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THE COWBIRD AT THE NEST *

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THE parasitic habit of the Cowbird (*Molothrus ater*) was known before the time of Alexander Wilson (1810), but the details of watching nest-building, visits of inspection, time of day of egg-laying, manner of approaching and entering the nest, time required for laying, and the systematic taking of eggs of the host from parasitized nests are features which have been brought to light only in the last few years. Some progress also has been made in the study of territory, mating, and length of laying season, but since these subjects are largely outside of the scope of this investigation they will be omitted from the discussion.

Early information on the Cowbird dealt with such points as came to the notice of the collector or casual observer. Naturally these dealt chiefly with the species of birds parasitized, the number of eggs laid, and the behavior of the young Cowbirds. Concerning these items there is a voluminous literature which has been summed up well by Friedmann (1929, 1931, and 1934).

Wilson (1810, pp. 154, 156), Audubon (1831, p. 495), and Burroughs (1887, p. 29) recognized that Cowbirds sometimes found the nests of the hosts by watching for nest-building, and Wilson quotes from Dr. Potter of Baltimore who saw a female Cowbird watching a Bluebird building a nest. Some of the later ornithologists, however, lost sight of these facts, and Forbush (1927, p. 423), for example, says, "A pregnant Cowbird, desiring to be rid of an egg, sneaks quietly through orchards, woods or thickets searching for an unguarded nest in which to deposit her leavings." It has been shown by recent work that female Cowbirds make a habit of watching nest-building (Friedmann, 1929, p. 187), and that they may return four or five days later to lay in these nests (Hann, 1937, p. 207) after the manner of the European Cuckoo (Chance, 1940, p. 25).

There is little actual data on the time of day that Cowbirds' eggs are laid. Before my own earlier work (1937) there was but a single recorded case of anyone observing a nest both before and after the supposed laying. Friedmann (1929, p. 185) accidentally saw a Cowbird go to a Robin's nest which he had just examined, and deposit an egg at 7:30 in the morning. The actual layings which I have observed,

* Contribution from the Department of Zoology, University of Michigan.



Figure 1. A female Cowbird taking an Oven-bird's egg from the nest. 9:10 A.M., May 30, 1941.

five in all, took place at dawn, about five o'clock (E.S.T.) or just before. In addition to these visits of the Cowbird, there were five additional visits made at the same time of day with the evident purpose of laying, but the bird was distracted by the photoflash.

Regarding the taking of eggs of the host by the Cowbird, Burroughs (1887, p. 29) says, "There is no doubt that, in many cases, the cowbird makes room for her own illegitimate egg in the nest by removing one of the bird's own." He also noted that the removal of eggs was confined to nests containing two or more eggs, an observation which I have found true in every case, although in one instance, one of the eggs was a Cowbird's, and in another, both were Cowbird's eggs, including the one taken (1937, figures 10-20).

T. S. Roberts (1932, p. 325) relates that a female Cowbird took an egg from a Scarlet Tanager's nest while he had his camera focused for a picture of the nest, and that he obtained a picture of the bird with its bill thrust into the egg. He also saw a female Cowbird take an egg from a Chipping Sparrow's nest. However, in spite of his own observations, he states that frequently the Cowbird removes an egg at the time of depositing her own.

Mrs. Nice (1937, p. 157) accidentally saw the female Cowbird take an egg of the Song Sparrow on two different occasions, both being in the forenoon, as in the case of my own observations. For the first three years of her work on the Song Sparrow, Mrs. Nice estimated that the number of eggs of the host taken by the Cowbird was 20 per cent of the number of Cowbird's eggs laid, but for the last four years she calculated that the loss was about 56 per cent, and concluded that the estimate for the first three years probably was too low.

In my own study of the Oven-bird (*Seiurus aurocapillus*) previously reported (1937, pp. 202-204) there was a loss of thirty eggs of the host attributable to the female Cowbird, and in addition to these, four eggs of the Cowbird itself. The total number of Cowbird's eggs laid was forty, thus the loss of the host's eggs was 75 per cent, and the total loss 85 per cent, of the number of eggs laid. Only a single parasitized nest retained the full number of eggs laid, and this one doubtless would have had an egg removed had I not set up a blind to see her take the eggs and frightened her away when she came (p. 203). None of these eggs in instances which were fully known was taken at the time the Cowbird laid her own egg, as is the case with the European Cuckoo (Chance, 1940, p. 27), but each was removed on a separate trip during the forenoon. As nearly as could be determined in twenty-three known cases, ten eggs disappeared on the day before the Cowbird's egg was laid, ten on the same day and three on the following day (Hann, 1937, figures 10-20). I have seen the female Cowbird take an egg of the Oven-bird on three occasions, one of these observations being

accidental, and two while I was watching for the incident to take place.

During my early study of the Oven-bird I learned to predict with some degree of accuracy when the female Cowbird was coming to a nest. Rules to be observed when one wishes to see her there are the following:

1. Begin with the earliest nests of the season, since they are the most heavily parasitized.

2. Watch for egg-laying on the mornings that the second, third, fourth and fifth eggs of the Oven-bird are laid, but not earlier lest the Oven-bird be disturbed.

3. Be in the blind by the time it begins to get light. If the Cowbird is coming she will be there during the next half hour.

4. Give preference to a nest where an Oven-bird egg has disappeared on the previous day.

5. Watch for the disappearance of an egg of the host during the forenoon following the laying of a Cowbird's egg early in the morning.

Up to the time of my first publication on the Oven-bird (1937) I had witnessed the laying of two eggs and had seen two Oven-bird's eggs taken, one case of egg taking being seen accidentally and one while watching purposely at the nest. My time had been so taken up with other phases of the work that I had made no effort to obtain photographs. Early in 1939, however, I began preparations for the season which was to follow, with the idea of getting some pictures of the female Cowbird as she came to the nest to lay, and, if possible, photographing her as she was taking an egg of the host. Also, additional observations which threw light on the habits of the Cowbird were to be recorded.

Certain problems in connection with photography had to be solved before I could get a picture. First, the Cowbird lays early in the morning before it is possible to get a daylight picture, and I met this problem by securing a portable photoflash apparatus. After some preliminary tests I found that I could get satisfactory pictures at close range with my 9 x 12 cm. Voigtländer camera, using panchromatic plates exposed 1/200 of a second with the stop at 22. This arrangement gave plenty of speed and depth and practically assured a picture, if the Cowbird and the operator performed their parts. The problem of operating the camera at a distance of seventy-five centimeters from the nest, and at the same time having the blind far enough back so that the birds would not be disturbed was solved by attaching the camera firmly to a portable rack which was placed in front of the nest, and releasing the shutter by a heavy thread attached to a lever which pressed on the releasing cable. The rack with the mounted camera and photoflash was carried to the woods each morning when watching. Its place was taken at the nest at other times by dummy racks which had tin cans mounted in place of the camera and reflector, so that the birds would not be frightened or confused by the sudden presence of the

apparatus. The blind ordinarily was left at the nest during the egg-laying period, but at one nest which was near the highway the blind was put up daily.

OBSERVATIONS IN 1939

My first contact of the season with the Cowbird, other than observing its presence, was a purely accidental one on May 18. I had found an unfinished Oven-bird's nest on the side of a bank at the edge of a creek-bed, and was sitting on a log twelve meters away on the opposite side, watching the female as she carried material to the nest. The Oven-bird left the vicinity with her mate for a time, and in about two minutes a female Cowbird appeared on the side of the bank about twelve meters from the nest. She came down to the thick vegetation along the lower edge of the bank and walked toward the nest, stopping frequently to look around, but walking rapidly when she went. She apparently saw me, but was little concerned with my presence. It took her about two minutes to reach the nest, and I raised my glasses to watch as she approached. She walked directly to the nest, stuck her head in and apparently pecked once. She then backed up and flew to the left without uttering a sound. In another part of the woods a few days later I saw a female Cowbird approach and examine a recently deserted nest of the Oven-bird, as if she knew previously where it was located. From these and other observations it seems probable that such visits to nests take place commonly if not always where a Cowbird lays her eggs, and in this manner she keeps in touch with the conditions at the nest, and also in some cases takes an egg of the host.

The nest mentioned in the first part of the last paragraph was only well started at this time, but on the following morning a Cowbird's egg was laid prematurely in the nest, and consequently the nest was deserted. Knowing, however, that Cowbirds often lay in deserted nests, I watched with the camera on the two following mornings, and on the second morning a female came. It was 4:57 A.M., about twenty-seven minutes before sunrise. The sky was cloudy, and I was nearly seven meters from the nest. I saw her alight near the nest and watched nervously for her to enter, but could not see well on account of poor light. Before I was aware she suddenly flew away, and I realized then that I had missed my chance to get a picture, because I was too far away to see her enter the nest. This taught me to place the blind closer, but as we shall see, not always close enough.

At the second nest I had seen no indications of a Cowbird, but watched on May 25, on the morning after the first egg was laid. I arranged the camera and other apparatus by flashlight and automobile light, and when I entered the blind the day was beginning to break. Seventeen minutes later, at 4:54 A.M., a female Cowbird lit on the ground about two and one-half meters from the nest. She stopped there for a minute or two, then moved up just back of the nest. After

another pause of nearly a minute she walked around in front, where she hesitated a moment, then entered. I could not see her position in the nest, but I pulled the thread. It was then 4:57. At the flash she flew upward from the nest, and lit on a limb about six meters away. Obviously she had not laid her egg, and after an interval of about two minutes she returned to the ground a meter or so from the nest, then in another minute reentered. She left in about thirty seconds, having deposited an egg in the meantime. I remained in the blind to watch the female Oven-bird, which entered the nest at 5:23 and did not seem to notice the extra egg. She left the nest at 6:44 after being



Figure 2. A female Cowbird in an Oven-bird's nest. Nest in natural position. 4:57 A.M., May 25, 1939.

in the nest an hour and twenty-one minutes. Upon development of the plate I found that it showed the Cowbird quite within the nest and somewhat hidden by the overhanging top (Figure 2). This was satisfactory for one picture, but when I set the camera on succeeding occasions I pushed the top of the nest back so that it would show the Cowbird better in case I got a picture.

I continued my efforts at other nests, and on the morning of June 5 was successful in getting a second picture in a distant part of the woods. At this nest the second Oven-bird's egg was laid on June 4, and later in the day one of these eggs disappeared. I was watching at

another nest at the time, but after getting this cue I set up a blind here and was in it next morning at daybreak. At 4:42 while it was still quite dark a Cowbird flew across between the blind and the nest and lit on the ground. Though the blind was only five meters from the nest it was still so dark that I could not see clearly. After three minutes something moved near the nest, and I pulled the thread, but this proved to be a false alarm. Having learned that the Cowbird might return, I left the blind immediately and reloaded the camera. In a few minutes she lit again near the nest. I saw her three or four times as she walked around back of the nest then near the front, and



Figure 3. A female Cowbird in an Oven-bird's nest. Top of nest pushed back to give better view of the bird. 4:52 A.M., June 5, 1939.

in a few moments I snapped another picture, thinking she must have entered, though I could not see clearly whether she was in the nest or not. She flew upward at a sharp angle following the second flash, and when I went to the nest I found a Cowbird's egg, which she had laid in record time, for she could not have been in the nest more than a few seconds. These pictures were taken at about 4:45 and 4:52 respectively. Upon development of the plates the first revealed only the empty nest, but the second showed the Cowbird quite distinctly (Figure 3). I resolved after this experience to place the blind close enough really to see, and so thereafter set it at about three meters.

All of this work was intensely interesting and exciting, but I have said nothing about the times when the Cowbird did not appear. In all I watched sixteen mornings from May 20 to June 20, thus securing one picture for each eight mornings of watching during the first season's work.

As a part of the program I was hoping to get a picture of a Cowbird taking an egg from a nest. At one nest where a Cowbird's egg had been laid in the morning I watched from 7:00 o'clock until 10:30, and concluded that she wasn't coming back. I left and returned in forty minutes to find that an egg had disappeared. Such occurrences as these remind one that he is on the right track, but must have more perseverance when the opportunity presents itself.

OBSERVATIONS IN 1940

During the season of 1940 attempts to photograph the Cowbird were beset with misfortune. On the evening before the first trial I broke one of the camera attachments, and though a Cowbird came to lay two mornings in succession on May 29 and 30, I failed to get a picture because of faulty mechanism. Following this was a period of rainy weather in which some of the nests under construction were deserted by the female Oven-birds. Though I spent much time hunting for new nests and watched at daybreak five more mornings, I failed to make any additional contacts with the Cowbird during the season.

OBSERVATIONS IN 1941

The season of 1941 had its ups and downs, but withal was quite successful. The first bright spot of the year was a visit from Mr. Edgar P. Chance, who has done so much in the study of the European Cuckoo. We hoped to see together the laying of a Cowbird's egg, but finding nests was slow, and Mr. Chance had to leave before we had opportunity to make the observation. If I had met Mr. Chance and received his helpful suggestions a few years earlier, I would have been better able to interpret the problems of territory, similarity of eggs, and length of laying season during the progress of my study.

I might have taken a valuable clue, during the search for nests early in the season, from a female Cowbird which flew up from the side of a woods road on May 15, for ten days later I flushed an incubating Oven-bird from a nest containing two Oven-bird's eggs and two Cowbird's eggs, about fourteen meters from where the Cowbird was sitting. It is very probable that the Cowbird was watching the nest or nest-building when I approached. I collected the eggs from this nest on the following day, but failed to find the second nest which doubtless was built soon afterwards.

Aside from the incidents just mentioned, the Cowbird work of the season centered around a single nest found in the process of construc-

tion on May 26. On the morning of May 28 at 7:30, it contained one Oven-bird's egg, and I proceeded to set up a blind and place a dummy camera rack in position before the nest. At 8:02 o'clock as I was sitting on a log seven meters away, I suddenly saw a Cowbird perched about a meter from the nest. She appeared to be looking for the nest and at the same time watching me. I arose and stepped where I could get a better view of the nest location, and she left. At 8:50 Mr. John L. George and I were watching some Crested Flycatchers at a nest near by when Mr. George saw the Cowbird near the Oven-bird's nest again. I approached quickly for I did not want her to disturb the nest when I did not have the camera, and she flew away after calling in a scolding fashion.

The next morning, May 29, I was in the blind at daybreak and a female Cowbird appeared three meters from the nest at 4:56 o'clock. She slowly approached and was at the nest in about two minutes. I pulled the thread for the first exposure when she was in front of the nest with her back to the camera, before she had time to enter. After reloading the camera I was back in the blind by 5:00, and she soon reappeared three meters back of the nest. After a half minute she entered the nest and I made the second flash before she had time to lay. I placed the third plate in the camera and reentered the blind but the Cowbird did not return. Neither did she return to take an egg, though I watched during the forenoon until 11:15. At 10:06 a female Cowbird was seen looking around intently near the Crested Flycatcher's nest which was in a near-by tree about fifteen meters from the ground.

It is embarrassing to have to say that neither of these exposures produced a picture. In my excitement I failed to get one plate properly covered, and the other was blank apparently on account of a lack of synchronization of flash and shutter, though I had tested the apparatus and found it in working order. To say that I was discouraged would be putting it mildly, and I decided that afternoon to give up the efforts at getting more pictures.

A night's rest will sometimes do wonders, however, and the next morning, Memorial Day, I was awake at daybreak thinking about the camera. I arose quickly, went to the laboratory and tried out an exposure of 1/50 of a second instead of 1/200, and found that it worked perfectly. I was in the woods before seven o'clock thinking that if there was a Cowbird's egg in the nest I would watch for the taking of an egg during the forenoon. The Oven-bird was a late layer and remained on the nest more than an hour after I arrived, and not wishing to disturb her I waited for her to leave. At 7:26 a female Cowbird appeared six or eight meters from the nest and came closer, even after I started to approach, but I chased her away not wanting her to disturb the Oven-bird or nest before I was ready. Finally I flushed the female Oven-bird from the nest, marked the newly laid

egg No. 3, and placed it nearest the opening of the nest. Chance (1940, p. 94) believes that the Cuckoo always takes the egg nearest to her, and I wanted to see if this was true of the Cowbird.

After setting the camera I entered the blind at 8:20 o'clock and waited. At 9:10 the female Cowbird fluttered and lit three or four meters from the nest. She moved slowly and rather nervously to the nest, reached in and pecked at least twice. She turned to the left then, holding an Oven-bird's egg in her bill, and seemed to pause. I pulled the thread so hard that it came in two where I had tied it, but not until a picture was taken (Figure 1). The Cowbird dropped the egg about fifteen centimeters from the nest when the light flashed, and obviously knocked another egg from the nest with her wing, for egg No. 3 was lying in front of the nest on the ground. The egg taken was No. 1, which lay farthest from the opening, and No. 2 was still in the nest. I replaced egg No. 3 and the Oven-bird laid two more on the two following mornings, apparently not disturbed by all of the ado going on at the nest. Egg No. 1 was pierced in three places, one hole obviously being made at the first peck. The other two holes where she was holding the egg as seen in the picture were small, the upper one visible only with the aid of a lens, but showing plainly the shape of the beak.

I stated that the Cowbird "seemed to pause" when turning from the nest, but the picture shows her slightly in motion. This may have been due to her starting to move after the flash, and 1/50 of a second was not fast enough to stop the action. I had feared that if the Cowbird did take an egg in front of the camera, she might turn and fly so quickly that I would not have time to get a picture, but her performance, though not perfect, was quite satisfactory.

I assume that only a single Cowbird was involved in the activities in the vicinity of this nest, but I have no particular proof for this assumption.

SUMMARY AND CONCLUSIONS

A brief review of the literature is given on the finding and watching of nests by the Cowbird, the laying of eggs, and the taking of eggs of the host.

The present study is a continuation of the work done previously on the Oven-bird and Cowbird, five miles southwest of Ann Arbor, Michigan.

The author has observed the female Cowbird at the Ovenbird's nest a total of fifteen times: five times when eggs were laid; five when she came for the purpose of laying, but was frightened away by the photo-flash; three times when taking eggs; and twice while making observations. In addition to these there were two cases when she intently watched nest-building from a little distance, and other times when she was seen near nests, apparently making observations.

The direct information and indirect evidence gained during the study warrant the following conclusions:

1. The female Cowbird regularly finds the nests of the host by seeing the birds building.

2. She sometimes watches the building process intently and this doubtless stimulates the development of eggs, which are laid four or five days later. This theory, first suggested by Chance for the Cuckoo, accounts for the delicate synchronization of the egg-laying of the Cowbird with that of the host, and does not preclude the possibility of laying several eggs on successive days.

3. The eggs of the Cowbird are usually laid during the egg-laying time of the host, but exceptions are common. Extremes noted during the study were three days before the first Oven-bird's egg was laid, and three days after incubation began.

4. A Cowbird lays but one egg in a nest unless nests are scarce; in that case she lays more.

5. The female Cowbird makes regular trips of inspection to nests during the absence of the owners, between the times of discovery and laying, and knows in advance where she is going to lay.

6. Her regular time for laying is early in the morning before the host lays, and she will frighten the owner from the nest if she happens to be there first. Cases of laying later in the day described by occasional observers are probably irregular and delayed ones. The fact that the Cowbird lays very early in the morning accounts for the laying not being seen oftener.

7. The Cowbird is both alert and determined when she comes to the nest to lay. She moves about in the vicinity of the nest and looks carefully for as much as three minutes before entering, but will return to the nest if she is frightened away.

8. She spends from a few seconds to a minute in the nest when laying and flies directly from the nest as soon as the egg is laid.

9. The Cowbird disturbs the nest of the Oven-bird but little when she enters to lay, and I have found no broken eggs which were attributable to her entering.

10. Parasitized nests regularly have one or more eggs removed by the female Cowbird. These are not removed at the time of laying, but during the forenoon of the previous day, or the day of laying, or rarely on the following day. In removing an egg the Cowbird pierces it with her open beak and flies away with it. Through poor technique, egg contents are sometimes left in the nest, causing the owner to desert.

11. Eggs removed are eaten by the Cowbird, but are not removed for that purpose alone, or their disappearance would not be correlated so closely with the laying of her own eggs. The number of eggs removed from parasitized Oven-birds' nests was eighty-five per cent of the number of eggs laid and included four eggs of the Cowbird itself.

From non-parasitized nests of the Oven-bird only a single egg disappeared during the study.

12. The statement by Burroughs that a Cowbird takes an egg from a nest only when two or more eggs are present is borne out by this investigation.

13. In removing an egg from a nest, the Cowbird does not necessarily take the one nearest to her, as Chance believes to be the habit of the Cuckoo.

14. There has been no evidence that the Cowbird takes an egg from the nest at the time of laying, as the Cuckoo does.

15. The Cowbird has not been known to give any attention to parasitized nests after laying, other than to remove eggs.

16. Two photographs are shown of the female Cowbird while she was in the Oven-bird's nest to lay, the first ever taken of a Cowbird in any nest.

A third photograph shows the female Cowbird taking an egg of the Oven-bird from the nest, the first picture of this behavior taken during purposeful watching.

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