

I thank Richard L. Knight and Fred E. Lohrer for helpful suggestions on the manuscript and Walter Record for permission and help in watching crows and ravens on his farm.

LITERATURE CITED

- CONNER, R. N., I. D. PRATHER, AND C. S. ADKISSON. 1975. Common Raven and Starling reliance on sentinel Common Crows. *Condor* 77:517.
- ERSKINE, A. J. 1968. Encounters between Bald Eagles and other birds in winter. *Auk* 85:681-683.
- HEWSON, R. 1981. Scavenging of mammal carcasses by birds in West Scotland. *J. Zool. Lond.* 194:525-537.
- KNIGHT, R. L. 1984. Responses of nesting ravens to people in areas of different human densities. *Condor* 86:345-346.
- LAWRENCE KILHAM, *Department of Microbiology, Dartmouth Medical School, Hanover, New Hampshire 03755*. Received 23 Jan. 1985; accepted 28 July 1985.

Polygamy and Promiscuous Behavior in the Barn Swallow.—The Barn Swallow (*Hirundo rustica*) is considered monogamous (Verner and Willson 1969, Von Haartman 1954), but at least 6 cases of polygamy have been reported in the European subspecies *H. r. rustica* (Feldman-Luternauer 1978, von Lohrl 1962, Mohr 1958, Richardson 1956, von Vietinghoff-Riesch 1955). None has been reported in North America, but my observations of banded and color-marked individuals at a colony 1.6 km northwest of Cohoctah, Livingston Co., Michigan, revealed such a relationship.

A banded male defended a territory with 2 active nests during the first clutch period (May and June) of 1979. The behavior of the birds at these nests is similar to that in prior published reports of polygynous behavior in this species. First, the distance (0.7 m) between the 2 nests would not involve separate territories defended by 2 males, see von Lohrl (op. cit.). Second, the male recruited both females in 1979 under normal conditions, without one of the females having been paired with another male until he was claimed by accident, as in a case reported by Mohr (op. cit.). The male incubated the eggs in one nest, but not in the other; other reports either do not mention male incubation or indicate that the male did not incubate at all. Both clutches hatched within a day of one another.

The color-marked females were synchronous in their nesting activities. Mate guarding by the male prior to, and during egg laying, forced the male to be on the wing most of the time. As the male and a female returned to the territory and nest, the male then accompanied the other female from the barn. The females seemed indifferent to one another, each coming and going independently. The male seemed to favor one female and associated nest over the other while near the nests, similar to behavior reported by von Lohrl (op. cit.). He landed on that nest more often when both females were present. During incubation the male settled into the favored nest after that female left the barn. At the other he remained on the nest rim until the female returned, or more frequently, left before her return. I made no observations during the nestling period. Mohr (op. cit.) and von Lohrl (op. cit.) reported that the male fed the young of both clutches equally, while Richardson (op. cit.) indicated that male-neglect of one brood resulted in death of the half-grown nestlings, though this occurred during a period of stress.

An observation of promiscuous behavior at this colony supports the suggestion that polygyny may be more common than previous reports indicate. A mated male attempted to recruit an additional female, and probably would have succeeded, had it not been for strong territorial defense by his mate. Observations made by Richardson (op. cit.) also indicate that males which behave monogamously in some years sometimes mate with an additional female when possible in other years.

I thank Dr. Robert Payne for his comments on an earlier draft of the manuscript and Elmer and Doris Boillat for their interest and support while conducting my studies at their farm.

LITERATURE CITED

- FELDMAN-LUTERNAUER, H., AND A. FELDMAN-LUTERNAUER. 1978. Polygamie bei der Rauchschnalbe. Vogel der Heimat 6:130.
- VON LOHRL, H. 1962. Paarbildung und Polygamie der Rauchschnalbe. Vogelwelt 83: 116-122.
- MOHR, H. 1958. Ein Fall Polygamie bei der Rauchschnalbe (*Hirundo rustica*). Ornithol. Mitteilunghan 10:7-9.
- RICHARDSON, R. A. 1956. Bigamy in swallow. Br. Birds 49:503.
- VON VIETINGHOFF-RIESCH, A. F. 1955. Die Rauchschnalbe. Duncker und Humbolt, Berlin.
- RICHARD A. WOLINSKI, 2450 Baker Road, Dexter, Michigan 48130. Received 1 Nov. 1984; accepted 20 Aug. 1985.

The White Tern May be Unable to Hover in Still Air.—Many terns obtain prey by skillful plunge-dives from air to water. Such dives are often preceded by periods of hovering, an energetically expensive activity. Hovering in still air (true hovering) may require more power than is available for more than a few strokes. Sustained hovering is characteristic of few birds and impossible for large ones (Pennycuick 1975, Rayner 1979) and numerous "apparent hoverers" may be able to remain stationary only in the presence of wind. The limits to flight performance in diverse species are ecologically important and the occurrence of true hovering is interesting because the physiological requirements are severe, but the necessary observations can be readily specified. Dunn (1973) showed that the hunting performance of Sandwich Terns (*Sterna sandvicensis*) and Common Terns (*S. hirundo*) improved as wind speed increased from low to moderate (0.5 to 7 m/s) and suggested that the difficulty of controlled flying at low airspeeds was one possible cause.

Here I report observations of White Terns (*Gygis alba*) suggesting that this species may be unable to hover in still air. The terns were observed on several islands during a 6-day visit to the Northern Marianas (Western Pacific) in August 1979. Seven fresh specimens obtained by R. Clapp on the island of Guguan were weighed on a Pesola spring balance and the area of one extended wing of each was outlined on paper.

White Terns commonly approached me closely and appeared to examine me as an intruder. Often the tern scarcely paused in its onward flight, but on several occasions it maintained a steady position within a few meters of my head for 15-60 s. At these times a wind was always blowing. On one windless occasion the tern behaved differently and sustained its behavior long enough for some measurements of its flight performance.

On 9 August, I disturbed a pair of White Terns from their perch in a tree on the steep west face of East Island in the Maug group. It was a calm day and, among the trees, completely windless. One member of the pair circled repeatedly in my vicinity as I stood at the edge of a small gap among the trees and shrubs. This behavior continued for nearly 2 min until ended apparently as a result of my inadvertent movement. During this time, instead of remaining stationary, the tern flew at a constant, low forward velocity, over an unchanging horizontal circular flight path, at a constant height of about 3 m above the steeply-sloping ground. I estimated the position of the flight path by reference to surrounding vegetation during the observation and subsequently measured it on the ground. The diameter was 4.2 m. I timed the tern with a stopwatch through 7 circuits, which it completed in 35 s, thus at an airspeed of about 2.6 m/s.

I interpret these slow circlings as the result of the bird attempting to maintain a particular distance from me, while unable to hover under the prevailing windless conditions. The constancy of position and velocity of the circular flights suggest that the bird was moving at its lowest conveniently-sustainable airspeed. The marked difference in behavior between windless and windy conditions leads me to reject an alternative explanation of the circling as a result of an approach-avoidance conflict.

This suggestion, that White Terns are unable to hover in still air, can be related to the performance of a better-known species of similar size, the Common Tern. On the basis