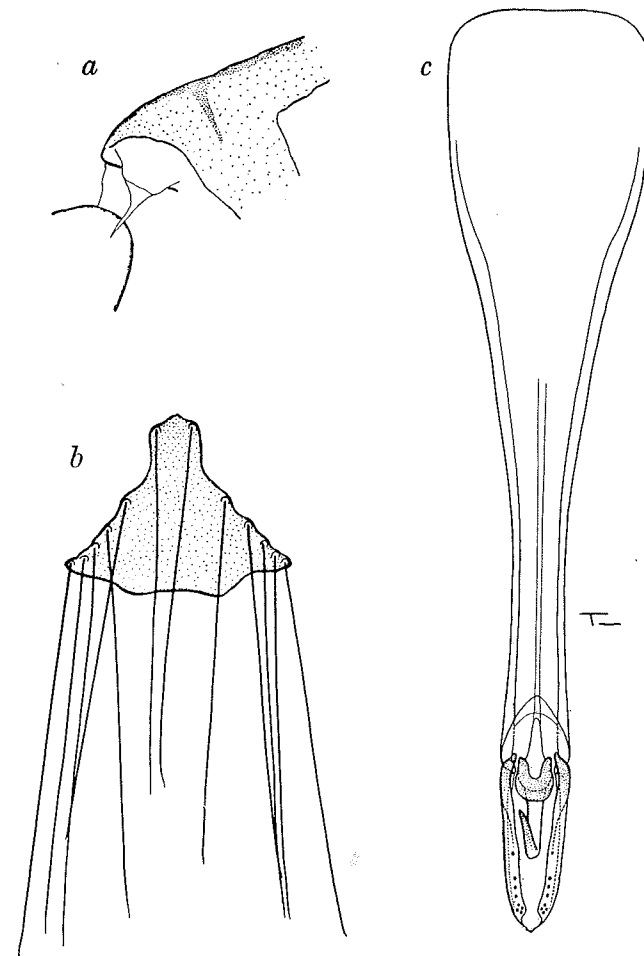


Figure 166—*Chelopistes meleagridis* (Linnaeus), details of male: a, clavi; b, sternal thoracic plate; c, genitalia. (After Clay, 1941; cut loaned by *Parasitology*.)

SPECIES INCERTAE SEDIS

The following two species appear not to belong to the genera to which they have been assigned. The types must be examined before they can be placed in systematic order.

Degeeriella (?) *diaprepes* (Kellogg and Chapman) (fig. 167).

Nirmus diaprepes Kellogg and Chapman, 1902:158, pl. 13, fig. 4; 1904:309, pl. 10, fig. 4.

Degeeriella diaprepes (Kellogg and Chapman) Thompson, 1939:75.

Endemic (?). Hawaii (type locality: Hilo).

Host: *Vestitaria coccinea* ("iiwi").

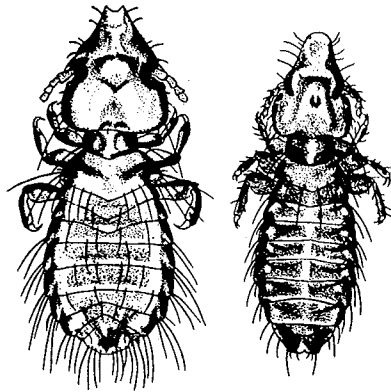


Figure 167—*Degeeriella* (?) *diaprepes* (Kellogg and Chapman), male, left; *Degeeriella* (?) *minhaensis* (Kellogg and Chapman), female, right. (Rearranged from Kellogg and Chapman, 1904.)

Degeeriella* (?) *minhaensis (Kellogg and Chapman) (fig. 167).

Nirmus minhaensis Kellogg and Chapman, 1902:157, pl. 13, fig. 2; 1904:307, pl. 10, fig. 2.

Degeeriella minhaensis (Kellogg and Chapman) Thompson, 1939:120.

Maui (type locality: Lahaina).

Immigrant; status uncertain.

Host: *Acridotheres tristis* (mynah).

While this volume was in proof, "Mallophaga Collected by the Tanager Expedition" by G. B. Thompson (1948) has come to hand. It includes several species new to Hawaii, as follows:

Austromenopon (?) *infrequens* (Kellogg, 1896), Pearl and Hermes Reef, on *Laurus hyperboreus*. *Austromenopon sternophilum* (Ferris, 1932), Laysan, on *Anous stolidus pileatus*. *Actornithophilus milleri* (Kellogg and Kuwana, 1902), Laysan, on *Anous stolidus pileatus*. *Longimenopon puffinus* Thompson (a new genus and species), Laysan, on *Puffinus pacificus cuneatus* and *Puffinus nativitatis*. *Saemundssonina* (?) *gonothorax* (Giebel, 1871), Pearl and Hermes Reef, on *Laurus hyperboreus*. *Lanaceps* species (?), Laysan, on *Numenius tahitiensis*. *Halipeurus mirabilis* Thompson, 1940, Laysan, on *Puffinus pacificus cuneatus* and *Diomedea nigripes*. *Harrisoniella* species (?), Laysan and Ocean Islands, on *Diomedea immutabilis* and *Diomedea nigripes*. *Giebelia* (?) *mirabilis* Kellogg, 1896, Laysan, on *Puffinus pacificus cuneatus*. *Docophoroides* species (?), Laysan, on *Diomedea immutabilis*.

The bibliography for this section is combined with that of the Anoplura and appears at the end of the section on Anoplura (p. 315).

Order ANOPLURA Leach, 1815

(*anoplus*, unarmed; *oura*, tail)

Sucking Lice

Aptera Linnaeus, 1758, in part.

Parasita Latreille, 1802, in part.

Anoplura Leach, 1815.

Siphunculata Latreille, 1825.

Pediculina Burmeister, 1835.

Pediculida Mayer, 1876.

Polyptera Banks, 1892.

Pediculoidea Crampton, 1921.

Hemiptera, suborder *Parasita*, Comstock and Comstock, 1895.

Hemiptera, suborder *Parasitica*, Osborn, 1923.

Psocoidea Weber, 1939, in part.

According to the law of priority, the correct name for this order appears to be *Parasita* Latreille, as has been recently pointed out by Essig (1942:202). However, the term *Anoplura* has been in use for so long that perhaps more confusion than uniformity would result from the usage of *Parasita* in place of *Anoplura*. The term *Anoplura* should probably be stabilized through the provision made by the International Rules for Zoological Nomenclature for *nomina conservanda*.

Body elongate, depressed, soft, but integument tough. Head prognathous, exposed mouth parts retractile, highly modified for piercing skin and sucking blood, haustellum present, mandibles obsolete, palpi absent, maxillae and labium greatly modified into dorsal and ventral piercing stylets, labrum inverted as the roof of the fore part of the buccal cavity, hypopharynx tube-like, enclosing the salivary duct; antennae short, exposed, filiform, three- to five-segmented; eyes present or absent, reduced if present; ocelli absent. Thorax usually small, segmentation obscure or obsolete, with one or more pairs of dorsal spiracles. Wings or wing rudiments absent. Legs strongly modified for grasping hair of hosts, with single-segmented tarsi bearing single claws. Abdomen apparently nine-segmented; cerci absent; spiracles on segments three to eight or two to eight; male genitalia well developed, comparatively simple; female genitalia without an ovipositor, but with a pair of gonopods used in placing the eggs on hairs at oviposition. Eggs (called nits) normally cemented singly to hairs of host; metamorphosis absent; four instars. Bloodsucking, permanent, obligatory, ectoparasites of mammals exclusively. Size range from 0.25 mm. in a species from American flying squirrels to over 6 mm. in a species from an African wart hog.