

when a female is widowed after being fertilized but before beginning to incubate. Nonetheless, given the short time involved, it is likely that too few females find themselves in that predicament to account for most of the female-female pairs.

*Acknowledgments.*—D. E. Aylor, D. O. Conover, J. C. Coulsen, D. M. Fry, G. L. Hunt, Jr., and W. E. Southern helped improve earlier drafts of this manuscript.—MICHAEL R. CONOVER, Dept. Ecology and Evolutionary Biology, Univ. California, Irvine, California 92717. (Present address: Dept. Ecology and Climatology, The Connecticut Agricultural Experiment Station, P.O. Box 1106, New Haven, Connecticut 06504.) Accepted 6 Jan. 1984.

*Wilson Bull.*, 96(4), 1984, pp. 716–717

**Intra- and extrapair copulatory behavior of American Crows.**—The copulatory behavior of American Crows (*Corvus brachyrhynchos*) has not been described. The present observations on intrapair copulations (N = 28) and extrapair copulatory behavior were made at the Hendrie Ranch, 24 km S, Lake Placid, Highlands Co., Florida, January–April 1982, 1983, and 1984. The crows at the ranch were relatively tame as described earlier (Kilham, in press). Birds on nests, 6–8 m above ground, were viewed at distances of 10–20 m without the use of blinds.

*Identification of sexes of breeding pairs.*—My observations are based on two groups (7–9 crows each) of cooperatively breeding crows occupying territories with a common boundary. During the period of greatest copulatory activity, i.e., between the end of nest-building and the third day of incubation, the behavior of the sexes of breeding pairs were clearly distinguishable. The males, the dominant members of groups, devoted much time (unpubl.) to driving away or attempting to drive away some of the adult auxiliaries as well as mate-guarding, in which they either watched the nest when the female was on it or followed her closely wherever she flew. The males frequently held an upright stance and did more wing-tail flicking and “cawing” than other members of their group. One male, identified sexually at times of copulations, had a missing right rectrix in 3 successive years. The breeding females, in addition to egg-laying and doing all of the incubating, were distinguishable at times by their never attacking other crows of their own group and, when perched by their mates and elsewhere, in having hunched postures with wings hanging loosely, which gave them a relaxed appearance. One female, identified at times of copulation, had a forked tail due to a breaking off of central rectrices. Criteria distinguishing adult from yearling crows are described by Emlen (Condor 38:99–102, 1936).

*Intrapair behavior.*—Twenty-eight copulations were observed both on nests and on the ground. A female was giving slow *caw-caw-caws* on her nest on 13 January when her mate came to the rim and mounted. I heard a single *cu-koo*. The male settled, waving his outspread wings which came to hang over the edge of the nest. The female stood up beneath him, her tail vibrating up and down as he worked his tail under hers. On the next day, the second of egg-laying, he again came to the rim, placing a foot on her neck before mounting. This time her body sank low as her head tilted way back. The crows vocalized (bills open) so loudly that they were audible at 250 m. Similar loud cries were heard in 11 of the 28 copulations.

I watched a crow fly over a pasture on 2 February when it abruptly alighted on a female that was crouching in the grass in a pre-copulatory pose. In the copulation that followed, she put her head back. This was 70 m from the nest. I watched the same female feeding in a pasture later when her mate alighted 5 m away in the same pre-copulatory pose that she had exhibited earlier. She flew to him immediately, also taking a pre-copulatory pose. He

then took a piece of debris about 7 cm long in his bill and, still holding it, mounted her and copulated. Of 28 copulations observed, 17 were on nests, nine on the ground, and two on branches. Copulations were estimated to be 4–12 sec in duration. Four copulations noted for one pair extended from the end of nest-building, through an interim period of 2 weeks, to the third day of incubation.

*Pre-copulatory display.*—In addition to complete copulations, I witnessed 23 unsuccessful ones. Considering both types together ( $N = 51$ ) a pre-copulatory display was noted in 29, the females performing in each and their mates performing simultaneously in seven. In a usual display, the male, the female, or both, crouched with body horizontal, wings out and drooping, and tail vibrating up and down. The display is also seen, at times, in juveniles begging from parents. Thirteen of 51 instances of copulatory behavior were preceded by the *cu-koo* vocalization and three by the male ( $N = 2$ ) or the female ( $N = 1$ ) holding a stick or other object in the bill.

*Extrapair copulatory behavior.*—The crows at the ranch fell into two groups of cooperative breeders which, in 1983, consisted of a breeding pair plus five to seven adult auxiliaries. These latter, although attacked repeatedly by the breeding males and driven from the vicinity of nests in weeks when copulatory behavior of the pair peaked, still exhibited signs of sexual activity. On 14 January the two members of one pair had nearly finished a copulation when a second male flew to the nest and landed on the back of the female next to the copulating male. Both males flapped their wings. The three crows rose and fell as the female moved underneath. After a few seconds, the males flew, one chasing the other.

Other instances of extrapair activity were seen on the ground. A breeding female was giving nest calls while feeding in a pasture when an auxiliary, a male, first flying to the unattended nest, flew to her and mounted. The breeding male knocked him away almost immediately, then returned three times within 12 min to attempt to copulate. Two other instances of extrapair activity were initiated by a female auxiliary (X). This individual came below the nest where a breeding female was incubating and crouched in a pre-copulatory pose. The breeding male mounted her. At this the incubating female flew down, lowered her head, and pushed X away. Two days later, again within sight of the nest, both X and the breeding male gave pre-copulatory displays followed by his mounting for a few seconds. None of the extrapair attempts appeared to be complete.

*Discussion.*—Most accounts of promiscuity in birds, as summarized by Gladstone (Am. Nat. 114:545–577, 1979) have been in colonial nesting species. Among 11 copulations witnessed by Wittenberg (Zool. Jb. Syst. 95:16–146, 1968) for the Carrion Crow (*C. corone*), a non-cooperative breeder, four were by intruding males. In one of these he saw, as I did with *C. brachyrhynchos*, two males mounted on a female simultaneously. All of the copulations witnessed by Wittenberg (1968) were on nests, Gent (Br. Birds 42:242, 1949) being the only reference to one on the ground. Wittenberg (1968) also describes Carrion Crows as giving loud copulation cries. The pre-copulatory display I noted seems to be common to some other *Corvus* species, Gwinner (Z.f. Tierpsychol. 21:657–748, 1964) describing it in both sexes of the Common Raven (*C. corax*).

*Acknowledgments.*—I thank J. N. Layne and F. E. Lohrer of the Archbold Biological Station for aid of various kinds and J. H. Hendrie, Sr., for permitting my wife and me to visit his ranch.—LAWRENCE KILHAM, Dept. Microbiology, Dartmouth Medical School, Hanover, New Hampshire 07355. Accepted 10 Apr. 1984.

*Addendum.*—Since this note was written, James (J. Field Orn. 54:418–419, 1983) has published one on reverse mounting in the Northwestern Crow (*C. caurinus*). I should report that I witnessed one instance of reverse mounting among 28 copulations noted for American Crows.—LK.