

Synopsis and Classification of Living Organisms

MALLOPHAGA

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Order of small, wingless, dorsoventrally flattened, oval or elongated insects, obligate parasites on birds and mammals;

they are commonly called chewing lice. Usually these lice are strongly chitinized and colored white, yellow, brown, or

black, or a combination thereof, to match the color of the feathers or fur of the host. The antennae are exposed, partially exposed, or concealed, with a maximum of five segments. Chewing mouthparts with ventral mandibles are present, except in the suborder Rhynchophthirina. The thorax may be modified so that the mesothorax and the metathorax are fused into a pterothorax. There is one pair of thoracic spiracles. At most, six pairs of abdominal spiracles are present. The legs are short and well developed, and possess or lack claws. Usually there are distinct abdominal tergal, sternal, and pleural plates. The prominent male genitalia are eversible. The large eggs are usually guided onto the fur or feathers of the host by lobelike structures on the terminal abdominal segments of the female.

AMBLYCERA

Small to large Mallophaga with a four- or five-segmented antenna; the third segment is pedunculate. Two- or four-segmented filiform maxillary palpi are present. The mandibles are small. The prothorax is prominent. The mesothorax and metathorax may be separated or fused together. One or two tarsal claws are present on each leg. Patches or combs of small setae may be found on the abdominal segments and femora of some species. There are five or six pairs of abdominal spiracles. The male genitalia are large. The female may or may not have an anal corona of setae. Amblycerans are found worldwide as parasites on mammals and birds. They usually roam freely on the body of the host and seldom attach firmly to the fur or feathers.

The suborder contains 7 families: Menoponidae, Laemobothriidae, Ricinidae, Boopidae, Trimenoponidae, Abrocomophagidae, and Gyropidae.

Menoponidae. Family of small to large (1.1–6.0 mm) amblyceran Mallophaga with a four- or five-segmented antenna. There are two sensilla coeloconica (sense organs). Labial palpi are present. The maxillary palpi are four-segmented. The head possesses or lacks heavy spines arising near the base of the palpi. The dorsal portions (pronotum, mesonotum, and metanotum) of the thoracic integuments are separated. Coxa I is elongated anteroposteriorly. There are two claws on each leg. Tergum I is not fused with the metanotum. Patches or combs of small setae are found on the abdominal segments and femora of some species. There are six pairs of abdominal spiracles. The female usually has an anal corona of setae. The male genitalia are asymmetrical in some species. [See illustration page 412.]

The family contains 69 genera found worldwide on most species of birds. Species of several genera live inside the quills of the primary feathers. Species of *Plagatiella* live inside the pouches of pelicans and cormorants. Most species live on the body of the host and roam freely among the feathers. Some species are known to consume blood and serum from wounds made by the lice, but most feed on the feathers. Some species can become a serious pest on domestic fowls. All degrees of host specificity are found with species of the family.

References. T. Clay, A key to the genera of the Menoponidae (Amblycera: Mallophaga: Insecta). *Bull. Brit. Mus., Entomol.*, 24:1–26, 1969.

Laemobothriidae. Monogeneric (*Laemobothrion*) family with 2 subgenera. Members are the largest (6.5–11.0 mm) known of the amblyceran Mallophaga, with a four-segmented antenna enclosed in bulbous capsules which open

The life cycle consists of the egg stage, three nymphal instars, and the adult. Distribution is limited to that of the hosts each species lives on; host specificity varies. The role of these lice in the transmission of diseases is not known for most species. Heavy infestations cause economic losses in domestic birds and mammals. Mallophaga do not live or feed on humans and to date have not been known to transmit or carry any human disease.

The order contains 3 suborders: Amblycera, Ischnocera, and Rhynchophthirina.

References. G. H. E. Hopkins and T. Clay, *A Check List of the Genera and Species of Mallophaga*. British Museum of Natural History, London, 1952.

ventrally. There are three sensilla coeloconica (sense organs). Labial palpi are present. The maxillary palpi are four-segmented. The mouthparts are well developed. Coxa I is elongated anteroposteriorly. The dorsal portions of the mesothoracic and metathoracic integuments (mesonotum and metanotum) are fused. There are six pairs of abdominal spiracles. The male genitalia are large and symmetrical. There are two claws on each leg. The venter of the third femur and some sternites have patches of minute hairs (microtrichia). Tibiae II and III have a terminal dorsal patch of microtrichia located distally and an anterior patch of smaller microtrichia. An area of sculpturing occurs on the temples (posterolateral angles of the head), with outer rows of peglike projections. There is no anal corona of setae on the female.

The subgenus *Laemobothrion*, consisting of 4 species found on birds of the order Falconiformes, is easily recognized by the straight or convex anterior margin of the forehead. The subgenus *Eulaemobothrion*, consisting of 7 species found on birds of the orders Podicipitiformes, Ciconiiformes (only Threskiornithidae), Galliformes (only Opisthocomidae), and Gruiformes (only Rallidae, Aramididae, and Psophiidae), is recognized by the concave or indented anterior margin of the forehead, which has several stout, spinelike setae. *Laemobothrion tinunculi* is found on all species of falcons, and no falcon is host to another species of *Laemobothrion*. This host specificity pertains to all *Laemobothrion* species. Populations are usually small on an individual host. Laemobothriids feed on feathers, mites, and smaller amblyceran Mallophaga.

References. T. Clay and G. H. E. Hopkins, The early literature on Mallophaga (part IV, 1787–1818). *Bull. Brit. Mus., Entomol.*, 9:1–61, 1960; R. C. Nelson and R. D. Price, The *Laemobothrion* (Mallophaga: Laemobothriidae) of the Falconiformes. *J. Med. Entomol.*, 2:249–257, 1965.

Ricinidae. Large and medium-sized (1.6–5.5 mm) amblyceran Mallophaga with a four-segmented antenna enclosed in capsules which open ventrally. There are two sensilla coeloconica (sense organs). The maxillary palpi are four-segmented. The mouthparts are reduced and modified for piercing and sucking. Coxa I is elongated anteroposteriorly. There are six pairs of abdominal spiracles. The dorsal portions of the mesothoracic and metathoracic integuments (mesonotum and metanotum) and first abdominal tergum are fused together. An anal corona of setae is present on the female. The male genitalia are short, broad, and symmetrical. There are two claws on each leg. There are no labial palpi.

The family includes 3 genera. The genus *Ricinus* is found worldwide on birds in 28 families of Passeriformes. The

genera *Trochiloectes* and *Trochiliphagus* are found only on hummingbirds. Host specificity within *Ricinus* varies according to species; some are monoxenous, others are oligoxenous, and many are polyxenous. All species of *Trochiloectes* and *Trochiliphagus* are monoxenous. Distribution of hosts and host specificity of parasite species limit distribution of each species of Ricinidae. These parasites are usually found on the apterial regions of the neck, sides, or back of the host. They slide slowly sideways between feathers when disturbed or to avoid capture during preening. Populations on healthy birds are small. Birds unable to preen often have large populations. Species of Ricinidae feed on the blood and serum of the host and on mites found on the host. There is no evidence that they feed on feathers as most Mallophaga do.

References. M. A. Carriker, Studies in Neotropical Mallophaga. XVII: A new family (Trochiliphagidae) and a new genus of the lice of hummingbirds. *Proc. U.S. Nat. Mus.*, 112:307-342, 1960; B. C. Nelson, A revision of the New World species of *Ricinus* (Mallophaga) occurring on Passeriformes (Aves). *Univ. Calif. (Berkeley) Publ. Entomol.*, 68: 1-75, 1972; G. Rheinwald, Die Mallophagengattung *Ricinus* DeGeer, 1778 (Revision der aussamerikanischen Arten). *Mitt. Hamburg. Zool. Mus. Inst.*, 65:181-326, 1968.

Boopidae. Medium to large (1.30-3.14 mm) amblyceran Mallophaga with a five-segmented clavate antenna. There are two sensilla coeloconica (sense organs). Prominent two- or four-segmented maxillary palpi are present. Small chewing mouthparts are present. The head possesses or lacks horn-shaped projections or heavy spines. The mesothorax is free, is usually smaller than the prothorax or metathorax, and has a pair of spines on the dorsal surface (notum). The mesosternum has prominent spines or setae beneath the mesonotum. The second coxa is located between the prothorax and the mesothorax. There are two claws on each leg. Six pairs of abdominal spiracles are present. The male genitalia are large and symmetrical. Usually there is no anal corona of setae on the female.

The family contains 9 genera: *Boopia*, *Dendrolagia*, *Heterodoxus*, *Latumcephalum*, *Paraboopia*, *Paraheterodoxus*, *Phacogalia*, *Therodoxus*, and *Macropophila*. *Heterodoxus spiniger* is found on species of Canidae through much of the world, and sometimes may be a problem on domestic dogs. All other species are found on marsupials of Australia and New Guinea. Boopids apparently feed on the fur of the host. The degree of host specificity is unknown for most species.

References. S. Keler, A revision of the Australian Boopidae (Insecta: Phthiraptera), with notes on the Trimenoponidae. *Aust. J. Zool. Suppl. Ser.*, 6:1-126, 1971.

Trimenoponidae. Small and medium-sized (0.8-2.1 mm) amblyceran Mallophaga with or without prominent spines on the lateral margins of the forehead. There is a four-segmented exposed antenna. Labial palpi and small chewing mouthparts are present. The prothorax is as large or larger than the prothorax. The legs are similar and almost of equal size. There are two claws on each leg. Five pairs of abdominal spiracles are present. The female has a small, inconspicuous anal corona of setae. The male genitalia are symmetrical, except in the genus *Trimenopon*.

All species of the family are found only on small neotropical mammals. The genus *Trimenopon* contains 1 species found on domestic and wild guinea pigs of the genus *Cavia*. The genus *Harrisonia* contains 1 species found on spiny rats of the genera *Proechimys*, *Diplomys*, and *Hoplomys*. Future

collections may find *Harrisonia* on other species in the mammalian family Echimyidae, as members of this genus are never abundant on a host. *Harrisonia* has prominent spines which are protrusions of the lateral margins of the forehead. The genus *Philandesia* contains 3 species found on chinchillas of the genera *Lagidium* and *Chinchilla*. *Hoplomysphilus* contains 1 species found on spiny rats of the genus *Hoplomys*. *Chinchillophaga* contains 1 species found on the mara (*Dolichotis patagonum*). The genus *Cummingsia* contains 4 species found on opossums of the genera *Monodelphia* and *Marmosa* and the mouse *Thomasomys cinereiventer*. *Cummingsia* species have either one or two pairs of prominent spines ventrally on the head. All species of the family feed on fur of the host they live on.

References. K. C. Emerson and R. D. Price, Mallophaga of Venezuelan mammals. *Brigham Young Univ. Sci. Bull., Biol. Ser.*, 20:1-77, 1975.

Abrocomophagidae. Monospecific (*Abrocomophaga chilensis*) family of small (0.95-1.14 mm) amblyceran Mallophaga with an exposed four-segmented antenna. The maxillary palpi are four-segmented. Normal chewing mouthparts are present. The legs are all approximately the same size. The dorsal portions of the mesothoracic and metathoracic integuments (mesonotum and metanotum) are not fused. There are two large thoracic sternal plates, the anterior one representing the fused prosternum and mesosternum. Five pairs of abdominal spiracles are present. One claw is on each leg.

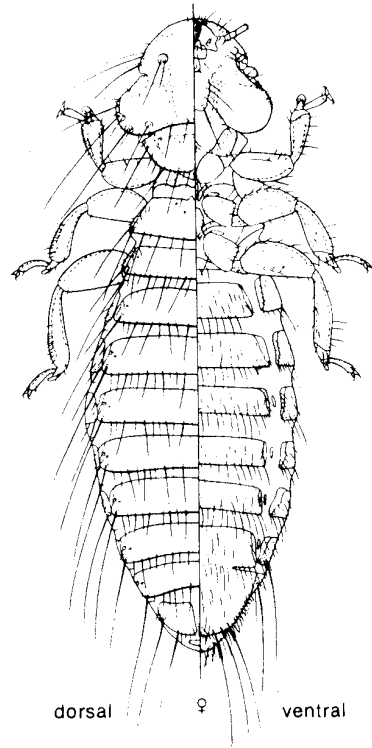
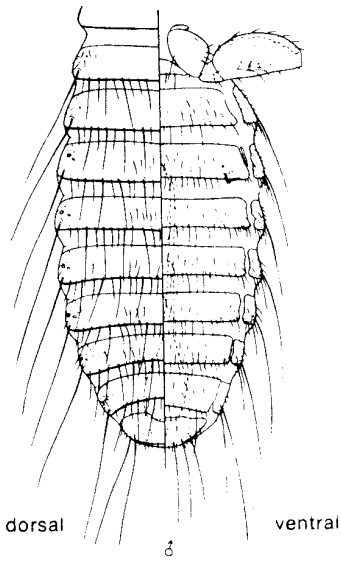
This family was erected for the recently discovered *Abrocomophaga chilensis*, which was collected from the rat chinchilla, *Abrocoma bennetti*, in Chile. Recently the same species was also found on the bush rat, *Octodon degus*, in the same area of Chile. It is not known whether distribution extends beyond southern Chile and the two hosts listed. The mouthparts and gut contents suggest that *A. chilensis* feeds entirely on the fur of the host.

References. K. C. Emerson and R. D. Price, Abrocomophagidae (Mallophaga: Amblycera), a new family from Chile. *Fla. Entomol.*, 59:425-428, 1976.

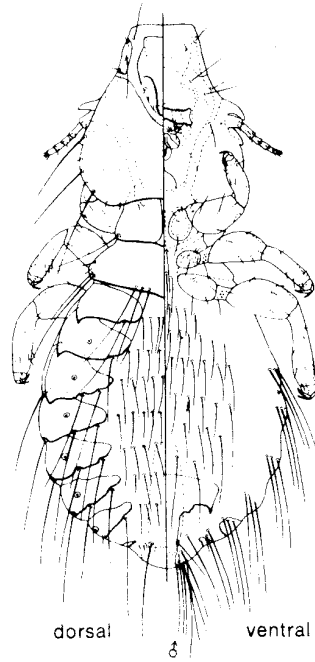
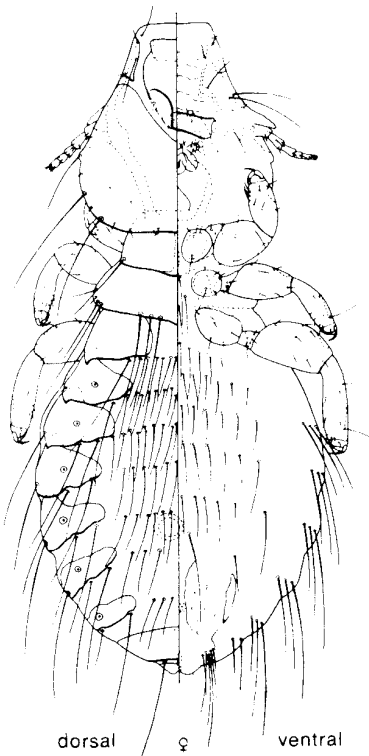
Gyropidae. Amblyceran mallophagan family containing 3 subfamilies with significant morphological differences.

The subfamily Protogyropinae contains a single species, *Protogyropus normalis*, found on *Caviella australis* in Argentina. This species has a four-segmented exposed antenna. Three-segmented maxillary palpi are present; there are also labial palpi. The dorsal portions of the mesothoracic and metathoracic integuments (mesonotum and metanotum) are fused. Abdominal tergum I is fused with the pteronotum. Each leg has a single claw. There are six pairs of abdominal spiracles. The male genitalia are symmetrical. The female lacks an anal corona of setae. Members of this species are less than 1.0 mm in length.

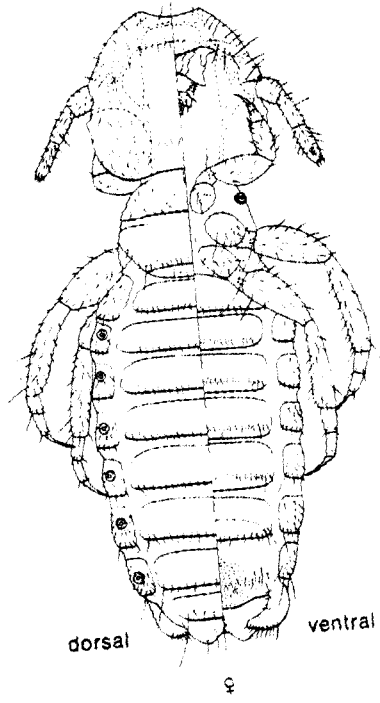
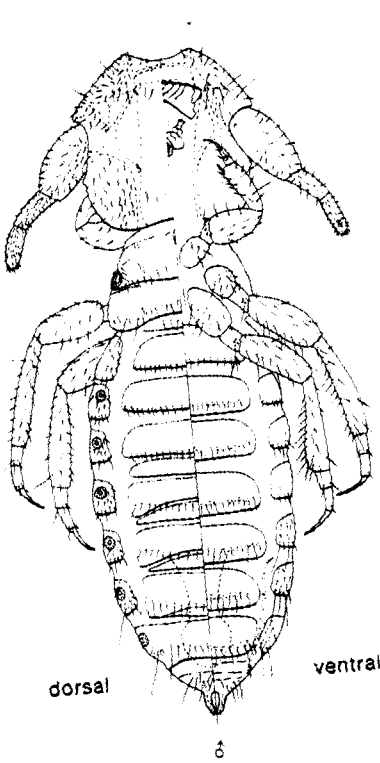
The subfamily Gyropidinae contains the genera *Aotiella*, *Gyropus*, *Macrogyropus*, and *Phthiropoios*. Each of the first pair of legs has a modified tarsal claw; the other legs each have a single claw which is usually enlarged. *Aotiella* contains 1 species found on the douroucouli, *Aotus trivirgatus*, in Central and South America. *Gyropus* contains many species found on mammalian hosts of Echimyidae, Caviinae, Abrocomidae, and Ctenomyidae of Central and South America. *Macrogyropus* contains 5 large species found on mammalian hosts of Tassuinae, Caviinae, and Dasyproctidae in Central and South America. *Phthiropoios* contains 7 species found on mammalian hosts of Chinchillidae, Ctenomyidae, and Abrocomidae.



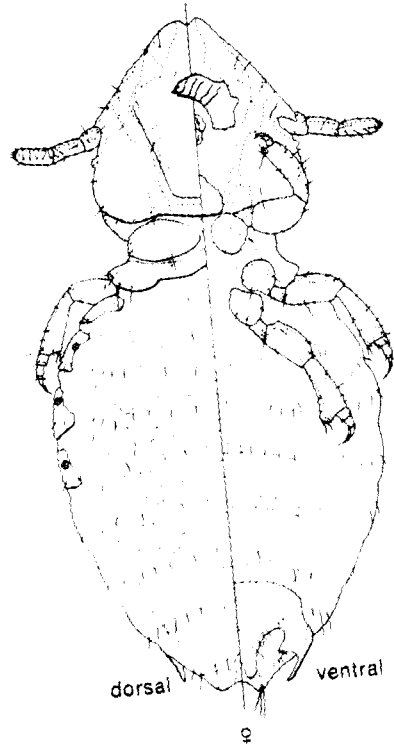
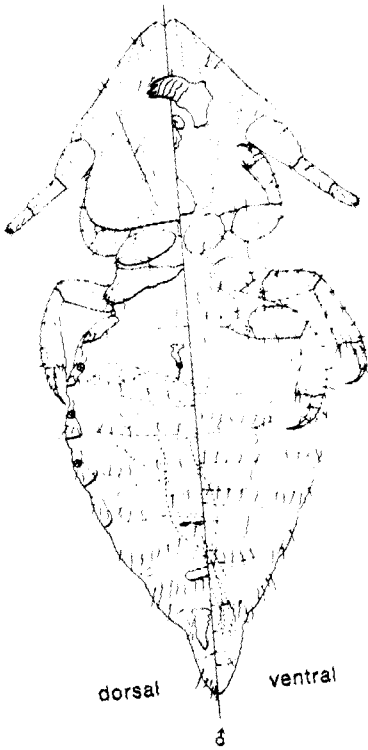
***Franciscoloa magnifici* (Menoponidae)**



***Strigiphilus acadicus* (Philopteridae)**



***Damalinia maai* (Trichodectidae)**



***Felicola liberiae* (Trichodectidae)**

The subfamily *Gliricolinae* contains the genera *Gliricola*, *Monothoracius*, and *Pitrufquenina*. All species are small and slender and have no tarsal claws. Members are found on mammalian hosts of Capromyidae, Echimyidae, and Caviinae in Cuba and Central and South America. *Monothoracius* contains 1 species found on *Kerodon rupestris*, and another for which the host is unknown. *Pitrufquenina* contains 1 species which is found on *Myocastor coypus* and now may be found everywhere the nutria has been introduced.

References. K. C. Emerson and R. D. Price. Mallophaga of Venezuelan Mammals. *Brigham Young Univ. Sci. Bull., Biol. Ser.*, 20:1-77, 1975.

ISCHNOCERA

Small to medium-sized Mallophaga with a filiform or sexually dimorphic three- or five-segmented exposed antenna. The mandibles are prominent. The prothorax is distinct. The mesothorax and metathorax are usually fused together. There is one pair of thoracic spiracles, and three, six, or no apparent abdominal spiracles. The legs are similar; each has one or two tarsal claws. The male genitalia are prominent. Usually there is an anal corona of setae on the female.

The suborder contains the families Trichodectidae, Philopteridae, and Heptapsogasteridae. These parasites are found worldwide on mammals and birds. They occur on the body and limbs of the host and are usually firmly attached to the fur or feathers. Movement on the host is slow.

Trichodectidae. Small to medium-sized (0.92-2.73 mm) ischnoceran Mallophaga. The exposed three-segmented antenna is always filiform on the female; on the male it may have an enlarged basal segment. The preantennal margin is rounded. The mandibles are triangular-shaped or indented, and prominent. The prothorax and pterothorax are not as wide as the abdominal segments. The legs are all similar, but the prothoracic legs are the smallest. There is one claw on each leg. The shape of the abdomen is sexually dimorphic. Normally there are three or six pairs of abdominal spiracles, but in some species none may be apparent. The abdominal sternal, tergal, and pleural plates are sometimes not clearly defined. The female has conspicuous gonapophyses. The male has prominent genitalia. [See illustration page 413.]

The family contains 20 genera found worldwide on species of Lorissinae, Bradypodidae, Geomyidae, Erethizontidae, Carnivora, Procaviidae, Equidae, Tragulidae, Cervidae, and Bovidae. Most species are specific for the host species, a few are limited to the host subspecies level, and a few are specific to the host generic level. All feed on the fur or hair of the host. They attach firmly to the hair or fur, which they damage if the population becomes large. Because many probable trichodectid hosts are endangered species and thus protected by law, it is likely that there are many undescribed species of Trichodectidae.

References. F. L. Werneck, *Os Malofagos de Mamíferos*, pt. I: *Amblycera e Ischnocera (Philopteridae e parte de Trichodectidae)*, 1948, and pt. II: *Ischnocera (continuação de Trichodectidae) e Rhynchophthirina*, Rio de Janeiro, 1950.

Philopteridae. Small to large (1.12-9.72 mm) ischnoceran Mallophaga. An exposed five-segmented filiform antenna is present on the female and some males, but it may be sexually dimorphic, with a large basal segment on the male. The margin of the forehead is complete or is interrupted medially. The mandibles are prominent. The mesothorax and metathorax are fused into a pterothorax. The legs are all similar, with the first pair the smallest. Each leg has two

claws. There are eight apparent abdominal segments. Six pair of abdominal spiracles are present. The male genitalia are prominent. There are no maxillary palpi. [See illustration page 412.]

The genus *Trichophlopterus* is found on a lemur in Madagascar. The other 121 genera are found on hosts of most avian families worldwide. All species live firmly attached to feathers, which are the only food. The long, slender forms are usually found on the wing and body feathers, which the host can preen. The larger, broad-bodied forms are usually found on the head and neck. Birds with damaged or deformed beaks usually have large populations of lice. Several genera are usually found on each host species. Host specificity varies from host subspecies to family levels.

References. G. H. E. Hopkins and T. Clay, *A Check List of the Genera and Species of Mallophaga*, British Museum of Natural History, London, 1952.

Heptapsogasteridae. Small to medium-sized (0.81-4.44 mm) ischnoceran Mallophaga. The antenna is filiform or sexually dimorphic. Prominent chewing mouthparts are present. The head and body are widely differing shapes and proportions. The mesothorax and metathorax may be completely separate, or they may be fused medially, or they may be completely fused to form a pterothorax. The metathorax or pterothorax is deeply embedded within the first apparent abdominal segment. The legs are normal in shape and size; each leg has two claws. The apparent abdominal segments are reduced to seven. There are six pairs of abdominal spiracles. The pleurites and some abdominal sternites and tergites may have heavy spines or setae. The male genitalia are prominent and symmetrical. Usually there is an anal corona of setae on the female.

The number of genera in the family is either 18 or 31, depending upon which classification is followed (G. H. E. Hopkins and T. Clay or M. A. Carriker). Heptapsogasterids are found exclusively in the Neotropics on hosts of the avian family Tinamidae (Tinamous). Most species are extremely host-specific and often are limited in distribution to a subspecies of an avian host. They attach to feathers on the host, which are consumed as food. Species of the various genera are found on different parts of the host.

References. M. A. Carriker, *Studies in Neotropical Mallophaga*, pt. I: Lice of the tinamou. *Proc. Acad. Natur. Sci. Phila.*, 88:45-218, 1936; G. H. E. Hopkins and T. Clay, *A Check List of the Genera and Species of Mallophaga*, British Museum of Natural History, London, 1952.

RHYNCHOPHTIRINA

Order represented by 1 family (*Haematomyzidae*) and 2 species. These medium-sized (1.9-3.0 mm) oval-shaped Mallophaga have a long proboscis. Chewing mouthparts are present at the anterior end of the proboscis. The five-segmented filiform antenna is as long as the proboscis. The short, broad thorax lacks sternal plates. The long, slender legs are almost equal in size; each leg has elongate tarsi and a single claw. The abdomen is broad and flattened. Five pairs of abdominal spiracles are present. The terminal abdominal segments of the female are fused into a small truncate cone partially enveloped by the gonapophyses. The male genitalia are long, slender, and symmetrical.

Haematomyzus elephantis is found on the Indian elephant. It is more numerous on immature elephants, in which it is common in the skin folds on or near the ears. As the elephants grow older and the body hair becomes sparse, the louse population is reduced. One record of this species from an African elephant is from a specimen kept in a zoo.

and hence may be erroneous. *Haematomyzus hopkinsi* is found on the warthog of Africa. Little is known of the biology of either species.

References. T. Clay. A new species of *Haematomyzus* Pi-

aget (Phthiraptera, Insecta). *Proc. Zool. Soc. London*, 141: 153-161, 1963; G. F. Ferris. The Louse of elephants, *Haematomyzus elephantis* Piaget (Mallophaga: Haematomyzidae). *Parasitology*, 23:112-127, 1931.