

## NEST PARASITISM OF HAWKS

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A VERY high percentage of infection by maggots of *Protocalliphora splendida sialis* Shannon and Dobroscky was found in the nests of the soaring hawks of the family Accipitriidae near Ithaca, New York, during the past two years (1935-36). *Protocalliphora* is a member of the family Calliphoridae, or blowflies, and is a relative of the fleshflies which are raised to feed to fishes and grouse. It was first mentioned in 'The Auk' by Henshaw in 1908. Since then it has been reported in California by Plath in 1919; at Cornell University by Coutant in 1915; again at Cornell by Shannon and Dobroscky in 1924; near Washington, D. C., by McAtee in 1927 and 1929; and in New England by Johnson from 1925 to 1932.

Plath, Coutant, and others report it as killing or crippling songbird nestlings, particularly Bluebirds and finches. In central New York it is an exceedingly common parasite in the nests of the soaring hawks. I have taken it in great numbers from both old and new nests of Red-tailed, Red-shouldered, and Cooper's Hawks in 1935 and 1936, but have failed to find it in nests of Marsh, Sharp-shinned, and Duck Hawks. The Marsh and Duck Hawk nests are probably not suited to it. The Sharp-shinned Hawk's nest examined was a new one without a damply matted interior. Had it possessed such an interior the maggots would probably have been found there. The Red-tailed and Red-shouldered Hawks are new host records, I believe. The Cooper's Hawk was reported as a host by Shannon and Dobroscky in 1924.

The insect is a blood-sucking parasite. Plath reports it attacking the feet, eyelids and crowns of songbird nestlings. In the Cooper's Hawks observed, the blood was obtained from the feather sheaths of the crown and nape, and probably from the feet. The nest examined contained five nestlings. Three of these vanished before they were feathered. This nest was most heavily infested and attacks of the maggots may have driven the young hawks from it. Such attacks have been observed to drive songbird nestlings from their nests.

The maggots enter the ear cavities and attack the feather sheaths of the crowns and napes of large hawks, but the feet do not seem to be attacked. Perhaps the skin is so thick here that they cannot pierce it. Ten maggots were removed from the right ear and nine from the left of a female Red-tailed Hawk reared in 1935. Ten more were found on her crown and nape, and the nest from which she was taken was crawling with them. Each maggot in the ears was as large as a mature housefly maggot and gray in color. The mass of their bodies crowded in the ear openings stretched these

to twice their normal size. The ear openings were completely plugged by the caudal ends of the maggots. This condition appears to be usual in well-grown nestling Red-tailed and Red-shouldered Hawks.

The maggots taken from the crown and nape at first seemed to be under the skin. Investigation proved that this apparent skin surface was an incrustation of down, blood and fecal waste caused by the maggots. The skin was not pierced. Apparently the blood was taken from the feather sheaths.

Three Red-tailed, three Red-shouldered and two Cooper's Hawks, all parasitized by the maggots were reared. No ill consequence of the parasitism was observed. Signs of irritation were not shown by these hawks. None of them showed any indications of deafness. The feathering of the crowns and napes developed normally. The feathering of the crown and nape of the female Red-tail already mentioned was, if anything, excessive. The two Cooper's Hawks, both males, were a bit small, weighing only about a pound each, but the female Red-tail, the most heavily infested of all, grew into a large bird, weighing over three and one-quarter pounds. This lack of injury to young hawks is in contradiction to the observations made upon songbird nestlings by others, with the exception of McAtee. Finding the maggots in the ear cavities is a new observation, I believe. It occurs only in the large *Buteos*. The ears of the small hawks and of the songbirds are probably too small for the maggots to enter. They prefer dampness and darkness, living in the interiors of the nests in the day and crawling out at night to feed. Birds that build well-ventilated nests, or no nests, are not infested. Duck Hawks appear to escape for this reason. It is possible that Duck Hawks might support as many maggots as could be sheltered in their ears, but such infestations have not been observed, and seem unlikely because of the lack of suitable places for pupation on the dry ledges where these hawks nest.

Pupation takes place in the damp interior of the nest, from the bottom of which the adult flies emerge. Mr. Hallock of the Cornell University Entomology Department, who reared the maggots collected in 1936, said that most calliphorid pupae would die in such wet situations. *Protocalliphora* pupae die if dried too soon. This observation agrees with those of Plath and Johnson and disagrees with Coutant's, who based his conclusions on insufficient evidence.

The adults resemble dull-colored bluebottle flies. A few were collected while feeding young Red-shouldered Hawks a dead chicken. The liver, which Red-shoulders will not eat, fell to the ground. A number of flesh-flies, *Lucilia*, collected on it. Associated with them were a few *Protocalliphora* and *Phormia* flies, noticeable by their different color and method of holding their wings. These flies have been supposed to be uncommon

because they are uncommon where insects are usually collected. If collections of birds' nests are made, large numbers of *Protocalliphora* usually emerge from them and they are a common inhabitant of bird houses.

My observations lead me to believe that the infestation of Red-tailed and Red-shouldered Hawks' nests is nearly one hundred per cent. Plath records a sixty-one per cent average for songbird nests in California in 1918. In these infested nests ten per cent of the nestlings died and all were crippled or weakened. In 1931, Johnson (1932) reports a weakening of nestlings in infested nests in New England, causing a lessened resistance to adverse weather. McAtee, in 1929, is the only one who reports songbird infestations without injury to the nestlings. The majority of the evidence, then, at the present time indicates abnormal host-parasite relations in the songbirds.

Contrasted with this, the large hawks, having probably one hundred per cent infection, are neither killed nor weakened under ordinary conditions. These are normal host-parasite relations and would seem to indicate that the soaring hawks, or Buteoninae, are a normal host of *Protocalliphora* maggots.

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