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*Received December 8, 1959*

# SOME INSECT PARASITES ASSOCIATED WITH THE EASTERN BLUEBIRD IN MICHIGAN

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Birds are known to have many external and internal parasites which may effect their health and numbers. O. E. Plath (1919) mentions two species of blowflies *(Protocalliphora avium* and *P. splendida)* the larval stages of which are external blood-sucking parasites of nestling birds. He studied 63 nests of five species of birds in western United States and found 39 were infested, often causing the death of the nestlings.

Boyd (1951) states that blowfly larval parasites of birds are typically nocturnal and feed intermittently. Mud constructed nests and nests in holes are favorable abodes for parasitic *Protocalliphora*, for the life cycle may be passed within the nest itself. Death of fledglings from such infestations has been frequently reported.

Sabrosky and Bennett (1956) recognize 21 Nearctic species of *Protocalliphora*, 13 species of which were found in Algonquin Park, Ontario. *Protocalliphora metallica* and *P. sialia* are the only forms definitely known by Sabrosky (1959) to occur in Michigan, although based on general distributional records at least eight other species seem likely to be discovered in this state.

In the Midland area, from 1956 to 1959, I have banded 61 Eastern Bluebird *(Sialia sialis)* nestlings and adults from nests. Not until 1959 did I find any larva of *Protocalliphora* actually feeding on the birds. On these occasions the birds were examined at twilight, indicating the nocturnal habits of the parasitic fly larvae. Even then, only a few out of hundreds of larvae were feeding at any one time, the rest being an inch or 2 away in the bottom of the nest, often out of sight, and nearly or completely engorged with blood.

In 1959 I found eight bluebird nests in the Midland area, of which four were successful. A few "case histories" of successful nests will illustrate the magnitude of the parasitic insect population of *P. sialia* maintained by bluebirds:

*Stowe bluebird house.* This box was 5 feet off the ground, on a fence post in a pasture. Chronological events are as follows:

June 7—5 bluebird eggs present.

June 19—5 nestlings about 2-3 days old.

June 26—Banded the nestlings and noticed 2 engorged maggots on each leg of one nestling; 1 maggot on the leg of another. Removed these maggots and 106 other pupae and maggots from the nest. Put insects in a quart jar at 80°F. in order to observe the development of the insects.

June 30—5 nestlings looked sick; cleaned out nest box and replaced bluebirds in a new nest artificially made of fresh hay; put all contents in the quart jar with the June 26th collection. A count of the parasites for June 26 and 30 totaled 206 larvae and pupae of *P. sialia.*[1]

July 6—In the holding jar, 15 adult *P. sialia* emerged from pupal cases.

July 13—There were no live adult blow flies in the jar. However, many small wasps, parasitic on the pupae of *P. sialia* emerged in the jar and were identified as *Nasonia vitripennis*[2] of the hymenopterous family Pteromalidae.

July 23—15 live adult wasps; no live adult blow flies in jar.

July 29—Some wasps in larval stage alive in fly pupae; no live adults in jar.

Aug. 7—No live adult blow flies or wasps. A count of the dead insects in the jar produced 146 life stages of the fly including 15 adults, 116 normal-sized pupae and 15 small pupae; plus 60 larvae too small to pupate which were dried up and difficult to find in the debris of the nest. Some of the small fly pupae contained wasp adults unable to emerge and one contained a dwarfed dead adult fly.

*Kenaga Bluebird House.* This box was about 6 feet from the ground, on a post at the edge of a shrubby pasture, about 2 miles northeast of the Stowe bluebird house. Chronological events are as follows:

June 13—6 nestlings; banded them.

July 6—2 nestlings left in the nest, both in very weakened condition; 1 remaining nestling had a fly maggot on its tarsis. Cleaned out contents of box; found 196 larvae and pupae of *P. sialia.* Kept these under observation in a jar as with Stowe bluebird box collection.

July 13—All bluebird nestlings gone from nest. In the jar, all fly larvae that were able had pupated; others dead.

July 14—3 adult flies alive in jar; numerous adult wasps *(N. vitripennis)* emerged; males about ½ the size of the females and with shorter wings.

July 16—2 adult flies alive; many adult wasps.

July 21—No adult flies alive; about 150 adult wasps alive.

July 23—2 adult wasps alive.

July 27—Hundreds of adult wasps alive.

July 30—Few adult wasps alive.

Aug. 3—No adult wasps alive.

[1]Identified from adults by Mr. Curtis Sabrosky, U. S. National Museum.
[2]Identified from adults by Dr. B. D. Burke, U. S. National Museum.

Aug. 5—Counted insect remains in nest debris and found 183 flies (8 were adults and 175 were pupae). At least 2 fly pupae contained live larval wasps or pupal wasps. There were approximately 2100 adult wasps, about 94% of which were females. In addition, there were 2 unidentified live adult fleas and one larva of the black carpet beetle, *Attagenus piceus* (a common household pest of woolen goods, feathers, etc.), and hundreds of unidentified non-parasitic mites.

During the summer of 1959, I found larvae of *Protocalliphora sp.* in the nest of several species of box-nesting birds, including the House Wren *(Troglodytes aedon)*, English Sparrow *(Passer domesticus)*, Tree Swallow *(Iridoprocne bicolor)*, Yellow-shafted Flicker *(Colaptes auratus)*, Eastern Bluebird and in the mud nests of the Cliff Swallow *(Petrochelidon pyrrhonota)*. The above species seem adjusted to the same nesting habitat. In the field study at Algonquin Park, Ontario (Sabrosky and Bennett 1956) over 2500 bird nests were examined. It was found that in general, species of *Protocalliphora* show a selective preference for certain habitat levels or strata. "Within a given habitat they will apparently attack any species of bird with young confined to a nest." Apparently the fly does not parasitize the adult bluebird. In 1960, in an area close by where bluebird nestlings were heavily parasitized, another pair of bluebirds, sitting on sterile eggs for a total of 46 days, remained completely free of *Photocalliphara* larvae.

Based on the data in the Kenaga bluebird house, the fly pupa takes about 8-10 days to emerge as an adult. In addition to the fly larvae, which parasitize the bluebird, there were at least 2 generations of wasps parasitizing the fly. According to Dr. Burks, *N. vitripennis* is a pupal parasite, ovipositing on the puparia within a quite narrow, critical time limit (Sabrosky 1959). The wasp appears to have a life cycle of about 12-14 days.

The Kenaga nest contained around 2300 insects dependent directly or indirectly on the bluebird nestlings blood. It is no wonder that bird deaths are often reported as the result of insect parasitism. Although I did not observe deaths to nestlings as a result of the above described parasitisms, a definite effect on the rearing time was noted. Six nestlings banded on June 13 in the Kenaga bluebird house were about 5-6 days old. Twenty-three days later (July 6), two nestlings were still in the box, making the rearing time well over 25 days. Bent (1949) states that the young remain in the nest 15-18 days. Thus, the 2 parasitized nestlings were retarded from leaving the nest by at least 10 days and possibly 14-15 days.

What effect does the parasitic wasp *N. vitripennis*, have on the population potential of *P. sialia*? Including the Stowe and Kenaga houses a total of 339 flies pupated, of which only 23 or about 7% emerged as adults. Thus, the wasp parasitism was heavy. The reproductive potential of a single pair of flies is probably several hundred eggs, so that if one assumes other survival factors to be favorable, this much wasp parasitism of the fly is not excessive for the survival of the fly species. Wasp parasitism of the fly comes too late to lessen the damage done by the fly larvae feeding on the bird, but is a significant factor in controlling the size of future generations of the blow fly.

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*Received January 10, 1960*

# DISTRIBUTION OF WINTER REDWINGED BLACKBIRD POPULATIONS ON THE ATLANTIC COAST

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The Coastal Plain Province of the Southeastern States is the principal wintering ground of Redwinged Blackbirds *(Agelaius phoeniceus)* that breed in the coastal marshes of the North and Middle Atlantic States, where they also form huge late-summer aggregations. The winter concentration area along the coast extends from about New York City to southeastern Georgia. Most of the Redwinged Blackbird population winters south of the mouth of the Chesapeake Bay, in the Middle and Outer Coastal Plain. In this Southeastern Coastal Plain area, U. S. highway 301 can be considered a tentative inland boundary, as far as significant numbers are concerned. Although appreciable numbers of Redwinged Blackbirds have been recorded during the winter in the southern Piedmont, and some in the southern mountain areas, *all* winter recoveries of birds banded on the breeding grounds and summer feeding grounds in the Northeastern and Middle Atlantic States have been east of the Fall Line, and mostly south of Chesapeake Bay.

Since 1957, the blackbird banding program of the Fish and Wildlife Service in the Eastern States has been accelerated, and the distribution picture may be somewhat altered when an appreciable number of additional recoveries have been made. It is expected, however, that the general pattern will be unchanged, for the moderate climate, bountiful food supply, and abundant protective roosting cover of the Coastal Plain south of the Chesapeake Bay apparently provide an optimum wintering ground.

## POPULATION CENTERS

The important winter population centers south of Chesapeake Bay are, in order of relative abundance of birds: (a) the Virginia-Carolina Peanut Belt that extends from the Suffolk area of Virginia to Beaufort County, North Carolina; (b) the Lower Cape Fear River region; and (c) coastal South Carolina, from the Lower Santee River to southeastern Georgia.