

SOME OBSERVATIONS ON THE NESTING ACTIVITIES OF THE  
YELLOW-BILLED AND BLACK-BILLED CUCKOOS  
(Coccyzus americanus and C. erythrophthalmus)

. by

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## Introduction

Studies of the nesting habits of the Black-billed and Yellow-billed Cuckoo (Coccyzus americanus and C. erythrophthalmus) were carried on during the summer of 1947 at the University of Michigan Biological Station on Douglas Lake, Cheboygan County, Michigan. Two nests of the Black-billed Cuckoo were observed from the last few days of incubation through the nestling stage and one nest of the yellow-billed species from the time of egg-laying until the nest was deserted during the latter part of the incubation period.

Observations totalling more than thirty hours were made from canvas blinds placed at nest level by the use of towers or platforms and located four to six feet from the nest itself. A six-power field glass was used, particularly in making additional observations on general habits outside the blind.

Acknowledgements are due Dr. Olin Sewell Pettingill, Jr. for guidance and helpful criticisms given during the study; to Dr. Theodora Nelson for assistance given many times; to Mr. Pershing Hofslund, Mr. Lewis Batts, and Mr. Russel Barget for finding and reporting nest locations; and to the University of Michigan Biological Station for supplying blinds and other items of equipment without which the study would have been impossible.

## Nests and Environment

The single nest of the Yellow-billed Cuckoo located during the study was constructed of the usual loosely arranged foundation of twigs with a lining chiefly of pine needles and birch or willow catkins. It was placed ten feet above the ground near the center of a dense clump of shrubs<sup>↓</sup> and supported on one side by a horizontal branch nearly an inch in diameter and also by several small twigs. This nest site was at the edge of a small bog approximately one-hundred yards from the Douglas Lake shore. The surrounding area is essentially a cut-over coniferous forest climax.

The two nests of the Black-billed Cuckoo differed widely in the ecological nature of their environment. The first was placed in a clump of bushes<sup>2</sup> at the edge of Smith Bog; a sizeable area of marsh located about two miles south-east of the southernmost tip of Douglas Lake. A horizontal limb six feet above the ground was used as support and the nest was stabilized by the twigs of adjacent branches. The nest site was located in a narrow strip of shrub-aspen ecotone which bordered the swampy area. The ground cover of bracken (*Pteris*) in the aspen association afforded excellent cover for the Oven-bird and Hermit Thrush nests in the vicinity while the bog itself supported a high population of Red-winged Blackbirds. Other birds with territories in the vicinity were the Northern Yellow-throat, the Red-eyed Towhee and the Song Sparrow.

1. Identified by Dr. G.W. Prescott as *Ilex verticillata*.
2. Identified by Dr. G.W. Prescott as *Nemopanthes mucronata*.

Table Number 1

	Yellow-billed Cuckoo's Nest	Black-billed Cuckoo Nest 1	Black-billed Cuckoo Nest 2
Location	Pine Point	Smith's Bog	Near Picnic Grounds U of M Biol. Sta.
Locus Key	T37N/R3W/S27	T37N/R3W/S35	T37N/R3W/S33
Date Found	June 30, 1947	July 5, 1947	July 17, 1947
Habitat	Edge of small bog within cut-over coniferous forest	In shrub-aspen eco- tone bordering a marsh	Upland aspen association
Nest Site	Center of a large winterberry bush	On horizontal branch in dense clump of mountain holly	In a red pine near the base of two small branches
Nest Elevation	10 feet	5.5 feet	5.0 feet
Bulk of Nest	Twigs of maple and pine	Maple, cherry and aspen twigs	Maple and oak twigs
Lining of Nest	Pine Needles and leaf scraps	Pteris and aspen leaf scraps	Pteris leaves, pine needles and aspen leaf scraps
Inside Diameter	3.75 inches	3.5 inches	3.5 inches
Outside Diameter	6.5 inches	6.3 inches	6.5 inches
Inside Depth	0.75 inches	0.75 inches	0.75 inches
Contents when found	two eggs	two eggs	two eggs
Total No. eggs laid	three	three	two
No. eggs to hatch	none	two	two
No. young matured	none	one	one

The second nest of the Black-billed Cuckoo was placed at a similar height (5.5 feet) but the nesting site was one of several small red pines which are thinly interspersed in an aspen association which occupies a dry ridge top adjacent to the Biological Station campus. The diversity of these habitats would suggest that the factor regulating the local distribution of this species is something other than a requirement for a specific type of vegetational substrate. The nest taken from the red pine was selected for a detailed examination, the results of which are summarized in figure 1.

#### Egg Laying, Incubation, and Hatching

The Black-billed Cuckoo normally lays two or three eggs per clutch averaging 27.18 by 20.57 mm. while the Yellow-billed usually has three or four eggs which average 30.4 by 23.0 mm. in size. In addition to being somewhat larger, the eggs of the Yellow-bill are a paler blue (Bent, 1940: 73-74).

The nest of the Yellow-bill on Pine Point contained two eggs when discovered by Mr. Pershing Hofslund on June 30th. An additional egg was deposited on the third of July. Incubation stains became prominent on the third day after deposition causing extensive discoloration of the eggs. Attentive and inattentive periods during incubation were approximately equal and averaged an hour in length. In all cases, the incubating bird was flushed with difficulty, especially toward the end of the incubation period. Although the mate was sometimes in evidence in the nest vicinity, no actual

Black-billed Cuckoo

Nest 2

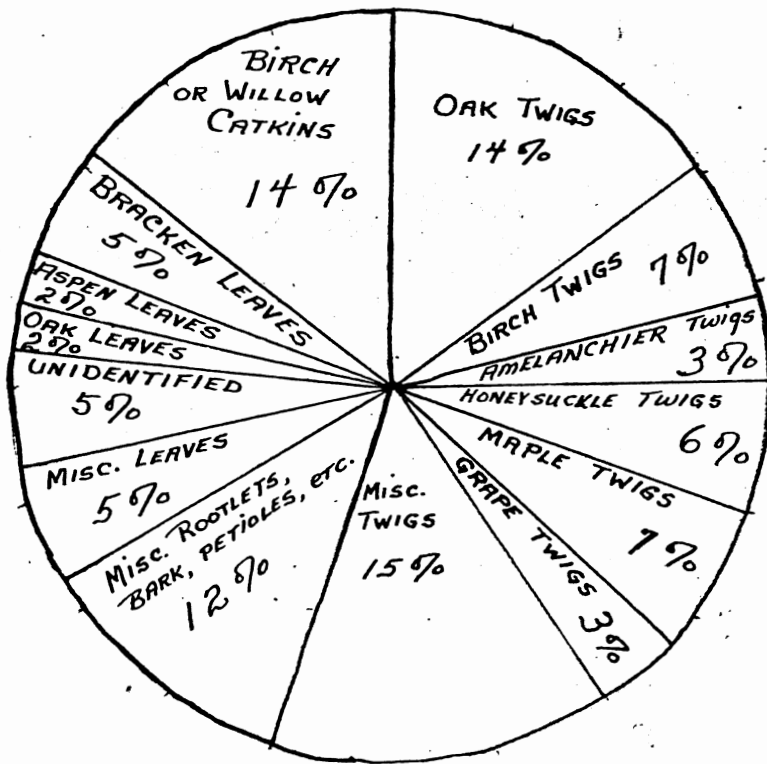


Figure 1

Analysis of Nesting Materials  
by weight

exchange of incubation duties was observed. Since the sexes were indistinguishable, I was not able to corroborate the statements of other authors (Herrick, 1910:195, and Spencer, 1943:14) that both sexes participate in the incubation of the eggs.

Since this single Yellow-billed nest was deserted before the end of the incubation period, no data on hatching or the nestling stage of that species could be obtained. This nest will be considered further under the subject of nest mortality.

As shown in Table 1, both of the Black-billed nests contained two eggs when found. A third egg was deposited in Nest 1 on the seventh of July, two days after the nest was discovered. This and other data support the contention of Spencer (1940:13) and others that the egg laying interval is variable.

An attempt was made to determine the exact length of the incubation period in both species studied. The eggs of each nest were distinguished by numbering with a wax pencil and the time of deposition of the last egg noted in both the Yellow-billed nest and Nest 1 of the Black-billed. However all the eggs on which adequate data were obtained were deserted before the full incubation time had elapsed.

In so far as was observed, the time of hatching was probably early morning. The hatching of the last egg in Nest 2 was an exception and occurred between 7:15 A.M. and 4:40 P.M. on July 24th. No attempt to dispose of egg shells was noted at either of the nests and shell fragments were conspicuous in the nest lining when a detailed examination was made in the laboratory.



## Nestling Stage

The nestling Black-billed Cuckoo emerges from the egg entirely dry (Spencer, 1943:15). The coal black skin is sparsely covered by wiry grayish-white hairs which, according to Herrick (1910:198), are the feather tubes of a vestigial down.

While still less than a day old, the nestlings give a weak buzzy sound when touched, have well developed auditory faculties (Herrick, 1910:198) and exhibit a feeding response which consists of lifting the head and bill to a near vertical position and weakly fluttering the wings. This response is initiated either by the sounds or the vibrations of the nest limb caused by the approaching adult. The nestlings were often observed giving this response when winds caused a stirring of the leaves or the movement of the nest branch.

The feather tubes of the juvenal plumage first appeared on the third day. The white hair-like tubes of the down plumage were not lost but remained attached to the tip of the growing feather tubes. Also on the third day, the eyes were opened for short periods, the nestlings first stood up in the nest when giving the feeding response and the feeble flutter of the day old nestling had become a strong and rapid vibration of the wings.

A startling transformation from the weak and helpless young to the coldly competent juvenal cuckoo took place on the seventh day at both nests. Where before the nestlings had remained lying motionless in the nest when the adults were not in attendance, the birds became very active and moved about almost continuously within the narrow confines of the nest.

Preening began in mid-morning and within two to four hours, the tips of the feather tubes were removed exposing the brown juvenal plumage. The culicine habit of raising the bill to a near vertical position when alarmed also becomes evident on this sixth day. With the appearance of the juvenal plumage, the young birds are ready to leave the nest.

#### Feeding and Care of Young

Beginning soon after hatching, the nestlings received a diet which consisted chiefly of caterpillars (70%) and occasional small insects or spiders (20%). At Smith Bog (Nest I), grasshoppers were fed in some quantity and accounted for ten percent of all the feedings observed. The feeding interval varied chiefly with the age of the young. During the first three days of nestling life, the adults fed two young an average of every thirty minutes. This was reduced to twenty minutes by the fifth day and to twelve minutes on the sixth. During a three-hour period at Nest I, a single sixth day nestling was fed nine caterpillars, five small insects and a single large beetle during sixteen visits to the nest.

Both sexes participated in the feeding and brooding activities at the nest. The usual routine consisted of an adult feeding the young and then remaining on the nest to brood until the mate appeared in the vicinity with food (See Table II). Sometimes the adults exhibited the culicine habit of alighting a few feet from the nest and running along the branch to the waiting young. More often the adult half flew, half hopped from branch to branch in its approach. The vibrations of the adult approaching on the nest limb usually were sufficient to stimulate the feeding response in the young birds.

Occasionally however, the adult appeared at the nest-side without arousing the young. At such times the adult gave a low mewing sound to stimulate the feeding response.

The red palate of the nestling cuckoo displays a group of symmetrically arranged white discs. Various functions have been attributed to these characteristic spots such as that of a food target and as an implement to facilitate the grasping and sucking of the bill of the adult during the transfer of food (Spencer, 1940:16). Since the adult cuckoos do not practice selective feeding, it seems probable that they do function as a food target by making the open mouth of the begging young more conspicuous.

Food is always brought to the young crosswise in the bill and usually masticated so that a larva appears limp and lifeless. Until the second or third day, the bill of the adult is placed well down the throat of the young bird and held motionless until a swallowing response occurs. This may take as long as two minutes if the food is a large caterpillar but something less than a minute is usually sufficient. After the third day of nest life, the food is usually placed directly in the bill of the young. Even then, the adult does not release the food immediately but remains motionless until the swallowing response occurs.

The following example of the slow type of feeding occurred at Nest 2 on July 25, when the nestlings were one and two days old. An adult brought a robust two-inch green larva to the nest at 5:03 P.M. after the young had been exposed only two minutes. Only the older nestling gave the feeding response. The larva was grasped about one-half inch from the end while the adult patiently held the worm and remained motionless for a full minute. The adult then removed the larva, masticated it and then successfully placed it

Table II Attentive - Inattentive Periods

	Black-billed Nest 1					Black-billed Nest 2			
Date-July	15	16	18	19	20	24	25	27	29
# young	1	2	2	2	2	2	2	1	1
Age of Yng. (days)	1	0&2	2&4	3&5	4&6	0&1	1&2	4	6
Observation Began	1:10PM	8:10AM	7:10PM	7:15PM	8:15AM	4:40PM	7:40AM	8:35AM	1:00PM
Observation Ended	6:00PM	10:35AM	8:22PM	8:15PM	11:18AM	5:55PM	11:45AM	10:35AM	3:25PM
Total Time (Hrs:Min)	4:50	2:25	1:12	1:00	3:03	1:15	4:05	2:00	2:25
Temperature	80-75	75-80	62-60	65-63	60-68	80-78	70-80	68-72	80-85
Wind (MPH)	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5	0-5
Weather	Good	Good	Good	Rain	Rain	Good	Good	Rain	Good
Time (Hrs:min)									
Attentive	1:29	0:39	0:09	0:28	0:48	1:10	3:01	1:40	1:39
No. Attentive Periods	2	2	1	1	15	2	10	4	3
Longest Period	0:52	0:33	0:09	0:28	0:31	0:52	1:16	0:32	0:39
Shortest Period	0:37	0:06	0:09	0:28	0:01	0:21	0:01	0:01	0:29
Average Period	0:45	0:20	0:09	0:28	0:03	0:36	0:18	0:25	0:33
% of time Attentive	31	29	12	47	25	97	74	83	70
No. feed- ing visits	1	2	0	0	14	1	8	4	2
No. brood- ing periods	2	2	1	1	1	2	10	3	3
Longest Period	0:52	0:33	0:09	0:28	0:31	0:49	1:16	0:32	0:39
Shortest Period	0:37	0:06	0:09	0:28	0:31	0:21	0:06	0:31	0:29
Average Period	0:45	0:20	0:09	0:28	0:31	0:35	0:17	0:32	0:33
% attentive brooding time	31	29	12	47	16	97	70	80	70
Time Inat- tentive	3:21	1:46	1:03	0:32	2:25	0:02	1:04	0:20	0:46
No. Inattentive Periods	2	2	1	1	16	1	8	3	3
Longest Period	1:45	1:06	1:03	0:32	0:24	0:02	0:15	0:16	0:26
Shortest Period	1:36	0:40	1:03	0:32	0:01	0:02	0:01	0:01	0:01
Average Period	1:40	0:53	1:03	0:32	0:09	0:02	0:08	0:07	0:15
% of time In- attentive	69	71	88	53	75	3	26	17	30

endwise in the throat of the young bird. This soon initiated a swallowing response and two-thirds of the larva disappeared. When the adult released its hold on the larva as swallowing occurred, the head of the young bird dropped to the floor of the nest with a good portion of the larva still protruding from its bill. The adult twice grasped the end of the larva and raised the head of the nestling to a near vertical position before a second swallowing response occurred and the feeding was completed. The adult bird then picked up the fecal sac, swallowed it and moved on to the nest to brood.

In both Nest I and 2, nest sanitation was accomplished by the adult's swallowing the fecal sacs through the first five days of nesting life. Rarely, the adult left the nest with the fecal sac in its bill before returning to brood. This was observed only twice during the course of the study. During the sixth day, the adult seldom picked up a fecal sac from the nest. According to Spencer (1940:18), young birds of this age back to the edge of the nest before voiding the fecal sac. No evidence of this type of behavior was observed.

#### Nest Leaving

On two occasions, the transformation from the quill-covered nestling to the juvenal bird ready to leave the nest was observed in detail. On the twentieth of July, the two nestlings at Smith Bog were beginning their fifth and seventh day of nestling life. In the course of the morning observation period, the older nestling was extremely active and preening action was noticed for the

first time. The feather-tubes were grasped firmly with the bill and vigorously pulled and scraped until the brown juvenal feather was exposed. In this manner, all of the feathers except those of the head and neck were cleaned of their horny protective covering during a single three hour period. At 11:15 A.M., I left the blind and approached the nest for a better look at the young birds. When I approached within four feet of the nest, the older nestling hopped to the rim of the nest and stood poised as though ready to leave at the slightest provocation. Not wishing to interfere with the normal course of events, I cautiously retreated to a safe distance and left the area.

Due to other obligations, it was impossible to continue observing on the following day. Dr. Olin Sewell Pettingill, Jr. spent the greater part of the day at the nest and I am indebted to him for the following observations. On the morning of the twenty-first, the older bird left the nest as Dr. Pettingill entered the area. This was accomplished by leaping from the nest with fluttering wings and flying downward to a low limb four or five feet away. It then hopped upward from limb to limb within the bush in which it had alighted until it reached the thick foliage at the top. There it remained motionless. During this time, one of the adults (the only one in evidence) protested by uttering rapid clucking sounds and flying nervously back and forth among the aspens surrounding the nest site.

The single young bird at Nest 2 began preening early on the morning of July thirtieth when only six and one-half to seven days old. Thinking the bird too young to leave the nest, I attempted

to clip a few pine needles which were obstructing the view from the blind. Immediately the juvenile cleared the nest in a single leap and clutched the branch in which it landed. Twice it was replaced in the nest but each time it left again as soon as released. Although still unable to fly, the young bird showed amazing dexterity in moving among the pine branches. Within a few minutes it had safely reached the ground and moved rapidly under the bracken with a hopping movement.

Preening to free the feathers of the juvenal plumage was carried on much of the time when the bird was not actually in motion. The emergence of most of the feathers was completed within two hours after the combing activity was begun. Shortly after the bird had left the nest, it was captured and the feather tubes tested with a pair of tweezers. The horny covering proved to be very fragile, especially those of the contour feathers and broke readily with a little pressure. The tubes of the primaries were still very tough and resistant, however, and evidently the weakening of these tubes occurs later than those of the body tracts.

The soft juvenal plumage is buffy brown above, each feather tipped with white. The underparts are white, tinged with gray on the belly and with pale buff on the breast. The plumage is virtually complete at the time of nest leaving except for the development of the wing primaries and the tail.

#### Nest Mortality

Of the total of eight eggs deposited in the three nests studied, only two developed into young birds which successfully left the nest. Seven days after the last egg was deposited in the Yellow-bill's nest

on Pine Point, one of the eggs was found crushed and the shell fragments lying together in the nest bottom. The remaining two eggs were unharmed. The adults completely deserted the nest after this incident and were not seen again in the nest area. Nothing was found to indicate predator activity although a flock of Blue Jays had recently moved into the territory.

Three eggs were deposited in the Black-bill's nest at Smith Bog. The last egg was found two days after the nest had been discovered. There was also a two-day interval between the hatching dates of the two nestlings. The last egg failed to hatch possibly because incubation was neglected when the pressure of feeding the two nestlings became great. The difference in age of the nestlings can also account for the failure of the younger bird to mature. On the twentieth of July, the older nestling received fifteen of the sixteen feedings observed during a two-hour morning period. It is obvious that there is no selectivity on the part of the feeding adult and the nestling giving the strongest and most conspicuous response receives the food. When the older bird left the nest on the twenty-first, the adults deserted the other nestling at a time when low temperatures and damp weather prevailed. Early in the afternoon the older nestling was captured by Dr. Pettingill and confined to a box for a short period. The adult then returned to the nest, fed an enormous dragon-fly that was nearly as large as the young bird, and then brooded until the other young bird was released. Later that evening, the nestling was found dead presumably from exposure and starvation.

The two eggs in the second Black-bill's nest hatched within twenty-four hours of each other and both young birds flourished



for several days. On July twenty-sixth, the nest was tipped half over by a gust of wind when the nestlings were two and three days of age. When the situation was discovered at 4:00 P.M., only the older nestling remained clinging precariously to the floor of the tipped nest. The younger bird had evidently been thrown from the nest and destroyed by a predator. With the assistance of Dr. Nelson, the nest was leveled and reinforced with additional twigs and branches.

#### Summary

Observations on the nesting activities of the Black-billed and Yellow-billed Cuckoos were carried on in Cheboygan County, Michigan during the summer of 1947.

Nest elevation varied from five and one-half to ten feet and two nests were found in lowland boggy areas as compared to a single nest found in an upland aspen association.

The egg-laying interval varied from one to three days, the longer interval apparently so disrupting the normal course of events that only a single nestling successfully left the nest.

Insect larvae made up 70 percent of the food brought to the nestlings with grasshoppers and small insects and spiders fed occasionally.

The nestling cuckoo is exceptionally precocious and is capable of giving a well-developed feeding response soon after hatching.

The young birds remain in the nest from six to eight days and leave soon after the juvenal plumage makes its appearance. The bursting of the feather tubes is hastened by a conspicuous preening action on the part of the young bird and required only two and three hours in the two instances observed.

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