Order Mallophaga

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CHEWING LICE

Mallophaga are permanent ectoparasites, primarily on birds, but with a small percentage of species on mammals. The economic importance of the vast majority of the chewing lice is not known; however, a few species found on poultry and livestock have been reported to cause irritation, loss of weight or production, and to otherwise contribute to an unhealthy condition of the host.

DIAGNOSIS

Small, somewhat flattened individuals, with mandibular mouthparts. Body divided into distinct head, thorax, and abdomen; head wider than pronotum; three pairs of segmented thoracic legs. Antennae short, of only three to five segments. Tarsi one-segmented, with zero to two claws. Abdomens of eight or nine apparent segments.

Immatures are much like adults except for smaller size, reduced chaetotaxy and sclerotization, and absence of genital features. A progressive increase in size, number of setae, and degree of sclerotization occurs from early to late instars, as shown in figs. 22.11–22.13 and 22.26–22.28.

Most work to date on the Mallophaga has been taxonomic, this being almost exclusively based on adult forms. As a result, immatures have for the most part been disregarded or discounted. Information is limited to occasional descriptions of an immature or part thereof. Nothing is known of the taxonomic characters of immatures and the possibility of species identification in the absence of adults. Workers should be encouraged to collect early instars whenever possible so that collections can gradually be built up. Ultimately, in this manner, a comprehensive treatise may be possible.

BIOLOGY AND ECOLOGY

Biological information is available for a relatively small number of species. From what is known, lice deposit their eggs on the host, attaching them directly to the feather or hair, or in some cases depositing them within the shafts of primary feathers. Development is hemimetabolous. There are three immature instars, with all stages permanently associated with the host; lice can live only a short time away from the host.

Their food consists of bits of feathers or hair, or other particular matter associated with the skin; some species of Monopodidae and Ricinogaster ingest blood as a regular port of their diet.

Although it has often been stated that the chewing lice are highly host specific and that each host taxon has its own unique host taxa, such a generalization is open to challenge. Work based on morphological evidence suggests that some lice are indeed quite specific, others not so much so, and at least a few may be found on a wide spectrum of hosts. The practice of some workers in describing new host taxa solely on the fact that they are taken from hosts not previously yielding lice is to be condemned. Lice must be recognized as distinct on the basis of characteristics of the lice and not solely because of their host association.

DESCRIPTION

Head distinct from thorax, as wide or wider than prothorax; with pair of mandibles situated centrally. Antennae three to five-segmented, clubbed or falcate. Eyes reduced or absent.

Prothorax usually distinct from metathorax; meso- and metathorax often closely associated to form prothorax. Three pairs of distinctly segmented legs: tarsi one-segmented, either with zero, one, or two terminal claws.

Abdomen distinctly segmented, usually with at least only weak sclerotization. With eight or nine apparent segments. Being 2–8 or 1–8, with terminal portion beyond 5 representing fusion of segments 9 and beyond. With less, often zero to five pairs of spiracles, these associated when present with segments 3–8.

COMMENTS

The classification followed here for the higher taxa is essentially that of Hopkins and Clay (1952), in which the Mallophaga are divided into three suborders, two of which occur in North America: the Amblycera with seven families, six of which are represented in the North American fauna; and the Ichnocera, with two of these families in North America.
ORDER MALLOPHAGA

TECHNIQUES

The preparation of chewing lice for microscopic study is essentially the same as for other small soft-bodied insects. Although staining may facilitate character observation, a phase contrast microscope is essential for detailed study.

KEY TO THE FAMILIES OF IMMATURE NORTH AMERICAN MALLOPHAGA

1. Antenna (fig. 22.3) usually 4-segmented, more or less clubbed, with pedunculate 3rd segment, often partially concealed beneath head; maxillary palpus present (fig. 22.1) (Suborder AMBLYCERA)

1'. Antenna (fig. 22.3) 3- or 5-segmented, bifid, with 3rd segment not pedunculate, and not concealed; maxillary palp absent (Suborder ISCHNOCERA) 2

2. Legs 2 and 3 with 0 or 1 tarsal claw (figs. 22.4, 22.5); on mammals

2'. Legs 2 and 3 with 2 tarsal claws (figs. 22.6, 22.7); usually on birds, less often on mammals

3. With 5 pairs of abdominal spiracles, those on 8 absent; on guineapigs

3'. With 6 pairs of abdominal spiracles; on dogs or birds

4. Head broadly triangular, expanded behind eyes (fig. 22.8); antennae often lying in groove on side of head; on dogs or birds

4'. Head not as above (figs. 22.9, 22.10); antennae lying in cavity opening ventrally; on birds

CLASSIFICATION

Order MALLOPHAGA

Suborder Amblycera

1. Messonotum with pair of stout setae each borne on protuberance (fig. 22.11); abdominal tergum 1 fused with metanotum, with 1st abdominal spiracle on Beoipodidae (p. 219)

5. Messonotum without such stout setae or protuberances; abdominal tergum 1 not fused with metanotum, with 1st abdominal spiracle on apparent 3rd segment; on birds

6. Side of head with conspicuous swelling in front of eye at base of antenna (fig. 22.10); ventral temple (fig. 22.13) with sculpturing of outer rows of peglike projections, ventral of 3rd tergum with microtrichial patch (fig. 22.16); Laemobioboridae (p. 218)

7. Messonotum with pair of stout setae each borne on protuberance (fig. 22.11); abdominal tergum 1 fused with metanotum, with 1st abdominal spiracle on apparent 3rd segment; on birds

8. Side of head with such swelling (fig. 22.9); without peglike sculpturing on temple or microtrichial patch on 3rd tergum

9. With 2 tarsal claws; antennae with 5 segments; on birds

10. With only 1 tarsal claw; antennae usually with 3 segments; on mammals

Suborder Ischnocera

1. Messonotum, avian body lice

Laemobioboridae, on birds

Ricinoidae, on birds

Boeipodidae, on mammals

2. Birds

3. Mammals

HOST LISTS

Since so much Mallophaga identification is based on host lists rather than on formal keying of the lice themselves, a set of four publications by Emerson (1972a, b, c, d) is indispensable for anyone attempting to affix a specific name to a North American chewing louse. The first two works list the species of lice by family and genus for each suborder, giving known hosts for each species. The last two works present a mammal and bird host list, giving the lice known from each host.

SELECTED BIBLIOGRAPHY

General


Rearing

Steenhamer 1936.


Hopkins 1970.


MENOPOIDAE

The Menoponidae, Avian Body Lice

Figures 22.2, 22.6, 22.8, 22.11, 22.14

Relationships and Diagnosis: This family of Amblycera contains by far the largest number of species of the suborder, with over 250 North American species distributed in about 35 genera, all restricted to a wide spectrum of bird hosts.

Separable from the other families of amblycera by the broadly triangular head and presence of tufted abdominal segments bearing six pairs of spiracles on 3rd and 4th abdominal segments.

Biology and Ecology: Members of this family are believed to ingest blood fairly often in the course of their feeding and, by doing so, have the potential to transmit pathogens among their avian hosts.

Description: In size, adults most commonly from 1.3 to 3.5 mm long, but occasionally up to 7.8 mm; generally somewhat slender, often brownish to gray. Head roughly triangular, with variable width, but usually small; each tarsus has two claws, abdomens with nine apparent segments, with six pairs of spiracles laterally on 3rd abdominal segment.

Comments: Clay (1969) has applied names to most of the head and prothoracic setae and has otherwise discussed in detail the morphology of adult menoponids. At least some of this will be pertinent to immature descriptions following study to establish appropriate homologies.

SUBORDER AMBLYCERA

Relationships and Diagnosis: Assemblage of six North American families, three of which are restricted to birds and three to mammals. Species are readily separated from those in the suborder Boeipodidae by having four-, five-segmented, clubbed antennae (fig. 22.1) and maxillary palp (fig. 22.1). A discussion of the relationships among the families of Mallophaga may be found in Clay (1970).

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ORDER MALLOPHAGA

Description: Adults up to 12 mm long, with moderately heavy ovoid bodies, usually tan to dark brown. Head angular (Fig. 22.15), with conspicuous swelling at side in front of eye near antennal base; antennae mostly concealed in ventral concavity; ventral ectoderm with sculpturing of rows of peglike processes; proboscis as for rhipidophores; each tarsus with two claws; venter of femur 3 (Fig. 22.16) with patch of microtrichia; abdomen with nine apparent segments, six pairs of spiracles laterally on 3–8.

Comments: Essentially nothing has been done on the immatures of this family or on the adults of the nonfalconiform hosts. Nelson and Price (1965) have discussed the adult taxonomy of the four species found on the Falconiformes.

Selected Bibliography
Nelson and Price 1965 (adults only).

BOOPIDAE

The Boopids

Figure 22.18

Relationships and Diagnosis: With a number of features in common with, and possibly closely related to, the Monotrematae. Found only on mammals, with only one North American species.

Separation from other amphipsyllids by the presence of a seta on a prominent protrusion on each side of the metasternal cavity (Fig. 22.18) in combination with the head shape, presence of two tarsal claws, and eight right abdominal segments.

Description: Adults about 2.5 mm long, generally ovoid and brownish. Head roughly triangular; ventral p spinous processes; metasternum with seta-bearing protuberance on each side; quadrata metabasals; each tarsus with two claws; abdomen with eight apparent segments bearing six pairs of spiracles laterally on 3–8.

Comments: Only one species, Heterodoxus spiniger (Enderlein) (Fig. 22.18), is known in North America; it has been found on the domestic dog, coyote, and wolf.

Selected Bibliography
Emerson and Price 1975, 1981 (adults only).
Hopkins 1949 (adults only).
Keller 1971 (adults only).
Werneck 1948 (adults only).

RICINIDAE

The Ricinids

Figures 22.9, 22.17

Relationships and Diagnosis: Only about 30 species in three genera that are restricted in distribution to the songbirds and hummingbirds. Rhipidophores. Found only in both the Monotrematae and Monotrematae by the head shaped much as in figure 22.17 and by lacking a conspicuous swelling at side in front of the eye near antennal base, and from the Monotrematae by the clubbed antennae lying in a cavity opening ventrally.

Biological and Ecological: Although little is known of the biology and ecology, we have a reasonable certainty of available information given by Nelson (1972). He compiles details of life cycle, sex ratio, intensity of infestation, rate of incidence, seasonal abundance, oviposition site, dispersion of the host, and blood feeding. In this last regard, it should be noted that ricinids apparently regularly feed on blood and serum, and, by so doing, have the potential for transmitting avian infectious agents.

Description: Adults from 2.6–6 mm long, rather elongate specimens with parallel sides, and pale colored. Head uniquely shaped (Fig. 22.17), lacking conspicuous swelling at side in front of eye near antennal base; antennae concealed in a cavity opening ventrally; mandibles reduced and inconspicuous; proboscis rectangular; each tarsus with two claws; abdomen with only eight apparent segments, segment 1 absent; six pairs of spiracles laterally on 3–8.

Comments: No members of this family are considered of economic importance, since they all occur on nondomestic hosts.

Selected Bibliography
Rheinwald 1968 (adults only).

LAEMOBOTHRIDAE

The Laemobothrids

Figures 22.10, 22.15, 22.16

Relationships and Diagnosis: The largest of all Mallophaga (adults to 12 mm long), but with only eight North American species, four of these found on various falconiform hosts and the others on gallinaceous, linnkians, cows, and geese. The large size and unique head shape (Fig. 22.15) with the swelling at the side in front of the eye at the antennal base separate laemobothrids from the other amphipsyllid bird lice.

Selected Bibliography
Clay 1969.
Emerson 1956, 1962 (adults only).

GYROIDAE

The Rodent Chewing Lice

Figures 22.4, 22.5, 22.19

Relationships and Diagnosis: Clay (1970) finds this family having the fewest characters in common with the Monotrematae of all Amphipsyllidae; the diversity within the Gyroidea even suggests it may be polyphyletic. There are four North American species, each placed in a separate genus. The gyroids are the only Amphipsyllidae having only two to one tarsal claws on legs 2 and 3, and this claw often is extremely modified and large (Fig. 22.4) or quite small (Fig. 22.5).

Description: Small, slender lice, only 1.0–1.5 mm long, and whitish. Head broad, angular, legs often disproportionately long, with no or single claw on 2 and 3, either very large (Fig. 22.4) or inconspicuously small (Fig. 22.5); abdomen with eight to nine apparent segments, five to six pairs of spiracles.

Comments: Found only on mammals, the most likely species of this family to be found in North America are associated with guineapigs in laboratories—Gliscirta porcelli (Schrann), the slender guineapig louse, Gyropus ovatus (Burmester), the oval guineapig louse. In addition to these, a loose form the cuticle and one from the collared pecos are the only other ones likely to be found.
Selected Bibliography
Emerson and Price (1975, 1981 (adults only).)
Hopkins 1949 (adults only). Wernick 1948 (adults only).

TRIENOPOMIDAE

The Trienopodids

Relationships and Diagnosis: Close to the Menopodidae and Boopidae in some respects, but with distinctive features. Found on mammals, with only one possible North American species.

Description: Head roughly triangular, devoid prohorax; each tarsus with two small claws; abdomen with nine apparent segments, but with only five pairs of spiracles, those on 8 absent.

Comments: Only one species, Trienopoma hirsutum (Burmeister) (fig. 22.20), may be found in North America; it occurs on guanabaras, but has not been reported to date from North of Panama.

Selected Bibliography
Wernick 1948 (adults only).

Suborder ISCHNOCERA

Relationships and Diagnosis

There are only two North American families in this suborder, one of which restricted to birds and the other to mammals. Specimens are easily separated from those in the Amblyceridae by having short three- or five-segmented filiform antennae (fig. 22.3) and lacking maxillary palpi.

PHILOPTERIDAE

The Feather Chewing Lice

Relationships and Diagnosis: This family has the largest number of species of any in the Mallophaga, with over 150 species found in birds, 75 and the Trichodectidae represent the only North American families of Ischnocera and thus are presumed closely related.

The Philopteridae are distinguished by having an antenna of five segments and two tarsal claws on each leg.

Description: A variety of sizes and shapes, with adults usually from 2-4 mm long, and broad (fig. 22.21) to slender (fig. 22.21) individuals. Head from narrowly rounded to broadly tapered anteriorly; antennae five-segmented; tarsus with two claws; abdomen with eight apparent segments; with six pairs of spiracles laterally on 8-8.

Comments: Found only on birds. As would be expected, a family of this size includes a number of parasites of poultry and other domestic birds. Commonly occurring on chicken is Cecidomyiidae heterogrammus (Nitz., the chicken head louse (fig. 22.23); Gomphus variabilis (Denny), the brown chicken louse; Galleria gallinae (De Geer), the buffalo louse (fig. 22.24); and Lipoptena gallinae (L.), the buffalo louse (fig. 22.21). Several species from turkeys are Cecidomyiidae melanogaster (L.), the large turkey louse (fig. 22.23), and Ovillodes polythrix (Burmeister), the slender turkey louse.

Selected Bibliography
Emerson 1956, 1965 (adults only).

TRICHODECTIDAE

The Mammal Chewing Lice

Relationships and Diagnosis: The only family of Ischnocera containing mammal-infesting lice, closely related to the Philopteridae. There are somewhat more than 50 North American species occurring in ten genera.

Recognized by having an exposed antenna, usually of three segments, and only one tarsal claw on each leg.

Description: A variety of sizes and shapes, much as for the Philopteridae. Antenna usually three-segmented; tarsus each with one claw; abdomen with nine apparent segments; variable number of spiracles, from zero to six pairs.

Comments: Restricted to mammals. The genus Bangio-bole contains a number of important livestock pests, including B. bovis (L.), the cattle biting louse (figs. 22.25-22.26); B. caprae (Erith), the goat biting louse; B. equi (Denny), the horse biting louse; B. lembata (Germar), the Angora goat biting louse, and B. avis (Schrank), the sheep biting louse. Lice found on domestic pets around the home include Felisdoma subobtusus (Burmeister), the cat louse (fig. 22.23); and Trichodectes canis (De Geer), the dog biting louse (fig. 22.23).

Selected Bibliography
Wernick 1948, 1949 (adults only).
Figure 22.21. Image of a Mallophaga (order Mallophaga).

Figure 22.22. Image of a Mallophaga (order Mallophaga).

Figure 22.23. Image of a Mallophaga (order Mallophaga).

Figure 22.24. Image of a Mallophaga (order Mallophaga).

Figure 22.25. Image of a Mallophaga (order Mallophaga).

Figure 22.26. Image of a Mallophaga (order Mallophaga).

Figure 22.27. Image of a Mallophaga (order Mallophaga).

Figure 22.28. Image of a Mallophaga (order Mallophaga).

Figure 22.29. Image of a Mallophaga (order Mallophaga).

Figure 22.30. Image of a Mallophaga (order Mallophaga).

**BIBLIOGRAPHY**


