cies (Walters 1990). This insistance on solitary roosting is not only expensive in terms of cavity construction, but is also extremely costly for those group members, usually juveniles, lacking access to their own roost hole. Such supernumerary individuals are generally forced to roost in the open (J. Walters, pers. comm.) where they are exposed to ambient temperatures, precipitation, wind, and predators. This suggests that, for the Red-cockaded Woodpecker, the costs of roosting communally within a cavity outweigh not only the costs of solitary roosting, but also the general benefits of cavity roosting.

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Anting by an American Dipper (*Cinclus mexicanus*)

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ABSTRACT.—Anting behavior has been recorded in over 200 birds, yet its purpose remains unresolved. Here I report an observation of anting in an aquatic passerine, the American Dipper (*Cinclus mexicanus*). The dipper was seen preening ants onto its remiges in a process known as "active" anting. Numerous hypotheses exist for why birds ant, including controlling ectoparasites, inhibiting the growth of fungi or bacteria, soothing skin irritated during the molting period, and removing toxic formic acid prior to food consumption. Because of the timing and nature of the dipper's anting episode and the fact that dippers are not known to consume ants, my observation does not appear to lend support to either the molt-irritation or the food preparation hypotheses for this species. *Received 5 Dec. 1997, accepted 26 March 1998.*

Anting behavior, in which a bird exposes its plumage and possibly skin to ants or other pungent substances (Whitaker 1957, Simmons 1966, Clayton and Vernon 1993), has been documented sporadically in the literature and its purpose remains unresolved. Although it is observed infrequently, anting has been recorded in more than 200 avian species (see Groskin 1950, Whitaker 1957, Potter 1970, Dun-

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can 1976, Hendricks 1980, Post and Browne 1982), most of which have been passerines. To date, only one record exists for anting in an aquatic species (Creutz 1952), the Eurasian Dipper (*Cinclus cinclus*). Here, I report an incident of anting in the American Dipper (*Cinclus mexicanus*), North America's only truly aquatic passerine.

I observed an adult American Dipper anting on Blodgett Creek (elevation 1370 m), near Hamilton, Montana, on 12 July 1997. Just prior to anting, the bird was engaged in two aerial chases and attacks with another dipper. At 09:50 MST, the dipper flew to the end of a downed log that was partially submerged in water across the stream from its nest. There, it pecked into a hole (7.5 × 13.2 cm), whereupon numerous ants began to emerge. The dipper then picked up an ant and, holding its right wing open, applied it with a preening motion to the ventral portion of its wing. The entire process was then repeated, with the dipper picking up a total of approximately 15 ants. The bird concentrated its efforts primarily on the axillary and secondary regions of its right wing. It appeared to insert each ant near the base of the remiges and then to preen down toward the tips. Several ants were applied to the base of the secondaries or secondary coverts and into the axillaries without a downward preening motion. I may have overlooked anting of the bird's primaries because it was several seconds before I recognized the dipper's unusual alternation of pecking at ants and preening as anting behavior. Only one ant appeared to be used for each preening bout and each ant appeared to be held among the feathers for only a few seconds. I was not able to determine whether the dipper consumed or discarded the ants after using them. The anting bout was conducted in full sunlight and lasted 1–2 minutes. The bird did not vocalize while anting.

Ants that were later collected from inside the hole in the log were identified as *Formica neorufibarbis* (Emery). I suspect that the dipper was using this species for its anting bout because it initially pecked into the hole numerous times and then began picking up the ants as soon as they emerged. However, two other species of ants were collected from the immediate vicinity of the hole, *Camponotus vicinus* (Mayr) and *Camponotus laevigatus* (F. Smith). Both genera spray formic acid and are known to be used by anting birds (Groskin 1950). From my observation position, I could not be certain whether the dipper was selecting *Formica neorufibarbis* exclusively, or whether it also selected one or more of the *Camponotus* spp. that may have been attracted to the swarming *Formica* ants. All ants were collected approximately one month after the observation, because high water prevented my being able to access the log any earlier.

The anting I observed conforms to descriptions of "active" anting wherein a bird actively preens ants into its feathers, as opposed to "passive" anting in which birds settle on ants and allow them to crawl into their plumage (Whitaker 1957, Potter 1970). Unlike many birds that have been described as anting "frenetically" (Clayton and Vernon 1993) or while in apparent "ecstasy" (Ivor 1956), even falling over in the process, the dipper I observed appeared to ant calmly, looking much as though it were merely preening.

Numerous hypotheses exist for why birds ant. Anting may help control ectoparasites (Groskin 1950, Simmons 1966), inhibit the growth of fungi and bacteria owing to the antibiotic nature of ant secretions (Ehrlich et al. 1986), soothe skin irritated by rapid feather replacement during the molting period (Potter 1970, Potter and Hauser 1974), or be a means of removing toxic formic acid prior to food consumption (Judson and Bennett 1992). My anting observation occurred prior to the dipper's presumed molting period and therefore does not appear to lend support to the hypothesis that anting is closely correlated with feather replacement (Potter 1970, Potter and Hauser 1974). American Dippers have been recorded molting only between July and September (Bent 1948, Sullivan 1973). Dippers molt after the dispersal of their young and undergo a brief molt-induced flightless period (Sullivan 1965, 1973). The dipper I observed was still feeding its fledglings, which had left the nest three days earlier. Dippers continue to feed fledglings up to two weeks before the young disperse (Sullivan 1973). The anting dipper still retained all its remiges and rectrices and showed no obvious signs of having begun its molt. However, without having the bird in hand, I could not confirm whether it had started replacing its body feathers. Be-

cause dippers molt symmetrically (Sullivan 1973), the dipper I observed presumably would have anted both wings if its anting bout was correlated with feather replacement. Anting birds frequently have been seen alternating wings during bouts of anting (e.g., Wenny 1998). Although the female Eurasian Dipper observed by Creutz (1952) in Germany anted the ventral and dorsal sides of both wings, it did so in early April (in 1939), well before its molt. Creutz was unable to identify the object(s) with which the Eurasian Dipper anted.

Because dippers are not known to consume ants (Kingery 1996), it is also unlikely that the American Dipper I observed was anting as a means of food preparation. To my knowledge, no information exists on ectoparasites, fungal pathogens, or bacterial infections of dippers. However, dipper nestlings and nests are known to be parasitized by ectoparasites such as the northern fowl mite (*Ornithonyssus sylviarum*; Halstead 1988). A nestling dipper of fledging age I found dead in the nest (4 July 1997) in my study area was heavily infested with unidentified ectoparasites. Cause of death was unknown, yet the presence of ectoparasites suggested that adult dippers could become infested by nest and nestling parasites during brooding and/or feeding of the young. More observations of anting in the dipper are needed to adequately determine whether this aquatic species gains the same possible benefits from anting as do non-aquatic passerines.

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