Francis H. Wilson

Excerpt Canadian Entomologist, February, 1933.

FAUNAE OF NESTS OF THE MAGPIE AND CROW IN WESTERN MONTANA.[1]

BY WM. L. JELLISON, ASST. BACTERIOLOGIST, AND CORNELIUS B. PHILIP, ASSOC. ENTOMOLOGIST,

United States Public Health Service, Hamilton, Montana.

Incidental to the collecting of ticks and other animal parasites in the Bitterroot Valley of Southwestern Montana, a number of nests of magpies, *Pica pica hudsonicus*, and a nest of the common crow, *Corvus brachyrhynchos*, were examined particularly for blood sucking dipterous larvae, *Protocalliphora* spp.

This type of parasitism has been recorded from widely separated districts and has been found common in the nests of many passerine birds wherever a systematic search has been made. Only the more pertinent references to the literature are mentioned below.

The first records for North America are by Henshaw (1908) who observed a fatal infestation on nesting bluebirds, *Sialia sialia*, at Wellesley Hills, Mass. Specimens reared by him were described later as *Protocalliphora splendida sialia*

1. Contribution from the Rocky Mountain spotted fever Laboratory of the United States Public Health Service, Hamilton, Montana.

TABLE 1—Collecting and Rearing Data of *Protocalliphora avium* Shannon & Dobroscky

Nest Number[1]	1	5	6	12	14	20	23	Total
Nest of	Magpie	Magpie	Crow	Magpie	Magpie	Magpie	Magpie	..
Date collected	5-28-31	5-28-31	5-28-31	5-31-31	5-31-31	6-2-31	6-2-31	..
Fledglings in Nest	3	6	1	4	6	Deserted Recently	Deserted Recently	..
P. avium puparia in Nest	8	3	0	7	12	2	3	35
P. avium, larvae in Nest	190	187	47	373	343	9	180	1329
No. pupating in laboratory	139	134	19	346	326	9	100	1073
Average pupal period in days	10.43	10.26	9.73	11.24	11.21	..	11.88	11.02[2]
No. adults emerging	135	125	19	330	290	9	84	992
Males	71	63	10	170	146	..	47	507
Females	64	62	9	160	144	..	37	476
Sex ratio (males to females)	1.11	1.02	1.11	1.06	1.01	..	1.27	1.07

[1]Many old, abandoned nests were examined but contained no viable *Protocalliphora* larvae or puparia.
[2]Weighted average.

by Shannon and Dobroscky (1924).

Important contributions to recorded faunae of birds' nests, particularly regarding biological observations on blood-sucking dipterous larvae, have since been made by Coutant (1915), Plath (1919 a, b), Arnold (1919), Keilin 1924 a, b), Dobroscky (1925), McAtee (1927, 1929) and Johnson (1929). Arnold in Colorado reports myiasis with deep, active invasion of tissues of nestling birds, particularly the western meadowlark. Shannon and Dobroscky (l.c.), in a monographic treatment of the genus described adults reared by Arnold as *P. hirudo hirudo* and others taken from crows nests at Ithaca New York as *P. avium avium*.

Chalcid parasites *Mormoniella vitripennis* (Walker) [syn. *M. (Nasonia) abnormis* Boh.], were reared from puparia of *Protocalliphora* spp. by both Plath and McAtee. Plath also records *Tinea occidentella* (Chambers) as predacious on normal and parasitized puparia.

The extreme infestations of *P. avium* larvae observed by us indicated that the large, twig canopied, mud plastered, fiber lined nests of the western magpie served as favorable habitations and the nesting birds as excellent hosts. From 5 of the magpie nests examined, 108, 187, 190, 343 and 373 larvae were taken respectively. An infestation of 343 larvae in the nest of a crow at Ithaca, New York, was the previous maximum number as reported by Dobroscky (l.c.).

The firm mud-plastered inner shells of the nests were removed from their massive outer framework of twigs and placed in sacks for later examination in the laboratory. An accurate census was then taken of the *Protocalliphora* larvae and puparia present. A few of the latter were found in each nest. As the larvae were well developed, most of them were placed in dry sand for pupation. The sand was screened daily and the puparia isolated. The numerous other insects and arachnids were pinned or preserved in alcohol.

Table I presents the collection and rearing data for *Protocalliphora avium* and Table II a qualitative list of the various insects found in the nests.

TABLE II—QUALITATIVE LIST OF NEST INHABITANTS.

I. Crow, *Corvus brachyrhynchos,* 1 occupied nest.

Diptera—Protocalliphora avium Shannon and Dobroscky (larvae and puparia); *Culicoides biguttatus* Coquillett (blood-gorged adults).

Coleoptera—Dermestes signatus Leconte (adults).

Mallophaga—off fledgling; *Docophorus communis* Nitzsch; *Myrsidea subaequalis* (Lyonet).

II. Magpie, *Pica pica hudsonicus* (Sabine) 6 occupied nests.

Diptera—Protocalliphora avium Shannon and Dobroscky (larvae and puparia); *Hylemia* sp. (adults); *Culicoides crepuscularis* Malloch (blood-gorged adults).

Coleoptera—Dermestes signatus Leconte (larvae and adults); *Dermestes talipinus* Mann. (adults); *Anthrenus occidens* Casey (adults); *Helops convexulus* Leconte (adults); *Cratraea* sp. (adult).

Hymenoptera—Mormoniella vitripennis Walker (parasitic in *P. avium puparia*); *Morodora armata* Gahan, n. gen. and sp. (parasitic in *P. avium* puparia).

Lepidoptera—Tineidae, undetermined species (larvae).

Mallophaga—Docophorus communis Nitzsch; *Mrysidea curysternum* (Nitzsch).

Many deserted nests were examined which yielded empty *Protocalliphora* pupal cases, a few spiders and one pseudoscorpion that has been determined as *Hesperochernes montanus* new species by J. C. Chamberlin who is describing this arachnid elsewhere.

As shown in Table II two species of chalcid parasites emerged from isolated puparia. *Mormoniella vitripennis* (Walk.) was reared from two collections. Another chalcid which proved to be new was reared from several other lots of puparia and is described in an accompanying paper as *Morodora armata* by A. B. Gahan of the Federal Bureau of Entomology. This species was induced to parasitize fresh puparia of *P. avium* under observation in test tubes. The adult parasites emerged in less than 36 days. Parasites were reared only from puparia collected in the nests and not from any that pupated after collection with the exception of the few experimentally parasitized.

BIOLOGICAL NOTES ON PROTOCALLIPHORA AVIUM S. AND D.

Every occupied nest examined contained *Protocalliphora* larvae as shown in Table I. The larvae were confined to the fibrous mass of rootlets and stems that lined the nest and in the accumulation of very dry, scaly, duff that had sifted through this mass to the tight mud-plastered floor. No larvae were found on or in the fledglings as has been reported by Arnold (l.c.). Most larvae were of uniform size and in an advanced stage of development with very few early instars present. In this respect their developemnt was well timed with that of the host as the fledglings were feathered and nearly ready to leave the nests. Bright red blotches of undigested blood showed plainly in the fore-gut of the living larvae. Ten were dissected and the gut contents smeared and stained revealing the nucleated erythrocytes of avian blood.

Many old nests were examined for *Protocalliphora* pupal cases but relatively few were found, indicating either that previous infestations had been light, that scavengers had destroyed the pupal cases, or perhaps that the advanced larvae had left the nests and dropped to the ground for pupation. This might account for the observation of Plath (1919 a) who recovered only 43 larvae and puparia from the nest of a goldfinch in which he placed 90 nearly mature larvae. He states, "The larvae had lost their bearings and fallen from the nest."

No difficulty was encountered in rearing imagos from the mature larvae collected. Larvae were placed in jars of clean dry sand into which they burrowed for pupation. The average pupal period of 983 reared adults was 11.02 days at room temperature during the months of May and June which approximated 24°C. Four-tenths of one per cent of the larvae died without pupating and a pupal mortality of 5.3 per cent was experienced.

The nests of magpies and crows appear to offer an optimum type of habitat for *P. avium* and it is possible that these birds are the usual hosts, while in the nests of smaller, beneficial species, the parasites may be injurious and even fatal to nestling birds as reported in the literature. Certainly, the magpie nestlings observed by us appeared healthy and of good flesh, with only minute lacerations on the breast to indicate feeding by the generous infestations of maggots present.

NOTES ON OTHER INSECTS.

Dermestid larvae were abundant in the nests and after removal to the laboratory were observed destroying viable puparia of *P. avium*. Eleven adults were taken from the crow nest, and one magpie nest yielded forty-seven larvae of various sizes. Both collected and reared adults were later identified as *D. signatus*.

Midges, *Culicoides biguttatus* and *C. crepuscularis* were abundant in nests built close to a stream. Many of these were gorged with blood and seemed perfectly at home in the debris of the nests.

The fledgling crow was infested with Mallophaga of two species, *Docophorus communis* Nitzsch and *Mrysidea subaequalis* (Lyonet). *D. communis* was also present on the magpies but associated with *M. curysternum* (Nitzsch).

Acknowledgements: Much of the insect fauna herein recorded was determined through the kindness of Harold Morrison by A. B. Gahan, H. S. Barber, E. A. Chapin, Alan Stone, J. M. Aldrich, C. T. Green, and C. Heinrich. We are also indebted to J. C. Chamberlin who determined the pseudoscorpion.

SUMMARY.

1. Extremely heavy infestations of *Protocalliphora avium* are recorded from nests of magpies, 373 larvae being taken from one nest containing 4 fledglings. Forty-seven larvae were also found in the nest of a crow.

2. Two hymenopterous parasites were reared from collected puparia, *Marmoniella vitripennis* (Walk.) and *Morodora armata* new genus and species described in an accompanying paper by Gahan. Parasitism of reared *P. avium* pupae was accomplished in the laboratory with the latter parasite, a new generation of adult chalcids being recovered.

3. Larvae of *Dermestes signatus* were observed to be predacious on P. *avium* puparia. This little known dermestid species appeared to be common in the birds' nests examined.

4. Blood-gorged midges, *Culicoides biguttatus* and *C. crepuscularis* were abundant in several inhabited nests.

5. Sixteen species of insects and arachnids are reported from crow and magpie nests in Western Montana.

BIBLIOGRAPHY.

Henshaw, H. W. 1908 A parasitic fly injurious to our native birds. The Auk *25*: 87-88.

Coutant, A. F. 1915 The habits, life history and structure of a blood sucking muscid larva *(Protocalliphora azurea)*. Journ. of Parasitol. *1*: 135-150.

Plath, O. E. 1919 a. Parasitism of nestling birds by fly larvae. The Condor *21*: 30-38.

..... 1919 b. The presence of *Phormia azurea* Fallen (larvae parasitic on nestling birds) in the Puget Sound region and data on two undescribed flies of similar habit. Ann. Ent. Soc. Amer. *12*: 373-378.

Arnold, W. W. 1919 Maggot infested birds. The Auk *38*: 147-148.

Keilin, D. 1924 a. On the life history of *Neottiophilum praeustum* (Meigen 1826) (Diptera-Acalypterae) parasitic on nestling birds, with some general considerations on the problem of myiasis of plants, animals and man. Parasitology *16*: 113-126.

. . . . . 1924 b. On the life history of *Anthomyia procellaris* Rond. and *A. pluvialis* Linn. inhabiting the nests of birds. Parasitology *16*: 150-159.

Shannon, R. C., and I. D. Dobroscky 1924. The North American bird parasites of the genus *Protocalliphora*. Journ. Wash. Acad. Sci. *14*: 247-253.

Dobroscky, I. D. 1925. External parasites of birds and the fauna of birds' nests. Biological Bull. of the Marine Biol. Lab. *48*: 274-281.

McAtee, W. L. 1927. Notes on the insect inhabitants of bird houses. Proc. Ent. Soc. Wash. *29*:87-90.

. . . . . 1929. Further notes on the insect inhabitants of bird houses. Proc. Ent. Soc. Wash. *31*: 105-111.

Johnson, C. W. 1929. The injury to nestling birds by the larvae of *Protocalliphora*. Ann. Ent. Soc. Amer. *22*:131-135.