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THE EUROPEAN CUCKOO AND THE COWBIRD

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RECENT discoveries and publications concerning the European Cuckoo (*Cuculus canorus canorus*) (Chance, 1922 and 1940) and the Eastern Cowbird (*Molothrus ater ater*) (Hann, 1937 and 1941) have encouraged the writers to set forth some comparisons between these two parasitic forms. The species are not closely related and their habits furnish a good example of parallel development, though in different degrees of specialization. Other species of cuckoos in the Old World and also other cowbirds in the Americas are parasitic, but in general are not well known. The Yellow-billed Cuckoo (*Coccyzus americanus*) and the Black-billed Cuckoo (*Coccyzus erythropthalmus*) of America, which are closely related to the European Cuckoo and which might be expected to be parasitic, build their own nests and are said to lay eggs only occasionally in the nests of other birds.

The European Cuckoo and the Cowbird have certain specialized traits in common, and each has traits of its own, but in general the Cuckoo is much more highly specialized than the Cowbird. Each species is able (1) to correlate its laying with the laying time of the host, (2) to replace an egg of the host with one of its own, and (3) to reduce the time required at the nest to a matter of seconds, thereby causing a minimum of disturbance to the host.

The Cuckoo, among its special traits, has a strong tendency to be host-specific, that is, each female tends to lay her eggs in the nests of one selected species. This inclination in turn accounts for a similarity between the eggs of many individual Cuckoos and those of their hosts. This specificity of hosts presupposes the mating of males and females of like foster parentage, since the male as well as the female is commonly believed to influence the type of egg laid by the daughter (See Chance, 1940, pp. 203–207 for discussion by R. C. Punnett). The type of egg laid by each individual female is fixed for life, and is not within the control of the bird herself. Rey (1892) first noticed the resemblance of eggs laid in a given territory and correctly assumed that they were the product of a

*Material from the second author is a contribution from the Department of Zoology, University of Michigan.

single female. Later Chance's discoveries were made possible by the fact that he could recognize the eggs of each female Cuckoo by their constant and distinctive markings, when he found them in the nest. Chance also was able to follow the Cuckoo by sight as she watched the nests and went to lay, and even to furnish nests in which to lay by previously collecting the nests of the hosts, thus causing them to build new ones at the proper time. This "management" of nests was an arduous task, but it enabled him to witness many layings and finally to have a photographer present in a blind to take moving pictures of the laying. As far as it is yet known there is no tendency for the Cowbird to be host-specific, and no particular similarity has developed between its eggs and those of the host.

The manner and time of laying and also the method of taking eggs of the host differ in the two species. The female Cuckoo usually takes an egg of the host at the time of laying her own. She grasps the egg in her beak without piercing it and holds it there while laying, then flies away with it. She of necessity sits *on* or *over* the nest rather than *in* it while laying, on account of her size, for she regularly parasitizes birds much smaller than herself. Chance made most of his observations at the nest of the Meadow Pipit, which is placed on the ground and often is well concealed. Here the Cuckoo seizes the egg nearest to her then merely moves forward over the nest and deposits her own egg in its place. She lays in the afternoon, and only on alternate days as was correctly guessed by Rey (1892). It requires only about eight seconds for her to deposit her egg, though the time varies somewhat, and as a rule she lays but a single egg in a nest. Under Chance's management a Cuckoo laid twenty-five eggs in one season from May 11 to June 29, but the normal number is probably less than half of that. Female Cuckoos appear to be more prolific after their first season. Nine years is the longest known life of a laying Cuckoo, but few live so long.

The Cowbird, as opposed to the Cuckoo, makes separate visits for the laying and taking of eggs. Hann observed the female Cowbird coming to the Oven-bird's nest to lay on eight different occasions, which varied in time from seventeen to twenty-seven minutes (average, twenty-two minutes) before sunrise. This is the approximate time of day when Cowbirds regularly lay, unless there are different races of Cowbirds, or different behavior with different hosts, neither of which is likely. The Cowbird *enters* the nest of the Oven-bird to lay and sits sidewise while laying, remaining from a few seconds up to a minute, then flies directly from the nest. (See photographs, Hann, 1941.)

Two or more Cowbirds' eggs often are found in the same nest, and as many as seven have been found in a single nest of an Oven-

bird (Hess, 1910, p. 26). More than one female may be involved in multiple layings, but certainly in many cases a single female will lay more than one egg in a nest. Friedmann (1929, p. 183) believed that female Cowbirds under his observation laid four or five eggs on consecutive days, and Mrs. Nice (1937, p. 155) found evidence that eggs were laid in three sets during the season with intervals of from six to twelve days between sets. More exact information on these points awaits further work.

The female Cowbird usually takes an egg of the host for each one of her own laid, but seems to restrict the taking of eggs to nests where two or more eggs are present. She makes a separate visit for this, either during the forenoon of the day before laying, during the forenoon following the laying in the morning, or rarely in the forenoon of the following day. She approaches the nest stealthily, pierces the egg in two places with her open beak and flies away with it. The taking of an egg of the Oven-bird was photographed by Hann (1941), and the removal of eggs of other species has been witnessed by different observers (Burroughs, 1887, p. 30) (Nice, 1937, p. 157). The eggs, at least in some cases, are eaten by the Cowbird.

In the young Cuckoo there is likewise a greater degree of specialization than in the young Cowbird. The Cuckoo, within thirty-six hours after hatching and before it has its eyes open, works itself under each of the other occupants of the nest and one by one ejects them over the side. The habit of laying a single egg in a nest is properly attuned to the habit of ejection, for if two or more Cuckoos were hatched in a nest, all but one ordinarily would be destroyed.

The young Cowbird does not eject other occupants of the nest, though sometimes its mere bulk may crowd them out. It may starve the rightful occupants by taking all the food, but this seems to depend somewhat on the habit of the parent birds in passing the food around. If the parents give all of the food to the young birds that reach the highest and call the loudest, the rightful occupants will fare badly. The Oven-birds regularly rear all of the young that hatch, including the Cowbirds; Song Sparrows usually will rear one Cowbird without the loss of their own young (Nice, 1933, p. 129); but other species, such as the Magnolia Warbler and Chipping Sparrow, perhaps as a rule lose all of their own brood and rear only the Cowbirds (Herrick, 1905, p. 222).

If the same methods could be applied to the Cowbird which Chance applied to the Cuckoo we should be able to discover a number of points which are now unknown or imperfectly known. Among these are (1) the area over which a Cowbird lays, (2) whether there is a tendency toward host specificity, (3) the number of eggs laid in a season, (4) the frequency of laying, and (5) the

circumstances under which more than one egg is laid in a nest by the same Cowbird. Friedmann and Nice have made a good start in studying egg patterns of the Cowbird, but it will take long and careful work to carry this task and its related problems through to completion. The difficulty here is much greater than in the case of the Cuckoo, since egg patterns are not as divergent, yet perhaps they are different enough that they usually can be distinguished. Moreover the Cowbird does not appear to be host-specific.

SUMMARY AND CONCLUSIONS

The European Cuckoo and the Cowbird of North America are outstanding parasitic forms, each in its own continent. Cuckoos and Cowbirds are not closely related and the habit evidently developed in each group independently. The Cuckoo is more highly specialized (1) in having individuals or races which parasitize particular species, (2) in laying eggs similar to those of the host, (3) in taking an egg at the time of laying, (4) in grasping the egg without piercing it, (5) in laying a single egg in a nest, and (6) in the young bird ejecting all other occupants from the nest. The Cowbird's (1) laying in early morning and its (2) refraining from taking an egg unless there are at least two in the nest may be considered specialized traits of its own. Both species are able (1) to correlate their laying with the laying time of the host, (2) to replace an egg of the host with one of their own, and (3) to reduce the time required at the nest to a minimum, thereby causing less disturbance to the host. If the methods used by Chance could be applied to the study of the Cowbird, much progress would be made, but the task of studying a species which is neither host-specific nor so strongly individualistic in its egg types is much greater than in the case of the Cuckoo. On the other hand Chance is of the opinion that the Cowbird is very much more abundant than the European Cuckoo.

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AN IMPROVED METHOD OF DETERMINING BAND NUMBERS ON ILLEGIBLE BANDS

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MANY of the banders who have been doing work with ducks, geese and shore birds have found that the bands, after a number of years, become so worn that they are illegible. Some of the banders find large numbers of these illegible bands during any one season. In October 1941 Mr. E. A. McIlhenny* mentioned some of these bands which were taken during the winter of 1941. I contacted Mr. McIlhenny asking him for some of these illegible bands upon which to experiment in an effort to determine band numbers.

Any bird bander resents not being able to determine the band numbers on his bands. When he can not complete the story of the bird a sense of futility hardly compensates for the hard work expended in trapping and banding these birds. With that in mind I began my experimentations by using first, ultra violet light. Certain digits on these old bands were brought out more clearly by the ultra violet light, but this method failed to bring out the exceptionally worn parts of the band, and was discarded as of little use in the final picture.

The next method attempted was the use of x-ray. I found that the alloy in the band was sufficient to make the entire band opaque to the x-ray. This method was not successful, and did not help in any degree to check additional digits on these bands.

The third and final method used was that of a slowly eroding solution which will attack the aluminum band as well as the copper band. The solution used by Mr. McIlhenny was that of an acid bath which was exceedingly strong. The principle of the two solutions is identically the same, that of erosion of the metal leaving the numbers exposed because of the compression of the molecules due to the stamping of the band. A slower eroding solution brings the numerals out after two or three applications, whereas the

*E. A. McIlhenny, *Bird Banding*,12, No. 4: 168.