

## A CASE OF JOINT NIDIFICATION IN RING DOVES

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THE work reported here was part of a study of hierarchy establishment among six Ring Doves, *Streptopelia risoria*. Ring Doves, like most members of the family Columbidae, are known to establish fairly permanent pair bonds; matings are usually permanent, although males sometimes display for the mates of other males.

### METHODS

A wire cage ( $1.3 \times 1.1 \times 1.3$  m) containing a nest box in each corner was used. Two boxes were taken over by the two doves not involved in joint nidification. These doves played a part in hierarchy establishment but will not be discussed further in this analysis. The remaining two boxes had access to the same perch, which stretched the width of the cage. The distance between them was 76 cm.

This study began in late February and extended through the middle of June, 1960. Observations were recorded four to five times per week. Each observation period lasted one and one-half to two hours, usually in the late afternoon. The birds were in an office where loud noises and undue distractions did not occur.

### RESULTS

The four doves involved in this aspect of the study were banded for purposes of identification; the males are designated as  $M_1$  and  $M_2$ , and the females as  $F_1$  and  $F_2$ . By the end of the third week  $M_1$  seemed to be mated with  $F_1$  (pair 1) and  $M_2$  with  $F_2$  (pair 2), the former having tentatively occupied nest box 1.

$F_1$  laid the first clutch of eggs in nest 1, nest 2 not yet being in position. At this time nest 1 seemed to be more in  $M_1$ 's possession than in  $M_2$ 's, although territories had not been clearly established. Prolonged fighting between the two males continued for several days; this resulted in destruction of the eggs.

Nest 2 was then added, and apparently taken over first by pair 2. Eggs appeared there about three days later, presumably laid by  $F_2$ . However,  $F_1$  immediately began to incubate the new eggs in nest box 2, and thus two females incubated in the same nest.

$F_1$ 's mate ( $M_1$ ) followed her to nest 2 and also began to incubate, after driving male  $M_2$  away from the nest. Then  $M_2$  established nest 1 as his territory and began "incubating" in the empty nest during the normal, male daytime period, presumably because  $M_1$ 's hostility prevented him from reaching the eggs his mate was incubating. A reversal

of male territories thus occurred.  $M_2$  usually left the empty nest to feed in the late afternoon, about the same time other males left their nests, but unlike them, he then returned to his own roost and "incubated" overnight. Perhaps the absence of a relief partner left him with the stimulation of an unoccupied nest, as instances of males incubating at night are extremely rare. This continued for about two weeks.  $M_1$  continued to incubate during the day in nest 2 and spent nights perched on the edge of box 1 where  $M_2$  was "incubating" on the empty nest.

$F_1$  and  $F_2$  incubated together in nest 2 at night (after 1630 hours), each female covering one egg. They roamed about the cage during the day. The males were hostile and fought during this period.  $M_1$  never allowed  $M_2$  to enter the nest with the eggs and seldom even let him sit on the perch nearby. Toward the end of the normal incubation period (about 14 days; Miller and Miller, 1958) one egg of this second clutch was broken; the other remained in the nest for about one week more. During this time there was competition at night between the two females for the nest with the egg.  $F_1$  usually won, but  $F_2$  was fairly persistent in her attempts to incubate. During this entire period  $M_1$  roosted alone in the second nest in the daytime. I removed the egg from nest 2 when the embryo was found to be dead.

For about one week no new eggs were laid, and it appeared that each pair would establish a roost and nest box in its own territory: pair 2 in nest 1, pair 1 in nest 2. Six days later  $F_1$  was found with two eggs in nest 2.  $M_1$  incubated there in the morning and early afternoon.  $M_2$  would not enter the nest when  $M_1$  was there, but often entered, without being pecked, when  $F_1$  was on the eggs. When  $M_1$  returned,  $M_2$  was not chased away. The next day  $F_2$  also began to incubate the eggs with, and without,  $F_1$ 's presence. At this time two new eggs, presumably laid by  $F_2$ , were noted in the same nest box, bringing the total to four. As before,  $F_1$  usually won priority over the eggs but there was not as much dispute between the two females as there had been with the previous clutch. Often  $F_1$  would leave the nest to feed, leaving  $F_2$  alone on the eggs.  $M_2$  "incubated" alone on the empty nest, but not with the frequency or duration noted in the earlier cycle. Occasionally he entered the nest with the eggs and was seen incubating them alone during the day. Three days later the two males were observed quietly roosting together on the eggs for about 10 minutes. This was seldom repeated subsequently. Two days later three of the four eggs were found to be infertile and removed.

The following sequence of events (time 1700 hours) is typical of the activity during the second cycle discussed above.

$M_1$  came off the nest and  $F_1$  replaced him, closely followed by  $M_2$ . There was a

slight tussle over who would roost on the egg, with  $M_2$  finally winning. Then  $F_2$  wedged her way into the nest. Both  $F_1$  and  $F_2$  tried to push  $M_2$  out of the nest. All three tried to incubate the lone egg at once.  $F_1$  won. About five minutes later  $F_1$  left the nest and  $M_2$  replaced her, with  $F_2$  following closely. Then  $F_1$  returned to the nest and attempted to reestablish her place on the egg. At first  $F_2$  would not yield her position, but then was pushed by  $F_1$  to a different angle, which made  $M_2$  and the egg more accessible to  $F_1$ . Three minutes later  $F_1$  routed  $M_2$  from the egg and forced both  $M_2$  and  $F_2$  out of the nest.  $F_1$  remained alone on the egg for 10 minutes, after which  $F_2$  entered again.  $F_1$  allowed her to stay as long as she did not attempt to incubate the egg, but  $F_2$  did try to incubate and finally succeeded, forcing  $F_1$  out of the nest.

A young bird hatched on 5 May. All four adults competed for the chance to feed it. The following sequence will illustrate the type of interaction typical of this period.

$M_1$  flew up to feed the hatchling and  $F_1$  moved away,  $M_2$  then came up, forced  $M_1$  out and proceeded to feed the young bird.  $M_1$  came back and pecked at  $M_2$ , but could not move him. Then all three ( $M_1$ ,  $M_2$ , and  $F_1$ ) tried to feed it simultaneously, with  $F_1$  pecking at both  $M_1$  and  $M_2$ .  $M_1$  left but soon returned and pushed his way into the feeding area. He did not, however, attempt to push  $M_2$  out of the nest. Finally,  $M_2$  left of his own accord and  $M_1$  and  $F_1$  continued to feed the hatchling.

Although closer delineation of status between the two males had not been established at that time, they had become almost passive toward one another in their dealings with the young bird and a new clutch of eggs, which began the third nesting cycle.

#### DISCUSSION

One finds few references in the literature to joint nidification in birds. Brackbill (1952) noted a joint nesting of Cardinals and Song Sparrows, but observed the event in only one breeding cycle. He cited other records of similar events, these involving communal nesting between birds of at least two different species. Forbush (1929: 96), however, gave an account of the females of two pairs of Song Sparrows using a nest together, with all four adults feeding eight young; Forbush also told (p. 156) of an instance of two pairs of Tree Swallows using the same nest. Bellrose (1943) reported two female Wood Ducks laying in one nest and incubating side by side, and mentioned that two canaries often lay and incubate in one nest.

There seem to be no previous reports of cyclic repetition of such behavior. Two cycles and the beginning of a third were recorded here, during which time the original behavior was repeated and intensified. The original confusion and fighting over possession of the nest boxes is presumed to be part of the cause of  $F_1$ 's laying her first clutch of eggs in the first box and then changing to the second one. Territory had not

been firmly established at that time, and I think that when  $F_2$  laid eggs in the second nest,  $F_1$  was not completely adjusted to the loss of her eggs and the retention of a strong incubatory drive caused her to go to nest box 2 and incubate with  $F_2$ .  $F_1$  was followed by her mate to the other nest and I presume that  $M_1$ 's eventual dominance over  $M_2$  in this territory was due to his dominant status in the hierarchy, established prior to this portion of the study. When nest 1 was left vacant, it was possible for  $M_2$  to claim it and attempt to protect it for himself and his mate. The stimulation offered by  $M_1$ 's incubation of eggs also incubated by  $M_2$ 's mate, plus  $M_2$ 's hesitation to enter the second nest, may have caused him to emulate this behavior in his own new nest and thus account for his persistent "incubation" of the empty nest during the early cycle.

The behavior noted in the second cycle was probably sustained by  $F_2$ 's having been conditioned to the use of nest 2 in the first cycle and by  $M_2$ 's later success in entering this nest and gaining access to the eggs. Presumably this was to be a lasting arrangement as confirmed by the decrease in hostility between the two males;  $M_1$ 's acceptance of  $M_2$  apparently tended to solidify the final nidification pattern as recorded here.

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#### SUMMARY

This paper describes what seems to be the first recorded instance of cyclic repetition of joint nidification of Ring Doves (*Streptopelia risoria*). Two cycles and the beginning of a third were observed. A male's nocturnal "incubation" of an empty nest, as well as two single males "incubating" jointly were also noted, apparently for the first time.

#### LITERATURE CITED

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