NOTES ON THE MALLOPHAGA

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BIRDS are probably the most intensively studied animal group in the world, but while there are a great many exponents of behaviour, biology, physiology, taxonomy and migration, few have the inclination to study bird parasites. Internally, birds carry around with them numerous and diverse endoparasites. On the surface of the skin and among the feathers live ticks, fleas, mites, bugs and feather lice. Parasites are part of the bird, and as students of the bird as a whole, we cannot neglect this facet of avian life. The purpose of this feature is to draw attention to an important group, of ecto-parasites, the feather lice or Mallophaga.

The Mallophaga are specialized, wingless, ectoparasitic insects which complete the entire life cycle from egg to adult on the same host. In size they range from minute species just less than one millimetre in length to the giant *Laemobothrion* species (Fig. 1), examples of which may be up to ten millimetres long. These insects feed on feathers, which are composed mainly of keratin, a particularly resistant substance to digestion. Accordingly, the feather lice possess a powerful reducing agent in the gut which breaks down the keratin to a more digestible form. While feathers are the main diet of Mallophaga, they have also exploited other food sources found on the exterior of birds. Certain lice are able to puncture the young and growing feathers and extract blood from the soft pulp inside. Lice of the genus *Piagetiella* have exploited a most unusual source of food, for they are found inside the throat pouches of pelicans and cormorants where they feed on blood, skin and probably food debris. Despite their remarkable way of life, *Piagetiella* have undergone no drastic changes of form and resemble other lice which have a solely external habitat.

The geographical distribution of the Mallophaga is obviously dependent on the distribution of the hosts upon which they are found, and a European Swallow, for example, has the same parasitic fauna in all places, whether it is breeding in Europe or being banded by a ringer at Rosherville! However, the feather lice have a "microgeographical" distribution on the individual bird, which is, after all, only a feathered planet as far as they are concerned. We find that lice have become adapted in body form to different regions or niches of the host's plumage. Those lice which are adapted to the head and neck regions of the bird are usually round-bodied forms with short legs (Fig. 2). They lay their eggs openly on the feathers; all this lack of caution on the part of the lice being due to the fact that they are out of reach of the bird's bill, and therefore are in no danger during preening operations. However, lice which live on the back and wings must be wide awake and fast-moving if they are to survive, for the bird can reach these parts with the bill, and will waste no time in pecking at an irritating louse if the latter shows itself above the feathers. Here we find a second type (Fig. 3) which is elongated, flattened, long-legged and able to move sideways between the feathers with surprising speed. The eggs in this case are usually laid on the wings and are placed between the barbs of the feathers where they are protected during preening. A number of other niches occur between these extremes, and lice with intermediate body form may be found on other regions of the plumage (Fig. 4).

Although many birds are found to be louse free, in general every bird harbours at least a few lice in its plumage. Very little experimental work has been carried out on the Mallophaga, but thus far they have not been found to transmit diseases or harmful organisms of any type. The effect of lice on the host is variable, and seems to depend on the numbers involved, and the condition of the host. Small numbers of lice appear to do the bird no harm, for the quantity of feather material consumed is low and easily replaced. However, if conditions arise which are favourable for a "Population explosion" by the lice, then the effects may be decidedly unpleasant. Birds which are sick or have injuries are found to harbour large numbers of lice, possibly because they do not preen as effectively as healthy birds. The movement of the lice is irritating to the bird, which may damage itself through excessive scratching. The lice may strip all the barbs from the feather shafts, or may even cause loss of blood by injuring the skin.

Judging from the present day distribution, parasitologists are of the opinion that the Mallophaga became parasites of birds when the latter were still at an early stage of their evolution. As the birds evolved into the modern species which we know, so their lice also evolved, but apparently at a slower rate. This has resulted in the interesting situation where the lice of related birds are themselves related. We can take this further and state that if the lice from two different birds are related, then the birds themselves are probably related, even though this relationship may have been obscured by evolutionary changes. A student of the Mallophaga can usually tell from which order of birds any particular speciment of louse has been

collected, and in some cases it may be possible to state the family, genus or species of the host, all depending on the degree of host-specificity exhibited by the particular parasite. As a general rule, it can be said that each species of Mallophaga is found on one host species, or on a group of closely-related host species, but there are many exceptions to this rule, and care must be taken in its practical application.

The theory that birds with related lice are themselves related must also be used with caution, for during the process of evolution several other factors have also been operating which have obscured the original, simple relationship between host and parasite. The most important of these factors are:

(i) Discontinuous distribution or Secondary absence,
(ii) Secondary infestation and
(iii) Parallel evolution.

These are rather complex problems, and will not be discussed further.

Lice are not particularly striking insects, lacking the popular appeal of beetles, butterflies and other large insect groups, so there have been few enthusiastic students of the Mallophaga. Moreover, the taxonomy of this order has been confused by early authors who created a host of synonyms by naming as a new species every louse which they found on a new host. During the past 25 years this unfortunate state of affairs has improved vastly, with revisions of genera being undertaken by a handful of dedicated taxonomists throughout the world. Much of the earlier confusion was due to inaccurate host records which came into being through poor collecting methods, and also the method of obtaining material from museum specimens which had previously been in contact with unrelated species. New species of Mallophaga are still being discovered, but at the same time many synonymies are created, especially among the older names. The lice of most orders of birds are gradually becoming fully known, with the exception perhaps of the Passeriformes. This huge order is parasitized by lice which are difficult to separate at the species level. Also, there are insufficient specimens available for a comprehensive revision of these lice to be carried out. The lice of the Passeriformes present a major challenge to workers on the Mallophaga.

How complete is our knowledge of the Mallophaga of Southern African birds? The species which migrate here from Europe are, as a rule, better studied in this respect than resident species. The pioneer student of Mallophaga in South Africa was Mr. G. A. H. Bedford of the Veterinary Research Institute, Onderstepoort, who collected widely and published descriptions of many new species of lice from South African birds during the period 1918 to 1939. For the last decade Dr. F. Zumpt of the South African Institute for Medical Research has collected bird parasites from many localities in Southern Africa (Fig. 5). The Mallophaga thus collected are deposited in the Entomology Department of the above-named institution, and also in the British Museum (Natural History), where many unnamed species are awaiting description. Many gaps still exist in our knowledge of the Mallophaga of the birds of the Ethiopian region, but these are slowly being filled. Work is now under way to assemble the mass of information into a single volume, which will form part of the series "The Arthropod parasites of Vertebrates in Africa south of the Sahara" (F. Zumpt ed.).

In conclusion, bird enthusiasts are reminded that "birds are not only birds but aviating zoological gardens" (from "*Fleas, Flukes and Cuckoos*" by Miriam Rothschild and Theresa Clay, a publication that is highly recommended for further reading on bird parasites).

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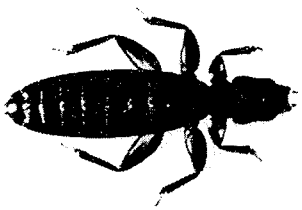

FIG. 1: *Laemobothrion kelloggi* Bedford, 1919. A parasite of the Hadeda *Hagedashia hagedash.*

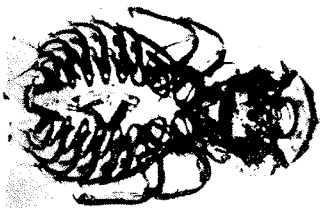

FIG. 2: *Goniodes gigas* (Taschenberg, 1878), found on the head region of the guineafowl *Numida meleagris.*

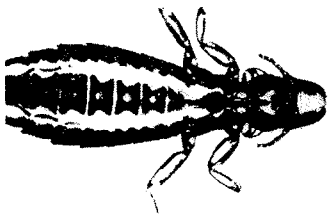

FIG. 3: *Numidilipeurus lawrensis* (Bedford, 1929), found on the wing and back region of the guineafowl *Numida meleagris.*

FIG. 4: *Colpocephalum subpenicillatum* (Piaget, 1885), from the Hadeda *Hagedashia hagedash.*

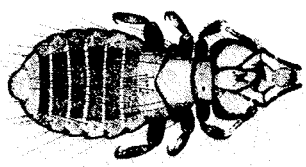

FIG. 5: *Penenirmus zumpti* Tendeiro, 1961 a parasite of the Black-collared Barbet *Lybius torquatus.*