

# BIRD - BANDING

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## ECTOPARASITES AND BIRD-BANDING

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THE ectoparasites found on practically every species of bird must exist at the expense of their hosts. This fact opens many interesting fields of study and raises many questions in which the bird-bander should be interested. The bander has the opportunity to observe the various ectoparasites and the effects they have on the bird and its behavior, and by collecting them will assist in the study of the life history, host-relationship, and classification of the parasites. Banders may find that birds repeating very often in traps and at feeding stations are parasitized, weakened, and unable to seek their own food. These would probably be more tame than birds free from parasites. An infested bird may not rear as many young, may not raise a second brood (in those species which generally have more than one brood a year), and may not protect the nest as well as a healthy bird. Young birds may become infested with parasites from the parent bird during bodily contact in the nest, and so be less able to survive than young raised by uninfested parents. I believe that ectoparasites have a definite effect on the behavior of the birds, probably causing them to have a somewhat shorter migration route, shorter life, smaller size, and dull plumage; to sing less; and perhaps to have a lower and more variable body temperature than birds not infested. It would be interesting to know whether female birds have more parasites than male birds; whether parasites are more numerous on those birds having more than one brood of young each year than on those having a single brood; and whether young birds obtain more of their ectoparasites from the parents in the nest than they obtain after becoming adults, during copulation, in flocks, or in nesting colonies.

All groups of ectoparasites are visible to the unaided eye, and even the eggs and young may be seen and collected without trouble from freshly killed birds. They are generally very difficult to pick from live birds, which are too frightened and restless to be examined easily. It is best for one person to hold the bird while another picks the parasites from among the feathers or from the skin of the host with a pair of small tweezers or forceps. A magnifying glass of three to ten diameters is useful for the examination of the parasites. The parasites should be placed in small vials (the one-dram homeopathic vials are a convenient size) of 70 per cent grain or denatured alcohol or 3 or 4 per cent solution of formalin for killing and preserving. Parasites from each individual bird should be placed in a separate vial, which should be labeled with the correct host-name, date, locality, and name of collector. It is also of value to give the band number of the host and to make a note on the banding record of the number of parasites collected as well as the approximate number still remaining on the bird. This affords an interesting record for comparison with future repeats of the host.

In order to determine the small parasites as to species they must be mounted on microscope slides and examined through a microscope. They are generally cleaned with potassium hydroxide before mounting in Canada balsam. Such a slide of a louse found on pelicans is shown in the accompanying figure (Fig. 1). The bird-flies are best studied on insect pins. Until so mounted they should be preserved in the dry condition in pill boxes packed with small bits of absorbent paper.

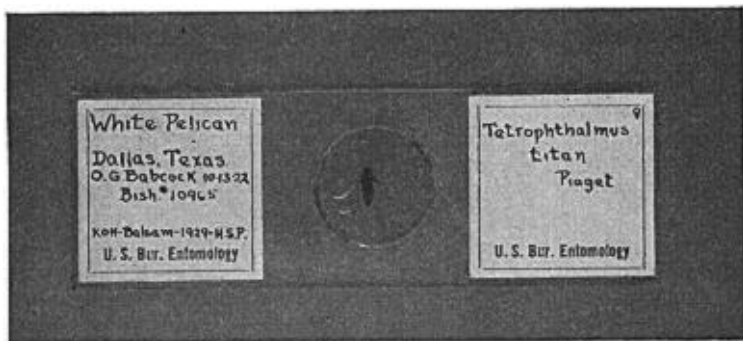


FIG. 1.—*Tetrophthalmus titan*, a louse from the pelican on a glass microscope slide. Showing method of mounting small ectoparasites for identification. Natural size.

Mr. S. Prentiss Baldwin and several others closely connected with bird-banding have expressed the thought that bird-banders in handling many thousands of birds can not only assist the entomologist in the collection of parasites but may be able to work out new problems in ornithology by studying the effects of the parasites upon bird life. It is with the idea of calling the attention of the bird-banders to these many new and interesting fields of study as well as to assist in identifying the groups of parasites found, that this paper is presented. Some details of the appearance, life history, habits, abundance, and importance are given for each group of ectoparasites commonly found on wild birds. The "Manual of External Parasites," by Dr. H. E. Ewing,<sup>1</sup> may be consulted for additional information if desired.

#### LICE

The most common parasites likely to be found on birds are the *Mallophaga*, or biting lice. All species of birds and many mammals harbor them, although not all individuals of a species may be infested. Those found on birds are small (most species being only 1 to 3 mm. in length), generally white, yellowish, or brownish in color, flattened, wingless, more or less active insects. They are well adapted to their parasitic mode of living, having claws for clinging to the feathers and skin, being flattened for easy locomotion through the feathers, and having biting mouth parts for feeding on bits of feathers and epidermal scales. They cause much irritation by their sharp claws and the rasping of their mandibles.

The biting lice spend their entire life on their hosts, seeming to require the body heat of the bird to remain alive. They never leave the host to crawl around on limbs of trees, on rocks, or in nesting material, although some may be shaken from the feathers by the bird in trying to free itself of these parasites. The complete life cycle of any one of the nearly 2000 species of *Mallophaga* described from the world has not been worked out accurately, but since the temperature of their habitat varies so little there are undoubtedly several generations during the year. The eggs, laid near the shaft or base of the feathers, hatch into nymphs which resemble the adults except in being much smaller and lighter in color. These nymphs shed their skins several times during their growth, each time becoming larger and more nearly the size and color of the adults.

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<sup>1</sup>Published in 1929 by C. C. Thomas, Springfield, Illinois.

The lice are generally most abundant around the head, throat, and breast regions, and on the long feathers of the wings and tail. It is very interesting to find that the different genera are found in definite and quite different regions of the body of their hosts. The slow-moving, heavy-jawed, and clumsy forms are found almost entirely around the head, neck, and throat regions since they are not easily dislodged by scratching. The lice found on the breast, anal, or back regions are generally rapid-running forms easily able to escape the bird's scratching or picking. A slim and fast-running group is found on the long wing-feathers. It is therefore necessary to examine definite regions on the body of the host in order to find all the lice.

Each species of bird is generally found to have its own species of lice, although closely related host species may often have the same parasites. It would be interesting to know whether a species of louse peculiar to one species of host would live if placed on another species. No very accurate work has been done along this line. In nature a few cases of "straggling" are found, principally on small oceanic islands where land and water birds are often found resting side by side on the rocks, thus allowing an interchange of parasites during bodily contacts.

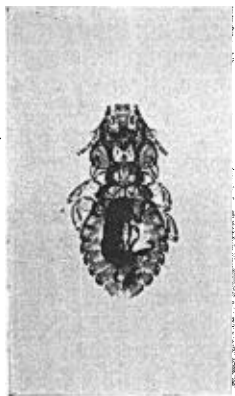


FIG. 2.—*Philopterus subflavescens*, a louse commonly found on many passerine birds. The dark mass in the abdomen is the crop filled with bits of feathers. X 17½.

Water birds, birds of prey, and large land birds seem to be most heavily infested with lice, while many individuals of the smaller passerine species are uninfested. Young birds are often found to have only immature lice, perhaps showing that the young lice are more active, thus seeking new hosts, or that they may be crowded from the host by the adults. A few collectors<sup>1</sup> believe they have found the life cycle of lice somewhat paralleling that of their host. They have found the lice mostly in the egg stage during the winter, many young lice in early spring, and many adults in late spring. Eggs deposited about the time the host is beginning to nest would

<sup>1</sup>Mr. M. B. Trautman, of Columbus, Ohio, first called my attention to this.

produce many young lice when there are young birds in the nest, thus allowing for migration and spread of the lice. This would seem to indicate only two generations a year—one for distributing the species, the other for populating the new host.

#### MITES

Mites are minute arthropods constituting, with the ticks, the order *Acarina* of the class *Arachnida*. They are distinguished by having four pairs of legs in the adult stage (three pairs in the larval stage), by being pale or somewhat red in color, more or less flattened, and by having sucking mouth parts, and an unsegmented abdomen broadly united with the cephalothorax. Mites are the smallest of the arthropods, yet they are exceedingly numerous and widely distributed, being found on plant and animal life, both vertebrate and invertebrate, as well as in the soil as free living forms. There are several kinds of mites found on birds, including especially the chiggers, itch mites, and feather mites. The first two groups named are very minute and almost impossible to observe and collect from living birds. Ground-inhabiting birds are an important factor in the distribution of the common chigger.

The mites most often observed on birds are called feather mites and belong to the family *Analgesidae*. They are small (about 1 mm. or less in length), flattened, with the legs placed laterally and usually each ending in a sucker, and with pro-

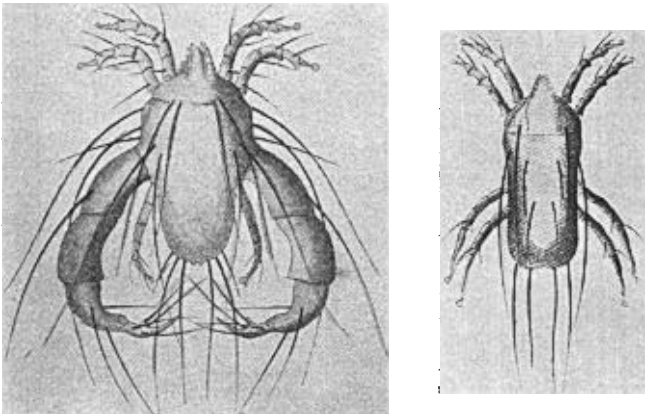


FIG. 3.—*Analges passerinus*, feather mite. Showing enormous development of the third pair of legs of male (left) in comparison to female (right). (After Ewing)

nounced sexual dimorphism, the male being the larger and in some genera having one pair of legs enormously enlarged for holding the female. They may be most easily seen crawling slowly along the barbules of the longer wing feathers. They have sucking mouth parts, but their feeding habits are not well known. The oblong, whitish, and very minute eggs are usually deposited end to end in rows between two adjacent barbs of the feathers. A migratory nymph may occur in the life history of some, and in most species a copulating nymphal stage precedes that of the adult female.

The family *Analgesidæ* is divided into four subfamilies, each of which is in turn divided into numerous genera. It is impossible to identify these very minute parasites without first mounting them on microscope slides for examination, and since there are so many genera no attempt will be made to give anything but the general characteristics of the subfamilies and some information as to where they may be found. The subfamily *Pterolichinæ* are rather robust mites found among the flight feathers of parakeets, birds of prey, gallinaeous birds, and certain of the passerines. The subfamily *Analgesinæ* includes forms found among any of the feathers except the long wing feathers of the host. They are not confined to any special groups of birds. The males may be much larger than the females and may have an enormous development of the third or fourth pair of legs. The subfamily *Proctophyllodinæ* infest the feathers of the wing, back, and flank of certain groups of land birds. They are forms in which the abdomen of the females is bilobed posteriorly and in which neither of the last two pairs of legs in the males is usually enlarged. The subfamily *Epidermoptinæ* include those which live next to the skin of the hosts. They are very small and not easily identified.

#### TICKS

The ticks constitute the superfamily *Ixodoidea* of the order *Acarina*. In the adult stage they are distinguished from the mites by a pair of stigmatal plates situated laterally behind the last pair of legs, and usually by their larger size, ranging from 1 mm. in the larvæ to as much as 15 mm. in the fully engorged females of some species. The group is not large in species, there being less than three hundred species in some dozen genera, but in number of individuals it is one of the largest and most important groups of ectoparasites. Ticks are found throughout the world and on four out of the five classes of vertebrates, being more abundant on reptiles and mammals than on amphibians and birds, and they are more numerous in the tropics and subtropics than in the temperate regions.

Ticks are known to transmit blood-borne diseases of mammals and may carry some diseases of birds.



FIG. 4. — *Hämaphysalis leporis-palustris*. A seed tick magnified about 20 times.

The most common ticks found on birds are *Hämaphysalis leporis-palustris* and *Hämaphysalis chordeilis*. They are found attached by their strong piercing and sucking beak to the skin at the base of the feathers on top of the head, around the eye, base of bill, and ear coverts of their hosts. They are generally of a red or brown color since they feed entirely on blood. The abdomen of the nymphs and females is capable of great

distention, allowing a relatively enormous quantity of blood to be imbibed. The eggs are laid in one or more masses in the surface soil or under leaves or humus. The "seed ticks," or larvæ, hatching from the eggs, have only three pairs of legs, are very hardy, and able to go without food for many days. They generally climb up blades of grass and other low vegetation and attach themselves to the first host which comes along. After engorging, the larvæ fall to the ground and pass through a quiescent state while molting to nymphs. The nymphs have four pairs of legs. They attach themselves to hosts, engorge, and drop to the ground to molt to adults, which likewise attach and engorge. Thus it will be seen that three separate hosts are required in the development of the tick. Owing to their peculiar life history, ticks are usually found only on those birds living or feeding on the ground. The adults of *H. leporis-palustris* are seldom found on birds, seeming to prefer rabbits. All stages of *H. chordeilis* are found on birds, although the adults are sometimes also found on small mammals. It is possible to find larvæ or nymphs of both species of bird ticks on the same host. A heavy infestation on young birds may cause their death.

#### FLEAS

Fleas are insects comprising the order *Siphonaptera*. They are small, laterally compressed, wingless, jumping insects with mouth parts fitted for piercing and sucking the blood of their hosts. The order includes about six hundred species widely distributed on birds and mammals. By far the greater number of species infest mammals, although many are found on birds.

They are parasitic only in the adult stage. The body is oval and greatly compressed, which allows them to slip easily and quickly through the narrow spaces between the feathers or hair of their host. Since they are greatly specialized for jumping they may pass readily from one host to another, either bird or mammal, and are not so restricted as are the



FIG. 5.—*Echidnophaga gallinacea*, the sticktight flea. X 25.

lice and mites. Some species may carry blood-borne diseases. They are known to carry bubonic plague.

The most commonly observed species on wild birds and poultry especially in the southern part of the United States, is the sticktight flea, *Echidnophaga gallinacea*, so called because it seldom hops from one host to another, as do most fleas, but settles down on one host, deeply inserts its mouth parts, and remains there feeding for days or weeks. It is a small (1 to 1½ mm.) dark brown species which may sometimes be found in enormous numbers or masses on the host, generally around the eyes, base of bill, and ear openings. The minute whitish oval eggs are laid on the host, but as they are not attached in any way soon roll off and come to rest in the nesting materials or other places which the host frequents. A slender, wormlike larva, without legs and having biting mouth parts, soon hatches from the egg, feeds on organic matter in the dust and debris of the nest, and, after reaching larval maturity, spins a small, thin, oval cocoon in which the pupal stage is passed. The adult emerges from the pupal skin after one to four weeks, and immediately seeks a host on which to feed.

Several larger species of fleas breed almost exclusively on



birds, and others may be found occasionally on birds. They may be easily overlooked since they do not remain attached but jump from their host when disturbed.

#### BIRD FLIES

The parasitic flies found on many birds and mammals comprise the family *Hippoboscidae* of the order *Diptera*. Those



FIG. 6.—*Ornithomyia avicularia*, a common bird fly on passerine birds. Magnified about 6 times.

found on birds are generally dark green or brown in color, five to ten mm. in length, greatly flattened, fast-running, and have one pair of wings. They are able to run sidewise through the feathers on the breast, back, and wings. When the feathers of the host are disturbed they may fly quickly from one bird to another and may even alight on a person handling their host. The adults seem to require the body heat of their host and spend practically their entire life on the bird. They cause great annoyance and loss of vitality by feeding on blood which they imbibe through their piercing and sucking mouth parts. They are known to transmit bird malaria and may carry other blood-borne diseases.

The *Hippoboscidae* have a peculiar life cycle in that the egg hatches and the larva develops in the body of the female fly and is deposited as a full-grown larva in the nesting materials or even among the feathers of the adult birds or nestlings. This larva immediately pupates, and the adult fly emerges after several weeks or months, depending on the temperature and other conditions. Several generations a year may occur, but very few details of the life history are known at the present time. Some bird-banders have found the flies more numerous on juvenile than on adult birds, and most abundant in late summer or early autumn. *Ornithomyia avicularia* is a species found on many passerine birds.

Mr. C. L. Whittle, of Peterboro, New Hampshire, has found that these flies are easily collected if the birds are banded and examined indoors in front of a window. When the feathers are

disturbed, the flies immediately dart to the window pane, where they are captured by placing the mouth of a small vial over them.

#### CONTROL OF ECTOPARASITES

Some banders may be interested in the control and eradication of these ectoparasites from birds they are observing in connection with some special problem. Lice may be killed with a light dusting of derris powder or sodium fluoride among the feathers of the bird. This powder may be applied in several "pinches," the quantity which can be held between the thumb and forefinger, inserted among the feathers at several places on the body of the bird, such as among the breast feathers, on the back at base of tail, and some under each wing. Fleas are easily controlled by dusting their hosts with fresh pyrethrum powder to kill the adults and by spraying their breeding places with creosote oil to kill the eggs, larvæ, and pupæ. Feather mites may be killed by dipping the host in a solution of sulphur, soap, and water, using two ounces of sulphur and one ounce of soap for every gallon of water. They should be dipped only on warm sunny days. Ticks and bird flies are best controlled by picking them from the host with small forceps.

#### CONCLUSION

Bird-banding has opened a new avenue of approach for the study of the ectoparasites of birds. The bander has an opportunity to study the parasites and their effect on the habits and reactions of the living bird, an opportunity which is not so readily available to the entomologist. This is a field of study which bird-banders have as yet scarcely touched, the possibilities of which it would be impossible to estimate. It is to the bird-bander that we must look for much information on the life histories of the parasites and their effect on the bird, and it is hoped that this paper will suggest some interesting problems as well as aid in the identification of the larger groups of ectoparasites.

The Bureau of Entomology will be glad to identify ectoparasites and assist the banders as much as possible in solving any problems involving ectoparasites. The bureau would also be glad to receive specimens of ectoparasites to aid in building up its collection and to receive any information which may aid in studies of the life history, host relationships, and classification of the parasites. Specimens may be addressed to the Bureau of Entomology, Washington, D. C.<sup>1</sup>

<sup>1</sup>Specimens and mail should be addressed directly to Mr. H. S. Peters at the Bureau of Entomology, Washington, D. C., in order to facilitate and hasten replies. Mr. Peters will send small vials of preservative to banders willing to collect and send him specimens for identification and for the collection of the Bureau of Entomology.—*The Editor.*