

PETER E. LOWTHER, *Department of Biology, University of Northern Iowa, Cedar Falls, Iowa 50614*. Received 14 Sept. 1982; accepted 1 Sept. 83.

Comparative Implications of Bathing by a Willow Flycatcher.—Comparative studies have tended to focus on reproductive and foraging behavior with few comparative studies of maintenance behavior. Because it is sequentially isolated (Slessers, *Auk* 87:91–99, 1970; Burt and Hailman, *Ibis* 120:153–170, 1978), maintenance behavior is difficult to study systematically. However, I observed a sequence of bathing by a Willow Flycatcher (*Empidonax traillii*) that, although anecdotal, suggests a number of functional comparisons with bathing behavior of other insectivorous birds, in particular swifts (Apodidae), swallows (Hirundinidae), and wood warblers (Parulinae).

At 2005 on 8 July 1981 I observed a Willow Flycatcher perched on a dead branch 2.5 m above the edge of a small pond in the Delaware Wildlife Refuge, Delaware, Ohio. From its perch the bird flew 3 m horizontally out over the pond then dropped at a 60° angle to the water which it entered breast first with a splash. While descending, the wings were fluttered about 60° above the horizontal, the feet hung down, and the tail was raised about 30° and fanned. At the time of entry into the water, the plumage was ruffled and the head raised. The bird dragged its body about .5 m through the water on raised, rapidly beating wings, then rose steeply, turned 180°, and flew in a straight line back to its perch where it landed and remained back to the sun. It shook its wet, ruffled plumage by rapidly rotating the body back and forth around the long axis, starting with the head and finishing with rapid shaking of the wings. The bird preened feathers of the back and breast, head-scratched over the wing once, then turned to face the sun and took off on the same flight path as before, repeating the entire process 4 more times. The last 2 flights took 4 and 4.1 sec and were separated by an interval of 13 sec.

The bathing behavior of wood warblers, swifts, and swallows, like that of the Willow Flycatcher, is organized into bouts of splashing alternating with intervals of shaking (Slessers, *op. cit.*; *pers. obs.*). However, warblers stand in shallow water throughout bathing, flying to a nearby perch only after the last bout of splashing (Slessers, *op. cit.*; *pers. obs.*). The Willow Flycatcher, like warblers, was non-aerial between bouts of splashing. Unlike warblers it perched away from the water when shaking and included preening and head-scratching between bouts of splashing. Swallows and swifts bathe by gliding across the surface of the water with the body in the water, the wings set at about 60°, and the tail raised and fanned (Slessers, *op. cit.*; *pers. obs.*). Just prior to rising from the water, the swallow or swift resumes flapping. After wetting the body, the swallow or swift shakes in flight and may even preen and head-scratch, before dipping into the water once again. After the last glide through the water, the swallow or swift may perch and shake, preen, and head-scratch. Like swallows and swifts and unlike warblers the flycatcher wet itself by flying with its body in the water and included preening and head-scratching between bouts of splashing. Unlike swallows and swifts the flycatcher's entry into the water was abrupt and the flycatcher beat its wings while its body was in the water, although the wings and tail were raised at about the same angle as those of gliding swallows and swifts. Unlike swallows and swifts, Willow Flycatchers do not shake, preen, or head-scratch while in flight. Thus the bathing behavior of Willow Flycatchers appears to be more aerial than that of warblers, but less aerial than that of swifts and swallows. Similarly the foraging behavior of Willow Flycatchers is more aerial than that of warblers, but less aerial than that of swifts and swallows. Adaptations to aerial foraging may be associated with aerial performance of maintenance behavior. Whether or not maintenance behavior can be performed while airborne probably depends on the efficiency of flight. Reduced predation may be the advantage of remaining airborne during maintenance behavior (Simmons, *in* *A New Dictionary of Birds*, Thomson, ed., McGraw-Hill, New York, 1964). Whatever the reason behind the association between the mode of foraging and bathing, interspecific variation in avian bathing behavior is considerable (Slessers, *op. cit.*) and deserving of functional study.

I thank Jack P. Hailman and Ned K. Johnson for their comments on an earlier draft. Field work on Willow Flycatchers was supported by an Ohio State Postdoctoral Fellowship

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 Red-bellied Woodpecker (*Centurus carolinus*) and Silvery Grebe (*Podiceps occipitalis*), it appears to be quite usual (Kilham 1961, Nuechterlein and Storer 1982). As Lawrence (1966) notes,