THE INCIDENCE OF HIPPOBOSCID FLIES ON NOVA SCOTIA LANDBIRDS

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ABSTRACT - Three species of hippoboscid flies were collected from landbirds captured on Bon Portage Island, a small island off the southwestern tip of Nova Scotia. Of the 73 hippoboscids collected, 67 specimens were *Ornithomya anchineuria*, 5 were *Icosta americana* and 1 was *Ornithoica vicina*. One specimen of *O. anchineuria* was collected from a boreal chickadee and one from a red breasted nuthatch, species which have not previously been recorded as hosts for this hippoboscid species. Juvenile birds were infested more heavily than adult birds. A total infestation rate of 5.74 % was found on Bon Portage Island.

In the fall of 1995 and 1996, a study was undertaken to capture and band landbirds on Bon Portage Island, a migration stopover site in Nova Scotia. In the first field season of the study, it was observed that many of these birds were hosts to at least three species of parasitic flies of the family Hippoboscidae: *Ornithomya anchineuria* (previously called *Ornithomya fringillina*), *Ornithoica vicina* (previously misidentified as *Ornithoica confluenta*), and *Icosta americana* (previously *Lynchia americana*).

Adult hippoboscid flies (also called hippoboscids, flatflies, or louseflies) are ectoparasites of birds and mammals and feed entirely on the blood of the host. They spend their adult life within the feathers or fur of the host, a habitat for which they are well suited. All hippoboscids are dorsoventrally flattened and move sideways through the host's feathers with ease. However, none is a particularly strong flier, and once they leave the host they are easily captured. Bequaert (1953a, 1953b), Corbet (1956), Askew (1971), and Maa and Peterson (1987) review hippoboscid fly biology.

Although hippoboscid flies have been well studied in other parts of North America (e.g. Bennett 1961, McClure 1984), to my knowledge, there is only one other study that documents the hippoboscid flies of landbirds in Atlantic Canada (Wheeler and Threlfall 1986). The authors of that study were surveying all ectoparasites of passerines in the province of Newfoundland but found only two specimens of *Ornithomya anchineuria*. Therefore, in 1996, I attempted to capture as many hippoboscids as possible during the bird banding study on Bon Portage Island, and thereby contribute to knowledge of Hippoboscidae abundance and host preferences in Nova Scotia.

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METHODS

Bon Portage Island is a small island 3 km off the southwestern tip of Nova Scotia. The island is approximately 150 ha in area and is forested with mostly black and white spruce and balsam fir. Since the island is just off the southwestern tip of the province, birds, which migrate along the north and south shores of Nova Scotia, are likely to stop there.

In each field season, nylon mist nets (12m long, 2.5m tall, 30mm mesh) were set up in a small, 10 ha section of the island. All mist nets were opened from dawn until at least six hours later and checked at intervals of no longer than 30 minutes. The number of nets opened varied on any given day, depending on weather conditions and the number of banders present. No nets were opened when it rained.

All birds captured were placed in cloth bags and taken to a central banding laboratory, where they were processed and released. The processing of birds involved recording the following information: age, sex, wing chord, amount of subcutaneous fat, and weight. Total handling time was kept to a maximum of 30 minutes per bird. It was usually during this handling that any hippoboscids on the birds would either fly off the bird while it was being handled, or would be observed on the bird, and subsequently collected. Because of the large numbers of birds that sometimes had to be processed by only three or fewer banders, no extra time could be spent examining every bird for ectoparasites, making statistical analyses of infested vs. non-infested birds invalid. Also there is no way of knowing whether or not any hippoboscids had deserted the bird while it was entangled in the mist net. However, since all birds captured were handled similarly and for approximately the same length of time, the hippoboscids that were captured, along with those that were observed on the birds, probably represent an unbiased sample of the hippoboscids on landbirds on Bon Portage Island. All hippoboscid specimens collected during this study are now in the Acadia University Wildlife Museum, Wolfville, N.S.

RESULTS

During the 1996 field season (August 2 - October 20), a total of 2177 migrant birds were captured, comprising 80 species. There were 17 species that breed on the island, and 2 species that are permanent residents (A.K. Davis, unpubl. data), many of which were also captured and banded during the spring and summer of 1996. Fifty-two hippoboscid flies were observed on birds, and another 73 were collected and identified (Tables 1 and 2), for a total of 125 observations (a 5.74% infestation rate). Birds that breed on Bon Portage carried most of the hippoboscids observed in 1996. The most abundant bird species, the yellow warbler, was the most heavily infested.

The dates or average dates of hippoboscid observations or collections on the breeding birds were within the month of August. The dates

or average dates of all of the migrants except cedar waxwings were later than August, although the sample sizes for these birds were very small. The two resident species, boreal chickadee and red breasted nuthatch, have late dates of observation as well, but again, these sample sizes were very small.

Of the 73 hippoboscid flies captured, 91.8 % were *Ornithomya anchineuria*, 1 was *Ornithoica vicina* (1.4 %), and 5 were *Icosta americana* (6.8 %) (Table 2). The records of the boreal chickadee and red breasted nuthatch each carrying an *Ornithomya anchineuria* are, to my knowledge, the first records of *O. anchineuria* infesting those bird species. Bennett (1961) found no hippoboscids on 23 red breasted nuthatches examined, and Wheeler and Threlfall (1986) found none on 12 boreal chickadees. Main and Anderson (1970) did not list the number of birds examined, but they recorded a specimen of *O. vicina* on a red breasted nuthatch, and one on a boreal chickadee.

Hippoboscids were carried mostly by young (hatch-year) birds. Out of the 125 records, 105 (84 %) were from hatch-year birds, 13 (10.4 %) were from adult birds, and the remaining 5.6 % were from birds of unknown ages.

DISCUSSION

The general patterns observed in this study are consistent with those in similar studies in North America. Bennett (1961) also captured the species *O. anchineuria*, *O. vicina*, and *I. americana*. He reported a higher infestation rate (16%) than found in this study (5.74%); however he was actively searching for ectoparasites on the birds he captured, and he sampled a larger number of birds (over 6000). Most of the hippoboscids he collected were *O. anchineuria*, as in this study, and he also found that young birds carried more hippoboscids than adults. Herman (1937) collected hippoboscid flies from birds at Cape Cod. He also found that the majority were *O. anchineuria*, and that more young birds were hosts than adults. Main and Anderson (1970) presented data on hippoboscids observed during routine banding at the Manomet Bird Observatory and the Encephalitis Field Station, and reported more *O. anchineuria* than *O. vicina* as well. All authors reported that *I. americana* was largely found on raptorial birds, which is consistent with this study.

Most of the hippoboscids occurred on the birds that breed on Bon Portage, and of the breeding species, the one that is most abundant (yellow warbler) carried the most hippoboscids. Bennett (1961) presented data suggesting that adult hippoboscids emerge from puparia at a time of year when juvenile birds, the most suitable hosts, are most abundant in the area. Most juveniles are present on Bon Portage from late July through August

Table 1: Summary of incidence of hippoboscid flies on birds on Bon Portage Island in 1996. (B = known island breeding species; M = migrant species, does not breed on island; R = known island resident species)

Host	Status	# of hippoboscids observed/ captured	Date or average date of obs./cap. *	Range		# of breeding adult birds
				First obs./cap.	Last obs./cap.	
Yellow warbler *Dendroica petechia*	B	28	14-Aug	03-Aug	09-Sep	29
Fox sparrow *Passerella iliaca*	B	26	01-Sep	11-Aug	02-Oct	18
Swainson's thrush *Catharus ustulatus*	B	13	23-Aug	02-Aug	11-Sep	17
Common yellowthroat *Geothlypis trichas*	B	12	19-Aug	07-Aug	10-Sep	16
Song sparrow *Melospiza melodia*	B	9	16-Aug	06-Aug	08-Sep	6
American redstart *Setophaga ruticilla*	B	5	20-Aug	08-Aug	31-Aug	14
Blackpoll warbler *Dendroica striata*	B	4	11-Aug	08-Aug	13-Aug	6
Sharp-shinned hawk *Accipiter striatus*	M	4	17-Sep	05-Sep	24-Sep	
Black-throated green w. *Dendroica virens*	B	3	23-Aug	12-Aug	15-Aug	4
White-throated sparrow *Zonotrichia albicollis*	M	3	14-Oct	12-Oct	19-Oct	
Myrtle warbler *Dendroica coronata*	B	2	04-Aug			3
Yellow bellied flycatcher *Empidonax flaviventris*	B	2	09-Aug	06-Aug	12-Aug	3
Red breasted nuthatch *Sitta canadensis*	R	2	25-Sep	19-Sep	02-Oct	3
Northern waterthrush *Seiurus noveboracensis*	M	2	30-Aug	30-Aug	31-Aug	
Red-eyed vireo *Vireo olivaceus*	B	1	30-Aug			6
Golden-crowned kinglet *Regulus satrapa*	B	1	13-Aug			4
Ruby crowned kinglet *Regulus calendula*	B	1	07-Aug			1
Boreal chickadee *Parus hudsonicus*	R	1	19-Oct			10
Northern saw-whet owl *Aegolius acadicus*	M	1	27-Sep			
Cedar waxwing *Bombycilla cedrorum*	M	1	19-Aug			
Hermit thrush *Catharus guttatus*	M	1	12-Oct			
Nashville warbler *Vermivora ruficapilla*	M	1	10-Sep			
Scarlet tanager *Piranga olivacea*	M	1	01-Oct			
Swamp sparrow *Melospiza georgiana*	M	1	02-Oct			
Total		125				140

* When more than one capture/observation was made, the average of all is given.

(A.K. Davis, unpubl. data). The fact that all hippoboscids taken from or observed on breeding bird species on Bon Portage were either captured or observed in August, seems to support this.

Very few migrant birds carried hippoboscids and the few that did were captured late in the migration season. It is not known, however, whether these birds were already infested when they arrived on the island, or whether they picked up late-emerging hippoboscids during their migratory stopover on the island. There is also the possibility that some hippoboscids may have inadvertently transferred to unnatural hosts during the processing of the birds. A hippoboscid could be dislodged from a bird while the bird was in a bag, then picked up by a different bird transported in the same bag. It is unlikely that this happens very often, but researchers need to keep this in mind.

Few researchers of hippoboscid flies have classified the birds they captured as either migrants, breeders, or residents as has been done in this study. On Bon Portage Island one can easily do this, since the island is small enough so that all breeding and resident species can be identified. Any other species that are captured in the fall must therefore be migrants. Relatively little is known of the effects of migration on hippoboscid flies. If more researchers would determine which birds are migrants and which are breeders, our knowledge in this area would improve.

Table 2: Prevalence of the three species of Hippoboscidae collected and their associated hosts on Bon Portage Island in 1996 (refer to Table 1 for scientific names of birds)

Bird Species	*Icosta americana*	*Ornithomya vicina*	*Ornithomya anchineuria*
Yellow warbler			8
Fox sparrow			22
Swainson's thrush			9
Common yellowthroat			1
Song sparrow			4
American redstart			2
Blackpoll warbler			2
Sharp-shinned hawk	4		
White-throated sparrow		1	1
Northern saw-whet owl	1		
Yellow bellied flycatcher			1
Cedar waxwing			1
Hermit thrush			1
Nashville warbler			1
Scarlet tanager			1
Swamp sparrow			1
Boreal chickadee			1
Red breasted nuthatch			1
Unknown host			10
Total	5	1	67

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