

tion in North American hummingbirds. Even if this is done, however, still more could be learned from large-scale banding programs, the success of which might prove to be considerable if the present account is taken as an indication.

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ECTOPARASITES FROM EIGHT TREE SPARROWS WINTERING IN SOUTHERN ONTARIO

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INTRODUCTION

Although it has been recognized that several types of ectoparasites may live on one species of bird (Ash, 1960) there are few records of more than one ectoparasite on individual birds and little attention has been given to the ecology of these parasites. The present paper will report on ectoparasites of eight individual Tree Sparrows, *Spizella arborea* (Wilson), and offer some suggestions concerning the ecological relationships of these parasites.

METHODS

In January, 1971 eight male Tree Sparrows were live-trapped near Guelph, Ontario, Canada. Shortly after capture the birds were sacrificed and examined for the presence of ectoparasites. The remiges and rectrices of each bird were removed and examined individually under a dissecting microscope for feather mites (Analgoidea). The head feathers and the body feathers were placed in separate containers of 10% KOH and allowed to partially dissolve. The resulting semi-liquid was poured through a fine bronze screen and bird lice (Mallophaga) were recovered. The ectoparasites collected in this manner were stored in 70% alcohol and later mounted in Hoyer's solution for identification. Representative specimens of all parasites collected were placed in the Canadian National Collection, Entomology Research Institute, Department of Agriculture, Ottawa, Canada.

RESULTS

Ectoparasitic arthropods were taken from all eight Tree Sparrows (Table 1). The most numerous parasites were feather mites. *Analges* sp. (Analgidae) were taken from the head feathers of birds one and six. *Proctophyllodes polyxenous* Atyeo and Braasch, 1966 (Proctophyllodidae) were abundant on the remiges and rectrices of all birds. This species of mite characteristically occupied the underside of the feathers and lay between the barbs close to the rachis.

TABLE 1. NUMBERS OF VARIOUS ECTOPARASITES RECOVERED FROM EIGHT TREE SPARROWS

Bird No.	Analgoidea	<i>Bruelia</i> sp.	<i>Philopterus</i> sp.	<i>Ricinus diffusus</i>
1	21	0	0	0
2	8	0	1	4
3	21	0	0	10
4	133	18	5	2
5	246	0	10	5
6	65	1	2	1
7	138	7	1	6
8	163	15	23	2

Bird lice of three genera were taken from the sparrows. *Ricinus diffusus* (Kellogg, 1896) (Ricinidae) were the most frequent, followed by *Philopterus* sp. (Philopteridae) and *Bruelia* sp. (Philopteridae). *Philopterus* sp. were confined to the head feathers where they were easily visible. *Ricinus diffusus* and *Bruelia* sp. were collected from body feathers. Neither of these two lice were easily found visually but readily recovered using the KOH treatment. Pigmented feather barbs were observed in the gut of both *Bruelia* sp. and *Philopterus* sp. No *Ricinus diffusus* had an obvious feather meal in the gut.

DISCUSSION

Proctophyllodes polyxenous has been previously collected from Tree Sparrows in Ohio and Colorado (Atyeo, personal communication). The *Analges* sp. from the sparrows in this study could not be assigned a specific rank because the genus is in need of revision (Atyeo, personal communication). Peters (1936) also reports the feather mite *Analgopsis* sp. from the Tree Sparrow.

Ricinus diffusus has been taken previously from several species of sparrows including the Tree Sparrow (Nelson, personal communication). *Ricinus fringillae* (DeGeer) has been taken from the Tree Sparrow less frequently.

Although Peters (1936) and Malcomson (1960) record *Bruelia* (= *Degeeriella*) *vulgata* (Kellogg, 1896) from the Tree Sparrow, the Slate-colored Junco, *Junco hyemalis*, is now considered to be the normal host of this species (Emerson, personal communication). Peters' and Malcomson's records should therefore, be replaced by *Bruelia* sp. The *Philopterus* sp. likewise cannot be placed in a specific rank until the genus is revised.

As can be seen from Table 1 the Tree Sparrows examined in this study exhibited a high degree of multiple parasitism. As many as five species of ectoparasites were taken from a single bird. These parasites occupied fairly specific niches on the sparrow. Only *Analges* sp. and *Philopterus* sp. were taken from head feathers. Feather mites may feed on feather lipids (Kelso and Nice, 1963) and the *Philopterus* sp. were clearly feeding on the feathers directly. Thus, these two sympatric ectoparasites are probably separated by feeding habits. Body feathers harboured both *Ricinus diffusus* and *Bruelia* sp. Members of the genus *Ricinus* are reported to be blood feeders (Foster, 1969) whereas the *Bruelia* sp. were feeding on feathers. *Proctophyllodes polyxenous* was virtually the sole occupant of the remiges and rectrices and thus allopatric to all the other ectoparasites.

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