ECTOPARASITE LOAD IN A LAUGHING DOVE WITH A DEFORMED MANDIBLE

J. A. LEDGER

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INTRODUCTION

On 6 July 1968, Mr. J. H. Oosthuizen (Zoology Dept., University of Pretoria) trapped eight Laughing Doves *Streptopelia senegalensis* near Pretoria, one with a deformed mandible. In an earlier discussion with Mr. M. B. Markus (Zoology Dept., University of Pretoria), the writer had suggested a project designed to correlate ectoparasite load with bill deformities. Through the kind intervention of Markus all eight specimens were collected and placed separately in glass jars containing about 500 ml. of 70% alcohol. On receipt in the laboratory, all specimens were treated as described below.

Each specimen was vigorously shaken in its bottle for one minute, and the alcohol decanted into a conical urine test glass. The fluid removed from each bottle was replaced with an equal amount of tepid water to which was added a few drops of commercial liquid detergent("Teepol"), and the bird was again vigorously washed in this solution for a further minute. The fluid from the second washing was also poured into a conical glass. After settling, the sediments in the test glasses were removed with pipettes and examined at a magnification of 12X under a stereomicroscope. All ectoparasites were picked up with a fine bulb pipette and placed in tubes of 70% alcohol for subsequent sorting and counting.

The doves were placed in a hot room at 40°C and allowed to dry for 24 hours. All feathers were then plucked from each carcass, and separately boiled in a solution of 10% potassium hydroxide until completely dissolved. The resultant fluid was poured through a 100 mesh bronze screen and washed with a stream of tap water. All ectoparasites trapped on the screen were washed back into a conical test glass and recovered in the manner already described. The plucked carcasses were separately weighed, crop contents removed and weighed, and the specimens finally dissected to determine sex.

Every effort was made to standardise the treatment of each bird in order to make comparable estimates of the ectoparasite load in each case.

The use of KOH to dissolve feathers is a modification of Hopkins' (1949) technique for recovering lice from mammal skins. Ash (1960:106) used a similar method to recover Mallophaga from birds. Its disadvantage is that weakly sclerotised nymphal stages, as well as eggs are dissolved. For this reason in the birds here discussed as many ectoparasites as possible were removed with alcohol and detergent washings before the feathers were dissolved.

The skull of the bird with a deformed mandible was examined by Markus who comments as follows: "The bill abnormality does not appear to be congenital but the result of the bird having suffered a fracture of the right mandibular ramus some time previously, 4.5 mm. from the commissural point. Lateral displacement and subsequent growth resulted in the mandible developing a strong curvature to the right of the maxilla. Although the bony structure of the latter seems to be normal, there is an anterovental extension of the distal portion of the rhamphotheca a few millimetres in length, a probable consequence of the upper and lower mandibles not approximating (Pomeroy, 1962). The elongation is similar to that in another specimen of *S. senegalensis* with an abnormal beak, described and illustrated by Markus (1962) but in the present case corkscrews very slightly to the left instead of to the right (*vide* Every, 1966)".

RESULTS

The main particulars for each dove are detailed in Table 1. Feather mites (Acarina: Sarcoptiformes) were recovered in small numbers from several specimens but numbers were insufficient for comparative purposes. Body weights (measured simply to compare the general condition of the specimens) should not be accorded significance outside the context of this paper, because of treatment in alcohol and feather removal before weighing. Likewise, crop contents were weighed mainly to assess the feeding ability of the deformed specimen.

Table 1

MALLOPHAGA RECOVERED FROM EIGHT SPECIMENS OF *Streptopelia senegalensis:* SPECIMAN NO. 8 WITH ABNORMAL BILL

Specimen No.	Sex	Weight (gm.)	Crop content (gm.)	*Coloceras* ♂♂	*Coloceras* ♀♀	*Coloceras* nn	*Columbicola* ♂♂	*Columbicola* ♀♀	*Columbicola* nn	*Bonomiella* ♀♀	*Hohorstiella* nn
1.	♂	44.3	1.6	2	8	5	3	5	3	–	–
2.	♂	60.5	5.8	–	2	2	–	–	–	1	–
3.	♂	44.1	4.2	2	2	8	3	3	4	1	–
4.	♀	45.1	1.9	–	2	2	3	4	2	2	–
5.	♂	47.7	0.8	1	2	–	–	–	–	–	–
6.	♀	52.1	3.2	1	3	13	5	11	12	–	–
7.	♀	53.4	1.1	1	–	4	3	8	10	–	2
8.	♂	68.8	7.3	58	76	56	3	–	1	–	–

The Mallophaga recovered from the doves fall into four genera, two belonging to the suborder Ischnocera, and two to the Amblycera.
Ischnocera:

1. *Columbicola theresae* Ansari, 1955

This species inhabits the wing feathers, along the shafts of which the eggs are laid. Specimens were recovered from all but two of the doves examined.

2. *Coloceras chinensis* (Kellogg & Chapman, 1902) *sens. lat.*

This species is generally accepted to inhabit the head and neck regions of the host. *Coloceras* was recovered in low numbers from all the normal doves, and in large numbers from the deformed specimen.

Amblycera:

3. *Hohorstiella* sp.

Two nymphs were recovered from one of the normal doves. The habitat of this genus is unknown; probably these lice move all over the body close to the skin, not restricted to any particular region.

4. *Bonomiella* sp.

Four females were found on three of the normal doves. Only two species of this genus have been described (Hopkins & Clay, 1952:51), and it appears to be very rare.

The Amblycera above were recovered only by dissolving the feathers. No specimens were dislodged by alcohol and detergent washings.

The figures (Table 1) for the numbers of Mallophaga nymphs should not be given too much importance, because it is likely that nymphal stages were lost during the KOH boiling treatment. Probably, however, the number of adult lice recovered represents the near-total adult louse population of each host, and affords a reliable indication of the degree of parasitism.

The specimen with the deformed mandible was a male, weighing more and with more food in its crop than seven of its fellows, collected at the same time and place. It also harboured a significantly large population of *Coloceras* (137 adult specimens), but only three adult specimens of *Columbicola*, and no *Hohostiella* or *Bonomiella*.

DISCUSSION

Pomeroy (1962) has pointed out that plasticity of feeding behaviour in birds allows survival of individuals with deformed bills, even those with gross abnormalities. He states that the deformity

in which the upper mandible becomes overgrown is particularly common in feral pigeons in Europe. It may be that the tameness of doves which subsist to a large extent on grain provided intentionally or accidently by man, is a factor favouring the survival of those with bill deformities that might be fatal in shyer species. Pomeroy (*op. cit.*) also gives weights of birds with deformed bills, indicating that, as in the present case, the birds were "able to feed themselves quite well."

Thus a bird with an abnormal bill can survive, and in fact be fairly vigorous, provided that it can adopt new feeding patterns. However, the deformity may have other indirectly deleterious results. Preening is considered to be important in keeping ectoparasites in check in wild birds and many authors (Rothschild & Clay, 1952; Worth, 1940; Kartman, 1949; Boyd, 1951; Ash, 1960 and others) have noted that birds with deformed bills usually have more ectoparasites than those with normal bills. However, as Ash (1960) has pointed out, unusually high louse populations have also been found on birds which are to all appearances healthy. Preening is probably only one of several factors.

Previous authors on this subject may not have given enough consideration to the complex ectoparasitic fauna of the individual bird. There are usually at least three or four genera of Mallophaga on each host species and these are usually ecologically separated on the host's body, having different feeding, egg-laying and behavioural patterns. Each genus is thus likely to be affected in a special way by the nature of the host's bill deformity. For example, of the four genera of lice recorded from the doves examined, *Hohorstiella* and *Bonomiella* both appear to be very uncommon and can hardly be considered for detailed comparison of maimed and healthy birds. Only one of the other two, *Coloceras*, appears to have undergone a population "explosion". The fact that only one of four genera realized the potential for increase may be due to any one or a combination of the three factors below.

(a) An apparent restriction to low numbers through natural causes other than preening. Some Mallophaga are never abundant on their hosts and a bill deformity would probably have a negligible effect on these (e.g. *Hohorstiella* and *Bonomiella*, above).

(b) Distribution of lice on the host.

The Ischnocera are usually distributed in fairly sharply defined areas of the host's plumage (Ash, 1960). The preening ability of a bird with a deformed bill may differ for various plumage regions. (Examples in Pomeroy, 1962).

The abnormal dove under discussion was clearly incapable of picking up small objects with the tip of its bill (Fig. 1). Thus a possible explanation of the predominance of *Coloceras* over *Columbicola* may be that the bird was unable to preen the head and neck region (principal site of *Coloceras*) because of the loss of picking ability, yet it was able to preen the remiges (principal site of *Columbicola*) quite adequately by drawing them through the bill. Fig. 1 indicates that the latter action could have been accomplished without much difficulty.

(c) Seasonal patterns in abundance and reproduction of Mallophaga of which little is known, but Ash (1960) has noted that a marked peak of infestation rate occurs in some species just prior to the host's breeding season. In an accidental deformity, the timing of the accident relative to the reproductive state of the louse population could affect the parasite's subsequent numbers. A large batch of hatching nymphs, suddenly having no preening control to check their numbers, could establish a large population in their first generation. Conversely, a group of lice in a "quiet" reproductive state at the time would be little affected by the removal of preening control. Further, if two genera of lice on the same host are out of step with regard to their seasonal reproductive burst (assuming such to exist), this will greatly modify the resulting population structures when the accidentally deformed bird is later sampled.

There may be other modifying effects, such as inter- and intra-specific competition between the lice. It is clear that the subject is a complex one. A bill deformity does not necessarily lead simply to a uniform and general increase in the number of ectoparasites.

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SUMMARY

Ectoparasites removed from a Laughing Dove *Streptopelia senegalensis* with a mandible deformed as a result of an injury were compared with those from seven normal Laughing Doves collected at the same time and place. Four genera of Mallophaga were recovered from the specimens, but only one of these, *Coloceras*, showed a marked increase in numbers on the deformed bird. Factors which may influence the number of Mallophaga on birds with deformed bills are discussed.

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J. A. Ledger, S.A. Institute for Medical Research, P.O. Box 1038, Johannesburg.