

ENTOMOLOGY

The Biting Lice or Mallophaga

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The Biting Horse Louse
(*Trichocetep equi*)

The term lice has probably as many meanings and associations as there are people who have seen them or felt them. It is a widely used term which may include at least three major groups of animals. Some use it erroneously to refer to the mites (Acarina) which are often abundant on chicken roosts and in Phoebe birds' nests. When carefully used, however, the term louse includes only the dorso-ventrally flattened insect ectoparasites of birds and mammals. These lice either suck blood (Anoplura) or have chewing mouth-parts (Mallophaga). The sucking lice occur only on mammals. Mallophaga, on the other hand, occur on only a few groups of mammals, and on all species of birds. This fact accounts for the prevalence of their common name "bird lice."

In addition to being dorso-ventrally flattened with mandibulate mouth parts, their antennae are three, four, or five segmented. Those with filiform three or five segmented antennae and no labial palpi are placed in the suborder ISHNO-CERA. Those with four segmented antennae and four segmented labial palpi are included in the suborder AMBLY-CERA. Both suborders have mammal infesting species, but those on our common mammals belong to the Ishnocera. The mammalian species of the Amblycera are restricted mainly to the marsupials and to the rodents of Central and South America with the exception of *Heterodoxus longitarsus* (Piaget) which has become established on the dog.

The Mallophaga on birds feed mainly on feathers. Two species of poultry lice and one from the pigeon (all Ishnocera) have been reared in an incubator with feather as the only food source. Their mandibles cut the feather barbules into convenient lengths for swallowing. How they can digest this resistant substance is unknown but the presence of symbiotes in their alimentary tracts has been suggested. One species from the fowl has been observed to puncture a young feather with its mandibles and take up the blood which oozes out. Probably all biting lice will feed on dried blood when it is available. The food of the mammal infesting lice is not definitely known. They are usually described as feeding on epidermal debris but may actually be able to rasp off material from the surface of a hair.

It is hard to believe that organisms with such feeding habits could cause serious injury to their hosts. Irritation from their movements is understandable. In birds the loss of the softer feather parts may be considerable, but it has not been ascertained whether this loss is sufficient to interfere with the maintenance of normal body temperature.

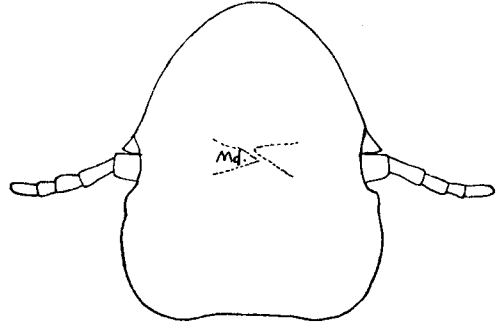


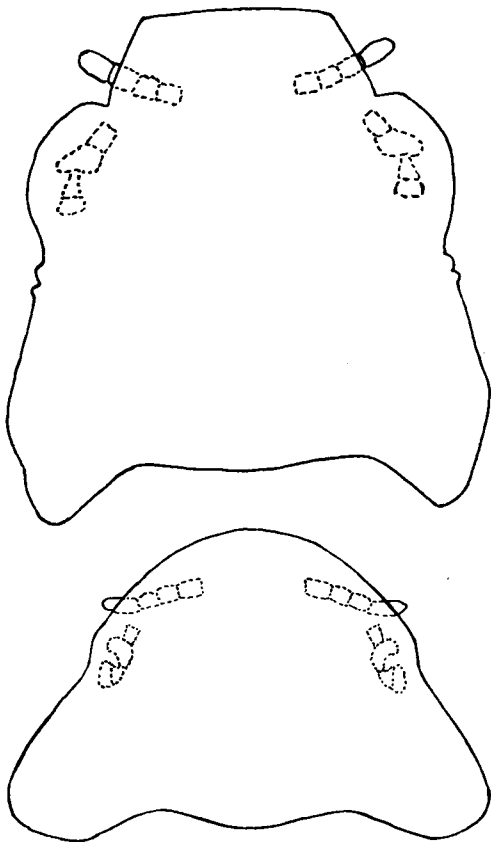
Fig. 1. Head of a female of the Ishnocera. This head-shape and five segmented antennae are typical of the suborder. The heavily chitinized mandibles (Md.) are on the ventral side of the head in all Mallophaga but are conspicuous in all slide mounts.

Lice require warmth to live. They tend to leave the body of a dead host and live only a few days, usually not more than five, when removed from a host or following the death of the host, unless warmth is found. They probably get from host to host largely through the direct contact of host bodies, in birds usually from parents to nestlings, as the lice stay near the attached ends of the feathers. No bird disease is known to be transmitted by Mallophaga, and even though they might have the disease organisms of their hosts they do not move readily from bird to bird as do mosquitoes and other blood-sucking flies.

The Ishnocera are quite easily studied when removed from their hosts. They are unable to crawl on glass and can thus be isolated on a piece of feather and kept in the incubator in a glass dish. A temperature of approximately 33° C has been found satisfactory for species infesting hens. Lice from other birds will probably require a slightly different temperature which can only be determined by experimental work.

The Amblycera are difficult to handle in an incubator as most of them crawl readily on glass. On the bird they are active travelers on the smooth shafts and quills of the feathers while the Ishnocera travel mostly on other parts of the feather. All efforts to rear species of Amblycera in an incubator have failed.

The eggs of bird lice are glued to barbules, barbules, or, as in *Goniocotes gigas* from the fowl, to the shaft of a feather close to the quill. In the species which have been studied the eggs hatch in approximately six days and each instar extends usually from six to twelve days. The fourth instar



Figs. 2 and 3. These show the usual outlines of the heads of the Amblycera. The four segmented labial palpi are on the ventral side of the head with the terminal portion often projecting beyond the margin of the head. The antennae are posterior to the labial palpi and are either ventral or in excavations in the side of the head.

is the adult stage. No mammalian mallophaga have been reared under laboratory conditions.

Specimens may be collected from mammals by combing, or, if the animal is freshly dead, they will crawl from the host and become entangled and die in cotton wrapped around the skin. On living birds they may be collected by searching through the feathers. Devices have been reported by which the body of the living host has been suspended in an atmosphere of chloroform or ether. A rubber collar is fitted around the neck of the bird and over the container and keeps the gas from escaping. Following exposure to the gas the bird is held over a white paper and the feathers shaken, the anaesthetized lice dropping from the feathers to the paper. Treatment with insect powder followed by a shaking over a white paper should have similar results. Cotton wrapped around dead birds

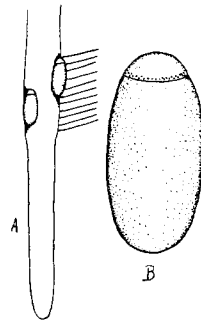


Fig. 4. Eggs of *Gonicotes gigas* Tasch.

- A.** Eggs attached to shaft of feather.
B. Enlarged view of egg.

or drying bird skins serves as a trap just as in the case of mammals. Care should be taken always in collecting lice to insure the accuracy of host records. Animals should be isolated from contact with others from the moment of capture. Paper bags of suitable size are convenient for this purpose.

The captured lice may be put in vials of 70% alcohol with a label giving host, locality, date, etc., or if the cotton method was used the cotton should be placed in a paper bag with a suitable label. The lice may be picked from the cotton whenever it becomes convenient or the cotton with host data may be mailed to anyone interested in the lice. Slide mounts are the most satisfactory method for permanent storage of the collection. If the specimens are in alcohol they should be transferred to water and then to a 10% solution of potassium hydroxide at room temperature in which they should be left to clear and soften. Specimens may be picked from the cotton and placed directly in the potassium hydroxide solution. The length of treatment depends on the size and hardness of the louse but it should not be so long that the natural color bleaches out. They should then be washed in water, passed through several grades of alcohol and mounted in Euparal or Canada balsam. Care should be taken to straighten out the legs and antennae. The genitalia should be dissected from a few representative males. A label at each end of the slide is most convenient, the one on the left for the host data and the one at the right end of the slide for notes on the parasite. Slides are most conveniently stored in slide boxes and arranged under each genus according to the A.O.U. checklist number of the bird. This is better than an alphabetical arrangement under each genus as it brings the lice from closely related birds together for handy comparison.

Mallophagan species are restricted to closely related birds. The extreme is reached with *Acidoproctus kelloggi* Carriker which has been found only on the canvas back duck although lice have been collected extensively from ducks. Thus it is almost possible to identify many birds by their lice and vice versa. Many genera and species of

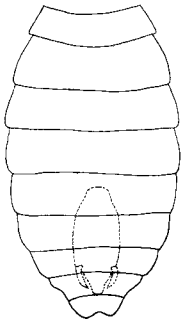


Fig. 5. Abdomen of a male. Male Mallophaga may be always recognized by the heavily chitinized genitalia showing through the body wall in the posterior part of the abdomen. The dotted lines show, in outline, one type of male genitalia.

Mallophaga have been described almost solely on the basis of their hosts. The host is still the most used method of identifying lice and one cannot go far without a host list on which is indicated the lice described or reported from a given species of bird.

Herbert Osborn and Vernon Kellogg have made the greatest contributions to our knowledge of North American Mallophaga. Their identifications and descriptions of new species have been major contributions to which comparatively little has been added. Neither one had anything like complete collections available to work upon. The species concept built up was on the basis of a few specimens of lice from three or four species of woodpeckers, a like number of blackbirds, sandpipers and other bird groups. Much confusion has followed as most identifications since have been made by workers referring to the original descriptions (not to the co-types) and the sporadic workers have had lice from only a small number of bird species for comparisons. Adding to the confusion numerous early species were based on immature specimens, the adult specimens having been described as a different species. L. Harrison in 1916 published a list of the Mallophaga of the world in which many of the generic and specific names used prior to 1916 were discarded or deduced to synonymy. This makes it difficult for the amateur to go from modern literature back to the names used by Kellogg and Osborn. Over 100 new genera have been proposed since 1916, all of which has not helped to make the taxonomy of the Mallophaga simpler.

The present major mallophagan collections are those at Stanford University (Kellogg's Collection), the United States National Museum, the Bureau of Entomology and Plant Quarantine, the University of Minnesota, and Cornell University. The Kellogg collection is the most valuable as it contains his type specimens; that at Cornell University is probably the largest. These collections together probably do not represent more than 500 of the slightly less than 800 species of birds rec-

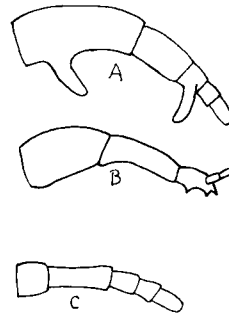


Fig. 6. In several genera of the Ishnocera, the male antennae are modified and serve to grasp and hold the female during copulation. A and B illustrate two modifications of male antennae. C is the unspecialized female antenna.

ognized by the American Ornithologists' Union and are complete for no large taxonomic group of birds. The outstanding need appears definitely to be a collection of Mallophaga complete for all North American hosts. This would enable a worker to study lice from a large number of woodpeckers, or a large number of owls, and arrive at a better species concept and a better understanding of a genus. This is a project which needs the help of all who are interested in birds and insects. From this collection a much needed monograph of the Mallophaga of North America should develop. The writer has been working as time has permitted since 1924; and with the co-operation of ornithologists, of Dr. Matheson of the Cornell University Entomology Department, and of the Zoology Department at Tulane University has accumulated a collection of approximately eight thousand slides representing about twenty thousand specimens. It is hoped that more ornithologists will save the cotton wrappings in which the lice have been trapped.

NOTES

The writer is always glad to get Mallophaga of any kind and is particularly interested in getting lice from the following hosts:

Eared Grebe
Mexican Grebe
Swans, all species
Brant, all species
Geese, all species

Pigeons and Doves, particularly those of southern Florida and those species peculiar to the west and southwest.

The cotton mentioned for use in trapping lice on dead birds is called "sheet wadding." It comes in 30 by 36 inch rectangles which can be split to give nearly two square yards of wrapping material. It can be obtained in most drygoods stores for ten cents or less per sheet.