and NSF grant 7911759.—EDWARD H. BURTT, JR., Department of Zoology, The Ohio State University, Columbus, Ohio 43210 (present address: Department of Zoology, Ohio Wesleyan University, Delaware, Ohio 43015). Received 4 Nov. 1982; accepted 8 Aug. 1983.

**Reverse Mounting in the Northwestern Crow.**—Reverse mounting has been reported in heterosexual situations for many bird species (various authors in Beach 1948, Brackbill 1969, Coombs 1978, Ficken 1963, Glick 1954, Hauser 1959, Kilham 1958, 1961, Morris 1954, Nolan 1978, Nuechterlein and Storer 1982, Shallenberger 1973, Thompson and Lanyon 1979, Van Tets 1965). However, few of these contain detailed information regarding the contexts of this behavior, and it is often dismissed as being aberrant. Here I report an instance of reverse mounting in a pair of Northwestern Crows (*Corvus caurinus*) on Mitlenatch Island, British Columbia.

The male of the pair was a 3-year-old, color-banded as a nestling. The female was not banded. By 7 May 1979, their nest appeared to be complete, and the first egg was laid on 12 May, but vanished on 14 May. That same day, the male gave the precopulatory display to her, but she ignored him. On 17 May, while both were foraging, the male picked up a small feather and approached her. Upon standing side-by-side, both bowed several times, but before the male could give any further display, the female hopped onto his back for perhaps 2 sec.

Three days later, I observed the pair engage in normal copulation. Again, the male approached her with a feather. Following bowing, the male partly spread and drooped his wings and tail, and with his bill pointing down, began to quiver his wings and tail while exposing his nictitating membrane. The female then pushed against him, and they leaned on each other, the male still quivering. Finally, he mounted her and copulation occurred with both of them cawing.

Three days later, an egg had been laid in a new nest. On 25 May, 3 eggs were present, but were subsequently deserted. I later collected 2 of them, and found both to be infertile. The pair apparently remained together for the rest of the summer, and were seen copulating normally in the territory as late as 22 June, although no new nest was produced.

Reverse mounting has been reported in another corvid. The female Rook (C. frugilegus) mounts the male when he uses the female's precopulatory display (Coombs 1978). Morris (1955) postulated 4 causal factors for what he termed pseudomale and pseudofemale behavior. Several subsequent authors (Ficken 1963, Nolan 1978, Thompson and Lanyon 1979) have used Morris' criteria to account for their observed reverse mountings. One factor, in particular, emerges as a causal agent: that of "the presence of the releasing stimuli for the sexual behaviour of the opposite sex." In these cases, the male crouched in the female's precopulatory position prior to reverse mounting. The exhibition of female behavior by males has also been used to explain other cases of reverse mounting (Coombs 1978, Kilham 1961, Morris 1954). In the present example, the male crow did not show any behavior more typical of females prior to the incident, although the species appears unusual in that the female normally quivers before coition in other members of the genus (Coombs 1978). The male was seen quivering prior to copulation in several other pairs and so this is not a peculiarity of the one pair.

One factor in common with other cases (Nolan 1978, Thompson and Lanyon 1979) was that reverse mounting followed a nest failure. The other authors argue this as an example of another of Morris' (1955) causal factors, that of "the arousal and subsequent thwarting of the sex drive." However, Morris used this to explain pseudofemale behavior by males, not pseudomale behavior by females. Nolan (1978) and Thompson and Lanyon (1979) suggest that an unusually long interval between nest failure and nest replacement may have thwarted the sex drive of the male. In the present case, reverse mounting occurred only 3 days after the first nest had failed, well within the normal nest replacement interval.

Several cases involve reverse mounting as a precursor to actual copulation (Brackbill 1969, Glick 1954, Hauser 1959, Kilham 1958, 1961). In fact, in the courtship of the Redbellied Woodpecker (*Centurus carolinus*) and Silvery Grebe (*Podiceps occipitalis*), it appears to be quite usual (Kilham 1961, Nuechterlein and Storer 1982). As Lawrence (1966) notes,

such behavior may be of ritualistic value designed to obtain the partner's full cooperation. It would normally precede copulation and perhaps continue after it had fulfilled this role (Hauser 1959, Kilham 1961). A similar interpretation may be applied to cases of reverse mounting following nest failure. After failure, the male's interest may wane somewhat. Reverse mounting may be an unambiguous signal to re-stimulate him for a replacement nest, and as such, would have an adaptive value. Nuechterlein and Storer (1982) have also suggested that the behavior not be treated as aberrant.

The age, and hence experience of the male, may play a role here too. The Northwestern Crow first breeds at 2 years of age, although I have never seen a first-time breeder successful. Thompson and Lanyon (1979) note the male involved in their case of reverse mounting was a yearling. It may be that younger inexperienced males need stronger-thanusual signals to facilitate cooperation.

I thank the B. C. Parks Branch for permission to conduct research on Mitlenatch, and Dr. N. A. M. Verbeek for his supervision.

## LITERATURE CITED

BEACH, F. A. 1948. Hormones and behavior. Hoeber, New York.

BRACKBILL, H. 1969. Reverse mounting by the Red-headed Woodpecker. Bird-Banding 40:255-256.

COOMBS, F. 1978. The crows, a study of the corvids of Europe. Batsford, London.

FICKEN, M. S. 1963. Courtship of the American Redstart. Auk 80:307-317.

GLICK, B. 1954. Reverse mounting in the Starling (Sturnus vulgaris). Auk 71:204.

HAUSER, D. C. 1959. Reverse mounting in Red-bellied Woodpeckers. Auk 76:361.

- KILHAM, L. 1958. Pair formation, mutual tapping and nest hole selection of Red-bellied Woodpeckers. Auk 75:318-329.
- ——. 1961. Reproductive behavior of Red-bellied Woodpeckers. Wilson Bull. 73:237– 254.
- LAWRENCE, L. DE K. 1966. A comparative life-history study of four species of woodpeckers. Ornithol. Monogr. No. 5.
- MORRIS, D. 1954. The reproductive behaviour of the Zebra Finch (*Poephila guttata*) with special reference to pseudofemale behaviour and displacement activities. Behaviour 6:271–322.

——. 1955. The causation of pseudofemale and pseudomale behaviour: a further comment. Behaviour 8:46–56.

- NOLAN, V., JR. 1978. The ecology and behavior of the Prairie Warbler (Dendroica discolor). Ornithol. Monogr. No. 26.
- NUECHTERLEIN, G. L., AND R. W. STORER. 1982. Who's on top?—Reverse mounting in Grebes and other monomorphic birds. Poster No. 249. Abs. 100th A.O.U. meeting, Chicago.
- SHALLENBERGER, R. J. 1973. Breeding biology, homing behavior, and communication patterns of the Wedge-tailed Shearwater, *Puffinus pacificus*. Ph.D. dissertation. University of California, Los Angeles.
- THOMPSON, C. F., AND S. M. LANYON. 1979. Reverse mounting in the Painted Bunting. Auk 96:417-418.

VAN TETS, G. F. 1965. A comparative study of some communication patterns in the Pelecaniformes. Ornithol. Monogr. No. 2.

PAUL C. JAMES, Dept. Biological Sciences, Simon Fraser University, Burnaby, B.C., Canada. Present address: Edward Grey Institute of Field Ornithology, Zoology Dept., South Parks Rd., Oxford OX1 3PS, U.K. Received 13 Sept. 1982; accepted 29 Aug. 1983.

**Observations on Roosting Sites of Screech-Owls.**—The Eastern Screech-Owl (*Otus asio*) is common to many parts of North America. However, because of the species' nocturnal habits and small size, data on its movements and habitat use are limited. Van Camp and Henny (North Am. Fauna No. 71, 1975) and McCombs and Noble (J. Wildl. Manage. 45:93, 1981) supplied data on diurnal use of natural and artificial cavities by Screech-