

COLLYRICLUM FABAE: A CHALLENGE TO BANDERS

By Lewis F. Kibler

While preparing a note on the occurrence of a parasite called Collyriclum fabae, in the Eastern Bluebird (Sialia sialis) I came to realize that there is little if anything about this parasite in the banding literature. This is surprising, for any one of us could come across C. fabae in our everyday banding activities. It was first reported by Schmaltz (1831) based on specimens collected by Bremser from the Great Titmouse (Parus major) in Austria in 1823. Between 1931 and 1944 it has been reported from 16 more species of European birds. In the United States Ransom first noted it in a House Sparrow (Passer domesticus) at Ripon, Wisconsin in 1907 (Cole, 1911). Hassel (Stiles and Hassel, 1908) reported it in a Bluejay (Cyanocitta cristata) from Maryland. Cole reported it in House Sparrows at Madison, Wisconsin (1911). Riley (1931) reported finding it on the House Sparrow at Ithaca, N.Y. in 1914 and Tyzzer found it on the same host in Boston, Mass. (1918).

At the time, there was some disagreement as to whether the European form was the same as that found in the United States (Ward, 1917; Harrah, 1922). At first it was assumed that the European form had been introduced into the United States via the House Sparrow. However, by 1926 (Chapin) parasitologists had generally agreed that the new world form was a distinct species. Morgan and Farnier (1944) in reviewing its status reported it in eleven species of birds from the United States. Besides those mentioned above they include the Domestic Fowl (Gallus gallus), Domestic Turkey (Meleagris gallopavo), Crow (Corvus brachyrhynchos), White-breasted Nuthatch (Sitta carolinensis), Robin (Turdus migratorius), Purple Grackle (Quiscalus quiscula), Red-winged Blackbird (Agelaius phoeniceus), Cowbird (Molothrus ater) and Purple Finch (Carpodacus purpureus).

These occurrences were limited to two geographical regions in this country: eastern United States, including Massachusetts, New Jersey and Maryland; and north-central United States, including Michigan, Minnesota and Wisconsin. Since then it has been reported in a Varied Thrush (Ictoreus naevius) from Oregon (Canaris, 1966) and the Eastern Bluebird in western New York (Kibler, 1968). I have not been able to find other records though there may well be others. Whether its recent occurrence in western New York and Oregon is fortuitous, or whether it has been present but undetected, or whether this actually represents an extension of C. fabae's range is not clear.

An interesting point is that the occurrences reported by Morgan and Farnier for the United States were from immature birds. They felt that this fact might be a significant clue to the, so far, unknown life cycle of C. fabae. On the other hand it may merely reflect the fact that immature birds with their limited powers of flight are more easily obtained for observation.

The characteristic finding in a bird infested with C. faba is one or more cysts near the vent although there are reports (Cole, 1911; Kerncamp, 1924; Riley, 1931) of birds with whole clusters of subcutaneous cysts from the vent to the pectoral area. In my experience, two female Bluebirds (AHY) had one or two adjacent to the vent and one male (AHY) had four around the vent which rendered the sphincter incontinent. The cysts are about 0.5 cm. in diameter, are pale red or flesh-colored and present a yellowish "head" from which can be expressed dark fluid material containing eggs when seen under the microscope. When sectioned the cysts are found to contain two hemispherical flukes. Based on a number of post-mortem examinations of chickens Riley found that the cysts did not involve the internal organs. Most affected birds show surprisingly little reaction to their presence and the cysts may run their course with no permanent injury to the bird. But Riley (1931: 207) does state that "there is no reason to doubt that in poultry as well as other bird hosts, the infection may have a fatal outcome." He cites a number of heavily infected and dead House Sparrows reported to him by two poultry farmers in whose flocks the infection was present. Morgan and Hawkins (1949: 259) write, "In the cases that have been recorded in the United States there has been no marked pathology except for the presence of the cysts. However, in other parts of the world heavily infected birds have evidence of emaciation, anemia, and deaths have been reported."

Hyman, noted authority on invertebrates, writes that the life cycle of C. faba is unknown. It is a flatworm (Platyhelminthes), a fluke (Class Trematoda) and belongs to one of the three orders of flukes which are endoparasites and which have relatively complicated life histories involving two to four hosts. An example familiar to many of us is the fluke causing the disease schistosomiasis. This fluke uses a snail, a sheep and a man to complete its full life cycle. C. faba is related to parasites which are known to cycle through a snail and a crayfish or the nymph form of an aquatic insect, and finally through the definitive host which involves various species of birds. The details of the several forms of asexual and sexual reproduction involved in the transfer between hosts, the subject of host specificity, and the many variations from the classical cycle are both intricate and fascinating. They are best described by the experts and for further reading Hyman's (1951) monumental work is recommended.

What specific information we have about C. faba is based on the fact that (1) many related trematodes have been proved to include as a second intermediate host a dragonfly, damsel fly or other insect the larval phase of which involves an aquatic form; (2) Riley (1931) has found in dragonfly nymphs subadult parasites (metacercariae) closely resembling the adult form of Collyriclum; and (3) a number of epidemic occurrences of the parasite in chickens and turkeys were traced to young birds which were in daily contact with dragonfly breeding habitat (Riley, 1931; Riley and Kerncamp, 1924).

The first question that comes to mind in pondering the source of infection in the species of birds known to act as hosts is whether they feed on the aquatic forms of insects which are known to carry this parasite. In the majority of instances this does not seem likely. It is known, however, that allied trematodes persist in an infective state through metamorphosis to the adult insect (Hyman, 1951). It is more likely that the adult insect or the emerging insect clinging to a reed, soft-bodied and unable to fly might serve as a source of food. What is the likelihood of the known host species feeding on the emerging or adult dragonfly? My principal interest in this regard has been in the Eastern Bluebird. Bluebirds do not characteristically feed on dragonflies. Nor do they routinely frequent marshy areas where they might be expected to find emerging nymphs. Knappen (1933: 452) reported seeing "myriads" of dragonflies along a road and beach near Virginia Beach, Virginia on which were feeding the Kingbird, Brown Thrasher, Mockingbird, Fish Crow, Long-billed Marsh Wrens and Red-winged Blackbird. She also stated, "Bluebirds and Cardinals were probably feeding on the Odonata". But Beal (1915) examined the stomachs of 855 Bluebirds taken during every month of the year and found no Odonata. Thus this possibility cannot be dismissed but my inclination is to seek elsewhere for a source of infection which harbors the probable intermediate hosts of C. faba; namely, a snail and an insect with an aquatic larval form and which at the same time is more consistent with what we know of Bluebird feeding habits. A possible source is discussed later on in this paper.

Approaching the question from another angle, it is possible that each of the three birds (i.e. infected Bluebirds discovered by the author. -Ed.) was infected from a separate source. Two of the three infected Bluebirds were nesting $1\frac{1}{2}$ miles apart and the third was 12 miles from the other two. There was a farm pond within one-half mile of each nesting site, somewhat outside the normal foraging range of each of these birds but not far enough to exclude positively the possibility of their visiting these ponds. If, however, three ponds separated by these distances supported this parasite it would suggest that it is of fairly general occurrence in the area. The fact that subsequent examination of 400 nestlings and 160 adult Bluebirds from the same region during the four following breeding seasons (1965-68) has not resulted in the finding of other cysts argues against the idea of generalized C. faba occurrence in the region. It makes one wonder whether the birds were infected in this area at all. By examining the pond snails and aquatic insect larvae for the presence of C. faba this conclusion might have been further substantiated. Morgan and Farner (1944) reported finding a Cowbird with 54 cysts around the anus. No evidence of C. faba was found in the examination of 246 snails from nearby ponds.

The possibility that only one pond or marsh served as the source of infection for the three birds is suggested from the isolated nature of the occurrence. This has been characteristic of previously reported infestations. In the case of the Bluebirds, though, the three territories were far enough from each other to preclude a common feeding area during the

breeding season as the source of the infection. Yet, the occurrences are close enough geographically and chronologically to suggest that they may be more than coincidences and that there might have been another period during their annual cycle when they were closely associated.

One of these occasions could have been as sibling nestlings. We do not know enough to speculate whether this is feasible. If these birds had acquired the infection as nestlings, it would have to be assumed that they had carried the infection at least ten months and I have not been able to find whether this is consistent with what is known of the life cycle of C. faba. Previous reports have all been from immature birds but no follow-ups on them have been reported. Since Bluebirds and many of the other host species generally return to the vicinity of hatching, the bander is in a good position to check this aspect. Unfortunately, none of my parasitized birds was re-trapped.

There are two other times during the annual adult cycle when these Bluebirds might have been expected to be living in relative proximity to a known source of C. faba. The first is during the winter months when many Bluebirds associate in small flocks through the south including the east coast states from which C. faba is reported. Bluebirds are numerous in Maryland during the winter months (Stewart and Robbins, 1958). There are no banding data to show whether Bluebirds wintering in the eastern states move into western New York to breed. To arrive at this fact all foreign retraps and recoveries of the Eastern Bluebird recorded from Pennsylvania and New York from 1924 to date were reviewed at the Banding Office at Patuxent.

The other time is during the spring migration. At this time (February and March) snow frequently covers the ground and their food is scarce. The rigors of this season frequently bring them together to feed on whatever food is available. At this time of year in New York one of the insects which is known to serve the passerine birds is the stonefly (Plecoptera), (Hamilton, 1933). D. Krieg and S. Eaton have watched Bluebirds in mid-March near Olean, N.Y. feeding on stoneflies (probably Taeniopteryx nivalis) newly emerged from a small stream (Krieg, 1964). Beal (1915) lists two species of Plecoptera from his examination of Bluebird stomach contents. I have been unable to determine whether C. faba has been found in Plecoptera but the stoneflies seem to be a logical answer to how these three Bluebirds mentioned in this paper might have become infected.

A final possible explanation of C. faba's occurrence in western New York is suggested from the following fact obtained from the Banding Office. There is one record of a male Bluebird (59-190692) banded in 1962 near Ithaca, N.Y. (an area known 50 years ago to have supported C. faba) and recovered two years later 140 miles west within ten miles of one of the three Bluebirds reported with C. faba infection.

The unravelling of C. faba's life history is a challenge. What are

the intermediate hosts of C. faba? How long do the cysts last? How often is the infection fatal and what is the mechanism of death? Is it possible for the infection to be carried from one year to the next? Banders are in a particularly advantageous position for contributing information toward answering these questions. I would therefore suggest that in addition to the fat class, iris color, amount of feather wear, etc., that we incorporate into our routine examination, inspection of the vent and surrounding area for indications of Collyriclum faba infestation.

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