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The Condor 92:775-776
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INFANTICIDE IN THE EURASIAN DIPPER¹

SONJA I. YOERG²

Department of Psychology, University of Massachusetts, Amherst, MA 01003

Key words: Eurasian Dipper; infanticide; polygyny; sexual selection; brood reduction.

Infanticide has been reported in several avian species (see Mock 1984, for a review). Direct observations of infanticide among individually marked animals are, however, scarce. Here I describe one definite case of infanticide by a male Eurasian Dipper (*Cinclus cinclus*), and three suspected cases.

Dippers are passerines closely associated with fast-flowing rivers in which they forage for invertebrates. Domed nests, made primarily of moss, are always located over water. Linear territories along rivers are defended vigorously by pairs during the breeding season, and maintained less assiduously by individuals the rest of the year. Though traditionally considered a monogamous species, polygyny has been reported (e.g., Galbraith 1979). Indeed, within my study area half of the males were polygynous (Yoerg et al., unpubl.).

Thirteen contiguous territories along a tributary of the river Wye in mid-Wales comprised the study area. All adults (13 females and eight males) were individually color-marked with leg bands during February and March of 1989, and were observed from February through June in a study of foraging and breeding behavior. Observations were made from inside a hide.

On 28 April 1989 I was 7 m from a nest where adults were provisioning young. The five nestlings were 5 days old; dippers typically fledge at 23 days of age. The resident male was the only trigamous male in my study

area: in addition to helping to provision the brood in question, he was building a nest with another female, and helping a third female feed five nestlings due to fledge in 2 days.

At 09:10 the female was brooding in the nest. The male from the downstream territory flew upstream landing 5 m downstream of the nest. This male was also polygynous. Both of his females were incubating eggs. For approximately 1 min he engaged in a soliciting display, dipping deeply with his wings low and neck outstretched. He then landed directly below the nest, where he called. (When the nestlings are small and the female likely to be brooding, a provisioning male will often call below the nest before attempting to deliver food.) After calling, the intruding male flew up and perched on the threshold of the nest opening. The female immediately chased the intruder downstream.

He returned 2 min later, before the female reappeared, and flew directly to an old dipper nest adjacent to the one in use. After looking inside, he flew down, then up to the active nest out of which he pulled a nestling. He descended to the river edge below the nest and dropped the nestling in the water. Flying up to the nest again, he grasped another nestling with his bill and drowned it in the same manner. As he was poised at the threshold of the nest, presumably to retrieve a third nestling, the resident male appeared below the nest and gave chase downstream. The female returned from downstream 15 sec later and immediately entered the nest to brood. Nine minutes later the resident male returned to a site near the nest where he habitually perched, presumably to guard. He flew downstream again after 10 min.

At 11:15 the same morning the intruder male approached the nest again. The female, who was foraging 10 m downstream, gave chase, joined by the resident male as they passed him upstream of the nest. All three

¹ Received 8 November 1989. Final acceptance 28 February 1990.

² Present address: Llysdyman Field Centre, Newbridge-on-Wye, Llandrindod Wells, Powys, Wales LD1 6NB, United Kingdom.

birds displayed vigorously for a short time, the resident pair then chasing the intruder downstream. The female returned to brood in less than 1 min.

I retrieved both nestlings from the river 2 hr later. (The water was extremely cold and the nestlings must have died almost immediately.) Both had fresh puncture wounds and older scabs. Three days later I inspected the three remaining nestlings, all of whom bore several puncture wounds, but were otherwise in good condition. Only one nestling of this brood eventually fledged. I suspect the other two were eaten by a mink that was observed at the nest on the day of fledging.

In three other nests I found nestlings with puncture wounds. Three 7-day-old nestlings were in a nest in a small drainage tunnel 3 m from the main river. The resident pair were monogamous, but bordered on the downstream side by a polygynous male. Both of his females were incubating. This male flew into the tunnel and was chased downstream twice in 1 hr. Two days later the nest contained one dead nestling with puncture wounds. The intruding male disappeared a week later and was presumed dead. The second brood raised in the tunnel survived to fledge. One 6-day-old nestling was found dead in a nest that had contained four young on the day of hatching. The nestling had several puncture wounds. The parents of that brood made another nesting attempt at a different site. At least three nestlings were in the nest 4 days after hatching, but were not examined. Two days later, the two remaining nestlings bore puncture wounds. During a nest watch 7 days after hatching, an unbanded adult of unknown sex flew up to the nest several times when both parents were absent. Both nestlings were dead when checked several hours later.

The presence of birds on foreign territories is itself suspicious: during the entire breeding season, the intrusions described above were the only occasions on which I saw a bird well within the bounds of another's territory. It is interesting, though perhaps coincidental, that both the bird I observed killing nestlings and the bird seen entering the tunnel that contained a nest from which nestlings disappeared were males with incubating females. These males would have little to do until their nestlings had hatched except feed themselves and guard their own nests.

Although the evidence in the three suspected cases is circumstantial, other explanations of the causes of the puncture marks are weak. Ground predators, such as mink or weasels, are unlikely to leave food behind. They usually enlarge the opening of the nest when they rob it, if they do not destroy it completely. It is possible that the marks were made accidentally by the claws of brooding females, but this fails to account for the relation between the presence of marks and a lost nestling. Romagnano et al. (1986) described similar intentional wounding of nestlings by female European Starlings (*Sturnus vulgaris*).

Infanticide can be explained as an outcome of sexual selection (e.g., Hrdy 1979), particularly if competition for mates is intense for one sex. If, for instance, females are scarce, then males may increase the probability of acquiring a female by killing her offspring, assuming remating is possible. Infanticidal male Barn Swallows (*Hirundo rustica*) sometimes won matings with widowed females whose nestlings they had killed, and in one case a killer induced a female to leave her mate and nest with him (Crook and Shields 1985). Similarly, infanticide in the Palestinian Sunbird (*Nectarinia osea*) probably enhances mate procurement (Goldstein et al. 1986). Such intrasexual selection is an unlikely explanation of infanticide in this population, however, because in the three suspected cases in which no nestlings survived, the allegedly victimized pair remained together on their territory. These observations, and the fact that dipper pairs typically defend the same territory across breeding seasons, also suggest that the infanticide was not motivated by competition for territories. Infanticidal dippers may benefit only indirectly by reducing a competitor's contribution to the population. Further speculation about the selective advantages of this behavior must be postponed until additional information is available about its frequency and the conditions under which it occurs.

I am grateful to S. Cartmel and J. O'Halloran for help with the observations, J. O'Halloran and S. Ormerod for bird banding and contributions to the project at all stages, J. Crook, L. Frank, and L. Romagnano for helpful comments on the manuscript, and F. Slater and the Llysdynam Charitable Trust for use of the Llysdynam Field Centre. This research was supported by NSF grant INT-8807471.

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