

NOTES ON NESTING YELLOW-BILLED CUCKOOS

BY ELOISE F. POTTER

Although the Yellow-billed Cuckoo (*Coccyzus americanus*) is a common breeding bird in the southern United States and nests in smaller numbers in at least parts of all 48 contiguous states (Bent, 1940), very little has been published on its nesting habits. Bent's account devotes only five pages to nesting, eggs, and young, and much of this brief account is a description of the dramatic way the young burst their feather sheaths shortly before leaving the nest. Hamilton and Hamilton (1965) studied the western subspecies (*C. a. occidentalis*) in Arizona, and Nolan and Thompson (1975) reported on anomalous reproductive activities of Yellow-billed and Black-billed cuckoos (*C. erythrophthalmus*) in southern Indiana. To the best of my knowledge, no published account offers details from nest construction through fledging of the young.

METHODS

In July of 1973, a pair of Yellow-billed Cuckoos nested successfully in the wooded yard of my home 3.5 mi N of Zebulon, Wake County, North Carolina. Cuckoos were unusually active at the W end of the house throughout the day of 11 July, but I did not see them carrying nesting material. I discovered the nesting site when the adults flew from a limb about dusk that evening.

When viewed from the nearest window of my house, the nest was at eye level about 12 m away. The open area between the house and the nest tree enabled me to watch the birds closely without disturbing them. Eggs were not marked, and young were not weighed, measured, or banded. Every effort was made to permit the cuckoos to nest without human disturbance.

Beginning on 12 July, I focused a 30× Balscope on the cuckoo nest, and with the help of Ricky Davis I watched daily until the last fledgling left on 30 July. The total observer time was 61 hours, 3.5 of these contributed by R. Davis. It should be noted, however, that the nest tree, although not the nest itself, could be watched from the kitchen. Thus, I was frequently aware of activities around the nest even when I was not giving it my undivided attention.

THE NEST

Situated in a fork of a horizontal limb of a young Red Oak (*Quercus rubra*), the nest was about 6 m above ground and about 1 m from the main trunk. Although the nest appeared to be rather flimsy and its contents could be seen through gaps in the side walls, eggs and young at no time appeared to be in danger of falling. About 30 cm in outside diameter, this structure was considerably larger and more sturdily made than some described in the literature (Bent, 1940; Hamilton and Hamilton, 1965). It was a depressed platform of twigs with a rim rising about

5 cm above the nest floor. The bottom was completely lined with rootlets and dried leaves, most of which appeared to have been skeletonized by fall webworms (*Hyphantria cunea*). The birds festooned the rim of the nest with dried pine needles, which were not woven into the twigs but were merely dropped into place. The nest was concealed from above and at least partially protected from rain by an overhanging cluster of oak leaves that drooped below the rim of the nest when weighted down with rain water.

The nest was not finished when the female laid the first egg the morning of 12 July. At least six twigs and most of the lining were added after that time. Construction continued sporadically until the laying of the third egg on 14 July, and both adults continued to rearrange materials on 15 July, when the fourth and last egg was laid. New lining materials were added and old pine needles were relocated on the rim on 20 July, the day before the first egg hatched.

Prior to onset of laying, both adults worked rapidly, breaking twigs from nearby trees and adding them to the nest. Afterwards, the male sometimes brought several pieces of nesting material in rapid succession for the incubating female to add to the nest. At other times he brought a single dried pine needle and added it before he settled on the eggs. After the first egg was laid, the male was more likely than the female to add nesting materials or to rearrange them. The pair gathered nest material from an area of approximately 0.4 ha, but most of the items apparently were obtained within 10 m of the nest site.

EGG LAYING AND INCUBATION

About 1000 on 12 July both adults brought lining materials to the nest, and the second bird flew away in the same direction as the first. One of the birds gave a long series of "cuks" that, while distinctly cuckoo-like, were unlike any Yellow-billed Cuckoo call I have heard before or since that time. At 1015 one of the pair, hereafter easily recognized as the female, arrived without nesting material, crouched on the nest, stood up, seemed to peer at the freshly laid egg, and settled on it. The female had grayish eyelids and a relatively small, dull yellow spot on the bill, whereas the male had bright yellow eyelids and a large, bright yellow spot on the bill.

While the female was laying her first egg, Carolina Chickadees (*Parus carolinensis*), Tufted Titmice (*P. bicolor*), and Wood Thrushes (*Hylocichla mustelina*) fluttered about the nest tree and called excitedly. The mobbing behavior continued until the female cuckoo settled on the nest. The Wood Thrushes had a nest about 12 m from the cuckoo nest. Bent (1940, p. 56) lists the Wood Thrush among the species in whose nests eggs of the Yellow-billed Cuckoo have been found.

At 1020 the male cuckoo arrived at the nest, displaced the female, looked into the nest, and flew away. The female settled on her egg. Almost immediately the male returned with a twig, deposited it on the nest, and departed. He returned with additional twigs or dried leaves

every 1 to 3 min until 1038, making a total of 10 offerings in less than 20 min. The female worked each new piece into the nest. At 1043 the male arrived without nesting material, relieved the female on the nest, and busily rearranged nesting materials while incubating. Despite the addition of material, I still could see the pale greenish-blue egg through a gap in the nest wall when the adults were changing places.

On 13 July the female was on the nest from 0710 until 0756. Bearing a dried pine needle, the male perched nearby, and the female left. He crept along the supporting limb to the nest, added the straw, and began incubating. At 0840 he moved aside and called softly. The female arrived silently, crouched on the nest, laid an egg, and poked her bill into the nest, apparently giving the new egg a little shove. The male perched on the side of the nest, letting out a long call while vibrating his tail. The female then left, and the male settled on the nest. Later in the morning (1129 to 1145), while the female was incubating, the male brought six more pieces of nesting material. The first four were deposited on the nest, and the fourth piece blew away. The male passed the fifth to the female's beak, and he worked the sixth into the nest as he began incubating. This immediate change in behavior to meet altered circumstances provides another example of the adaptability noted by Hamilton and Hamilton (1965).

On 14 July the male brought a dried pine needle each time he relieved the female on the nest. A third egg was laid on this date and a fourth on 15 July, but the events immediately surrounding laying were not witnessed.

The birds sat on the nest constantly until the afternoon of 22 July, the day the second egg hatched, when a high air temperature (32°C in the shade) enabled them to leave the eggs and nestlings uncovered for extended periods. Prior to 22 July the female stayed on the nest until the male displaced her. The male left the nest whether or not she had arrived to relieve him, but she usually returned within a minute after his departure. Departing adults usually flew directly from the nest, but upon returning they almost always perched near the trunk of the nest tree and crept along the branch to the nest. In cool or wet weather they were very still upon the nest, but they tended to become restless on hot days, turning, preening, panting, and occasionally appearing to be in distress. Both called frequently from the nest and nearby perches at all hours of day and night, possibly as a means of coordinating feeding and nest-tending activities. Usually they exchanged places every hour or two throughout the day, but a parent caught on the nest by a rainstorm remained until precipitation ceased, thus making some turns very long (once 4 hr and 44 min). Although the female may have incubated more than the male on some days, the two birds shared about equally in the daytime care of the eggs and young throughout the entire nesting period. The male almost always relieved the female just before dark, and he usually was on the nest at my first observation of the day. He appeared to be primarily responsible for nighttime incubation.

The limb supporting the nest extended S from the main trunk, which was about 25 cm in diameter at that height. At first the incubating bird sometimes faced E or W (crosswise the limb); but while the male was bringing nest material, the female faced the direction of his approach (N, toward the tree trunk). As early as 13 July the birds began to show a preference for facing S with the tail extending above the supporting limb in the direction of the trunk. This preference for facing away from the trunk is consistent with the observations of Hamilton and Hamilton (1965).

HATCHING

On 20 July both adults appeared to be excited. For the first time since the laying of the third egg, they brought dried leaves and pine needles when they relieved each other at the nest. The male in particular showed great interest in pulling pine needles from the outer edges of the nest and placing them upon the rim. Subsequent events indicate that this activity probably coincided with the pipping of the first egg.

Chick 1 hatched on 21 July before 1840, at which time it could raise its head above the rim of the nest to accept feedings from both parents. The adult on the nest departed at the approach of the other one bringing food.

Chick 2 hatched the morning of 22 July. At 1130 the male rose on the nest, stood above the eggs and the day-old nestling, peered into the nest, and poked his bill into it. His body strained as he appeared to be tearing at the shell left by a newly hatched chick. On 1 August the nest held many small fragments of eggshell, but by no means the equivalent of four entire shells. No fragments lay under the nest, nor did I see an adult fly from the nest carrying any part of a shell; therefore, I believe some parts of the shells were eaten.

Chick 3 hatched the morning of 23 July, and Chick 4 at 1040 on 24 July. Again the male appeared to tear at the shell. Chick 4, which was fed at least once and seemed to be healthy, disappeared from the nest before 1300 on the day of hatching; Chick 3 disappeared around noon the next day. I believe both were taken by Blue Jays (*Cyanocitta cristata*). Reasons for this view are in the section on nest defense.

The four eggs were laid on four successive days, 12 through 15 July, and they represent a normal clutch for the Yellow-billed Cuckoo (Bent, 1940). Although the eggs were not marked, they were arranged at laying in sequence counterclockwise from the NE corner of the square formed by the completed clutch. They hatched in the same sequence, and the parents were not observed in any behavior that might have relocated eggs once they were positioned in the nest.

The eggs hatched on four successive days, 21 through 24 July. Nine days elapsed between the laying and the hatching of the first egg. Only 12 days elapsed between the laying of the first egg and the hatching of the fourth one. All four eggs hatched on the ninth day after laying. Egg 2, the only one for which the times of both laying and hatching are

known, hatched between 218 and 219 hours after laying. This incubation period is appreciably shorter than the still quoted "about 14 days" mentioned by Bent (1940, p. 57) and slightly shorter than the 10 to 11 days reported by others for the Black-billed Cuckoo (Spencer, 1943) and the Yellow-billed Cuckoo (Hamilton and Hamilton, 1965).

CARE OF YOUNG

Brooding

After Chick 2 hatched on 22 July, the adults sat on the nest only during the cooler hours of the day (usually dusk through early morning), during rainfall, during raids by Blue Jays, and when necessary to provide shade from the midday sun. During the warmer hours, they apparently depended upon sunlight and the body heat of the nestlings to continue incubation of the remaining two eggs. Daylight brooding virtually ceased when the feathers of Chick 2 burst their sheaths on 28 July.

Feeding

Newly hatched cuckoos receive their first meal of semidigested animal matter (mostly caterpillars) within an hour after hatching. On the afternoon of 22 July, the nest contained one day-old chick and one that had hatched at 1130 that morning. Parents approached the nest with food in their beaks. Items for the younger nestling were crushed, swallowed, and regurgitated into the mouth of the chick. It was impossible to tell whether the regurgitated food was semiliquid or merely slightly pulverized. The brief time it remained in the adult's digestive tract suggests the latter.

Day-old nestlings received whole live caterpillars, butterflies, and katydids. Sometimes the caterpillar was so large that the parent had to give it a couple of pokes before the chick could close its beak.

Yellow-billed and Black-billed cuckoo nestlings have soft whitish spots on the palate and tongue (Nolan, 1975). These papillae apparently enable them to clasp the bill of the adult during transfer of food. Occasionally I saw a chick's head snap backward when the adult pulled away, giving the impression that the papillae function like suction cups. Having seen the head-snapping motion in chicks no longer receiving food by regurgitation, I suspect that the papillae remain functional until about the time of fledging and are useful in grasping hard-shelled insects often brought, still kicking, to the offspring.

Adults gathered food for the young and for themselves from about a 1-ha plot. Various observers (Hamilton and Hamilton, 1965; Nolan and Thompson, 1975) proposed that Yellow-billed Cuckoos time their reproductive activities to coincide with outbreaks of cicadas, tent-building caterpillars, and other suitable prey. While fall webworm nests were conspicuous in my yard during July 1973, the cuckoos apparently showed no preference for these caterpillars. Most of the observed prey

items were katydids, butterflies, and large green caterpillars. Only once did I see an adult bring to the nest an unidentifiable black mass that I took to be a fuzzy caterpillar stripped of its skin.

Nest sanitation

Adults swallowed smaller fecal sacs (from the younger chicks) and carried off the larger ones (from the older chicks), occasionally swallowing one sac and carrying away another in a single trip. Sacs carried from the nest may have been swallowed later. Once the young are old enough (3 or 4 days old) to stand on the rim of the nest to defecate, the adult grasps the sac as it emerges. The expelling of loose feces over the rim of the nest apparently does not begin until the sixth day or about the time the sheaths burst. The nest held no droppings when it was inspected after all surviving young had departed.

Nest defense

The parents actively defended only the nest and its immediate vicinity, a space roughly corresponding to the nest tree and the ground beneath its branches. At close approach of a human intruder, the incubating or brooding female tended to remain quietly on the nest, but the male usually flew to a conspicuous perch and raised his tail over his back in a distraction display. When a Red-shouldered Hawk (*Buteo lineatus*) was in the yard on 13 July, the male sat quietly on the nest for nearly an hour while Blue Jays, Wood Thrushes, and other passerines called constantly in great agitation. On 29 July the well-feathered Chick 2 sat quietly in the nest while other birds mobbed a black rat snake (*Elaphe obsoleta*) as it retreated into a bluebird box 4 to 5 m from the cuckoo nest. Meanwhile the adult female cuckoo perched nearby with food in her beak, waiting quietly until the commotion subsided before feeding her offspring.

Blue Jays are perhaps the most frequent predator upon cuckoo eggs and young. Chicks 4 and 3 disappeared from the nest about noon on 24 and 25 July, respectively. About noon on 26 July the male parent successfully defended the remaining two nestlings from marauding jays. This event strongly suggests that jays took the lost chicks from the nest.

On several occasions the male parent flew toward a jay and perched with wings drooped and tail raised over the back. On 26 July he called loudly while making this distraction display to drive a single jay from the nest vicinity. Almost immediately two jays approached the nest. Outnumbered, the male flew to the nest and settled over the nestlings. This episode offers further evidence of the cuckoo's adaptability in nest defense, a characteristic noted by Hamilton and Hamilton (1965).

APPEARANCE AND DEVELOPMENT OF YOUNG

Newly hatched Yellow-billed Cuckoos have shiny black skin and closed eyes. Not having examined the hatchlings in hand, I did not see the sparse sheathed down that Nolan (1975) described as being dusky gray

and "so similar to the color of the skin that it might pass unnoticed." Nor did I see an egg tooth on the bill of any of the four nestlings, two of which were seen well (head only) less than an hour after hatching (see Nolan, 1975; for illustrations see Bent, 1940, pl. 10, and Harrison, 1978, pl. 14).

Development is rapid. A chick is able to hold up its head and accept regurgitated food within an hour after hatching. Whole live caterpillars, butterflies, and katydids are eaten within 24 hours. At 1 day of age the chick has its eyes open, is partly covered with many short pinfeathers, and can stand in the nest and flap its wings at feeding time. Hamilton and Hamilton (1965) indicate that nestlings of the western subspecies do not open their eyes until about the third day, but this may be in error because they do not provide known hatching dates.

A 2-day-old chick can climb to the rim of the nest and snap at flies. By the third or fourth day nestlings can perch on the rim of the nest and turn tail outward when defecating, but fecal sacs are still present and are still disposed of by the parents. By the fifth day chicks are well covered with long feather sheaths that burst open on the sixth day, or perhaps not until the seventh in some cases (Bent, 1940). Within about two hours the nestling changes into a fairly well-feathered version of the adult. At this stage loose feces are expelled over the side of the nest, and white splotches of droppings appear on the ground below.

Chick 1 left the nest during its seventh day, but Chick 2 remained until its eighth day after hatching. Vera Campbell (pers. comm.) observed a 10-day nestling period (from hatching of first egg to departure of both nestlings) for two young fledged from a nest at Jacksonville, N.C.

While preening, each well-feathered chick rubbed its head under its wing, which seemed to help remove sheaths from crown feathers. During its extra day in the nest, Chick 2 preened, stretched, and sunbathed (Potter and Hauser, 1974). For sunning, Chick 2 deliberately moved to sunny spots on the rim of the nest other than those regularly used for feeding and defecating.

The chicks were surprisingly quiet during most of the time they were in the nest. Begging was brief and not very loud. Only after Chick 2 was alone in the nest did I hear any loud or persistent vocalizations from an offspring. This was a croaking call that sounded very much like a gray tree frog (*Hyla versicolor*). From 1345 to 1425 on 29 July, Chick 2 called almost incessantly at the rate of 1 to 9 times/min, pausing only to grasp twigs in the nest or leaves hanging above it and to snap at flies and butterflies that lit upon the nest. It continued calling off and on until dark, and the next morning it called both before and after leaving the nest.

NEST DEPARTURE

During its seventh day after hatching, Chick 1 began running along the limb supporting the nest to meet the adult approaching with food.

At 1150 on 28 July, Chick 1 climbed to the limb above the nest. Shortly thereafter the male parent assumed full responsibility for this chick, and by 1510 the two had moved out of sight toward the spring about 30 m from the nest. At about 1000 on 30 July, Chick 2, attended by the female, moved toward the spring. The calls of another young cuckoo, apparently Chick 1, could be heard coming from the direction of the spring. On 31 July no cuckoos could be found in the yard.

Upon departure from the nest, young Yellow-billed Cuckoos look almost exactly like the adults except for their short tails, gray eye color, gray eyelids, and the absence of yellow on the slightly stubby bill. The upper mandible is mostly dark gray with a light spot along the cutting edge from the base of the bill to a point just beyond the nostril. The lower mandible is mostly light gray, becoming slightly darker toward the tip. The light gray areas appear to correspond to the parts of the mandibles that will become yellow later in the summer. On 23 September 1973, I watched a hatching-year Yellow-billed Cuckoo preening outside my kitchen window. The bird was molting head and body contour feathers, and its eyelids were still grayish; but its bill was bright yellow and black.

POSTNUPTIAL MOLT

Both adults began the postnuptial molt while tending the nest, and both preened frequently while incubating and brooding. The adult female dropped and completely renewed her rectrices between 15 and 29 July. She apparently replaced her under tail coverts between 18 and 29 July, and she was molting the breast between the same dates. Twice on 25 July the molting female sunbathed while perched in a young oak near the nest tree (Potter and Hauser, 1974). One time she exposed the ventral plumage, and the other time the dorsal while preening at the base of the tail. By 29 July the female, presumably a second-year bird because of her gray eyelids, had acquired bright yellow eyelids; but the yellow on her bill remained restricted and provided a reliable means of separating her from her mate. The adult male dropped his first rectrix on 23 July and dropped the under tail coverts on 27 July. Cuckoos call very little from the time the last young leave the nest until southward migration. Apparently the adults' wing plumage is renewed during this quiet time.

The amount of yellow on the bill of this species appears to be a matter of individual variation. Examination of skins at the North Carolina State Museum of Natural History revealed no correlation between bill markings and the age or sex of the birds.

NESTING SEASON

Although Bent (1940) and Pearson et al. (1942) offer no comment on the number of broods raised each season by the Yellow-billed Cuckoo, Sprunt and Chamberlain (1949) state that in South Carolina the species is double-brooded with eggs for the first set being laid about mid-May.

Reports of young leaving a nest near Statesville on 22 August (Chamberlain, 1959) and of an adult incubating eggs at Southern Pines on 22 September (Teulings, 1975) support the case for a second brood in North Carolina.

Nolan and Thompson (1975) and Hamilton and Hamilton (1965) consider the North American cuckoos to be single-brooded. They offer evidence that these birds can adjust the timing of breeding to coincide with a temporary local abundance of food. The wide range of egg dates is thus attributed to the birds' extraordinary responsiveness to environmental controls rather than to the laying of successive clutches. Their viewpoint is supported by the fact that there is no documented case of two nestings by a single female in one breeding season. Obviously the erratic nature of Yellow-billed Cuckoo egg laying will make proof of single-broodedness or double-broodedness difficult to obtain.

Southward migration seems to take place mostly in late September and early October, my late date for the species at Zebulon being 12 October; however, stragglers have been found as late as 15 December at Rockingham, N.C. (LeGrand, 1975).

DISCUSSION AND SUMMARY

Table 1 summarizes the significant events in the nesting cycle of the breeding pair of Yellow-billed Cuckoos. Behavior of these birds differed from published accounts (Bent, 1940) primarily in the shortness of the incubation period. For the most part, my findings were consistent with those of Hamilton and Hamilton (1965).

Only 19 days elapsed between the beginning of nest construction on 11 July and the departure of the last nestling on 30 July. The four eggs were laid on four successive days, 12 through 15 July, and each egg hatched on the ninth day after laying, incubation having begun with the laying of the first egg. Only two nestlings survived, the other two possibly having been taken by Blue Jays. Chicks 1 and 2 burst their sheaths on the sixth day after hatching and left the nest on the seventh and eighth days, respectively. Assuming that survival of the other two chicks would have extended the nestling period by two or three days, the cycle still is very short for a bird as large as the Yellow-billed Cuckoo. As Hamilton and Hamilton (1965) noted, the period of 16 or 17 days between onset of incubation and freedom from the nest is "one of the shortest for any bird, *precocial* or *altricial*."

Incubation from the laying of the first egg combined with the very rapid rate of growth for nestlings probably explains some reports that young Yellow-billed Cuckoos "frequently hatch at irregular intervals, and young of different ages are often found in the nest" (Bent, 1940). Another possible explanation for reported irregularities in hatching times may be the parents' prolonged absences from the nest once the first two nestlings require frequent feedings. In some instances sunlight and the body heat of the nestlings may not provide adequate warmth to maintain a normal rate of development for the embryos in the un-

TABLE 1.
Major events for a breeding pair of Yellow-billed Cuckoos.

July	Activity
11	Nest building begins.
12	Nest building continues. First egg is laid. Female begins incubating immediately, but nest building continues.
13	Nest building continues. Second egg is laid.
14	Nest building continues. Third egg is laid.
15	Fourth egg is laid. Nest apparently is complete, but adults continue to rearrange materials. First sign of postnuptial molt in female.
16	Incubation continues with both parents sharing responsibility about equally.
20	Incubation continues. New materials are added to nest. Old pine needles are rearranged.
21	Chick 1 hatches.
22	Chick 2 hatches. Chick 1 has pinfeathers.
23	Chick 3 hatches. Chick 1 perches on rim of nest. First sign of postnuptial molt in male.
24	Chick 4 hatches, is fed at least once, and disappears when about 2 hours old.
25	Chick 3 disappears from nest.
26	Male defends nestlings from Blue Jays. Chicks 1 and 2 are large, active, and covered with long sheathed feathers.
27	Chick 1 bursts sheaths.
28	Chick 2 bursts sheaths. Droppings are found under nest. Chick 1 leaves nest, attended by male parent.
29	Chick 2 remains in nest, attended by female parent. Young bird calls loudly and persistently.
30	Chick 2 leaves nest, attended by female parent.

hatched eggs remaining in the nest. Other anomalies observed by Nolan and Thompson (1975) defy such simple explanations.

Hamilton and Hamilton (1965) and Nolan and Thompson (1975) consider the extraordinarily rapid development of embryo and nestling to be a result of the species' ability to time reproductive activities to coincide with local environmental conditions that produce a temporarily abundant food supply. The latter authors regard the Yellow-billed Cuckoo's occasional brood parasitism as a result of this environmentally sensitive egg-production mechanism. When food is unusually abundant, excessively responsive females may produce too many eggs for one nest or lay eggs prior to construction of a nest. Under such circumstances, they apparently lay opportunistically in alien nests. Three of the four interspecific parasitic acts and one of two possible intraspecific ones discovered by Nolan and Thompson during 15 years of fieldwork in southern

Indiana occurred in about one month of a single nesting season when food was unusually abundant.

My observations make me question the Yellow-billed Cuckoo's need for an abnormally large number of suitable prey items. First, the adults swallow many of the fecal sacs, thus providing nourishment for themselves as well as the young with maximum efficiency. Second, both adults molted during the nesting cycle, creating a simultaneous energy demand that presumably could be avoided by nesting in May rather than in July. Third, the nesting cuckoos took a wide variety of prey items and made little use of the abundant fall webworms as a food resource during the daylight hours, although I cannot say what prey, if any at all, they may have taken at night. Fourth, the cuckoos hunted prey in only about 1 ha of a yard approximately twice that size; thus a slight increase in feeding territory could have produced a substantial increase in the food supply.

Although Nolan and Thompson (1975) make it clear that Yellow-billed Cuckoos do not regularly practice interspecific and intraspecific nest parasitism, there is a possibility that the incidence in some parts of the country may be greater than it is in Indiana. The mobbing behavior of the chickadees, titmice, and thrushes from the time the female cuckoo approached the nest to lay her first egg until she settled on it to begin incubation strongly suggests that other species of birds are aware of the Yellow-billed Cuckoo's inherent, although apparently largely suppressed, tendency toward brood parasitism. If females in this part of the country only rarely and opportunistically lay in alien nests, why did three species of birds mob a female in the process of laying in her own nest?

Before any firm conclusions are drawn about the role of parasitism in the reproductive behavior of the Yellow-billed Cuckoo, there should be a long-term study of the species in the southeastern United States. Here, particularly in the coastal plain, the long growing season, generally high humidity, and normal abundance of insects may induce brood parasitism in all except the extremely dry nesting seasons. An environmentally sensitive species certainly should not behave the same in Florida or the Carolinas as it does in Arizona or Indiana. While a great deal has been learned about the life history of the Yellow-billed Cuckoo during the past 40 years, many questions remain unanswered, or at least only partly answered.

ACKNOWLEDGMENTS

Ricky Davis extended the time that the nest was under observation. Vera Campbell provided information on a nest she watched. Harry E. LeGrand, Jr., James F. Parnell, and David S. Lee offered helpful comments on earlier versions of the manuscript. Mr. Lee also made it possible for me to examine skins at the North Carolina State Museum of Natural History. I am grateful for their generous assistance.

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ADDENDUM

At 1850 on 2 July 1979, I heard a Yellow-billed Cuckoo calling from my wooded yard. I found one bird foraging about 15 m above ground and another perched in the flight intention movement (Hamilton and Hamilton, 1965) 5 to 6 m high on a sloping dead limb. The lower bird, hereafter the female, began pumping her tail in the precopulatory display described by Eaton (*Wilson Bull.*, **91**: 154-155, 1979). After 8 to 10 pumps in about 1 min, the other bird, hereafter the male, swooped down and mounted immediately. During copulation, which lasted about 5 sec, the male grasped the female's bill with his bill. As they parted, the female ate an insect apparently passed to her by the male. The male perched nearby in an inverted position (head down, tail up) and fanned his tail briefly. Then he moved about, apparently searching for food. Once he paused to preen the under tail coverts. The female soon moved out of sight, and 30 min later I could find no cuckoos in the yard. Although cuckoos were heard in the yard and across the fairway regularly throughout July, I found no proof of nesting.

The precopulatory display described above is similar to that given for the Black-billed Cuckoo by David Lee and Barbara Rothgaber (*Maryland Birdlife*, **29**: 143, 1973), who saw a pair mating on 23 August 1973 in Garrett County, Md. According to their account, which is paraphrased below, the female flew out of a swamp and across a clearing to the edge of the surrounding woods with the male in pursuit. She perched about 7.5 m above the ground. The male flew from branch to branch, finally perching about 1.2 m above and to one side of the female. She pumped her tail up and down four or five times immediately prior to coition, which lasted only a few seconds. The pair remained in the same tree at the same level for the next 15 min and were still there when the observers left.

A search of the literature has revealed no other description of insect passing during copulation or of a postcopulatory display by the male in either the Yellow-billed or the Black-billed cuckoo. Bent (1940, p. 68) cites an observation of courtship feeding in which the male Yellow-billed Cuckoo "hovered lightly over his mate and, settling gently upon