

(James and James, The seasonal occurrences of Arkansas birds, *Arkansas Acad. Sci. Proc.*, 18:26, 1964), and several times (summer) in Iowa (Brown, An annotated list of the birds of Iowa, *Iowa St. J. Sci.*, 45:434, 1971).—DAVID A. EASTERLA, *Department of Biology, Northwest Missouri State University, Maryville, Missouri 64468* AND RONALD E. BALL, *804 South Buchanan, Maryville, Missouri 64468, 8 February 1973.*

Starlings stealing worms from Robins.—It is well-known that Starlings (*Sturnus vulgaris*) are adept at stealing worms from Robins (*Turdus migratorius*) and other thrushes Van Tyne, *Wilson Bull.*, 53:185, 1946; Snow, *A Study of Blackbirds*, 1958). However previous reports have said little about the rate of success enjoyed by Starlings. Here we discuss the results of watching a mixed foraging group of Robins (up to 20) and Starlings (up to 8) attracted to a watered lawn (Rainier Vista) on the University of Washington campus in Seattle on 17, 23, 24, 25, 31 May, 1, 2, and 16 June 1972.

Table 1 shows the species observed attempting to take prey from Robins and the degree to which they were successful. As Van Tyne also noted, Starlings that prey-steal do not usually stand about waiting for a robin to pull a worm from the ground. Instead they walk quickly along probing the lawn frequently in their normal foraging pattern. In the midst of this activity they will suddenly dash over to a robin, sometimes running, sometimes flying. The distance between the two prior to an attempted steal ranged from 15 cm to an estimated 18 m (mean = 3.5 m, N = 32 recorded cases). In one instance a Starling hunting on one side of Rainier Vista suddenly flew across the entire width of the lawn (18 m) to reach a Robin that had just extracted a worm.

In addition, on five occasions Starlings were watched as they cruised in the air over a group of foraging Robins and then suddenly dropped down beside a Robin with a freshly caught worm which they stole.

Most, but not all, attempts to steal a prey occurred when the Robin was in the act of capturing or had just removed a worm (79 of 99 cases in which this information was

TABLE 1
BIRDS STEALING WORMS FROM ROBINS

| Species | Attempts | Known Steals | Worm Lost ^a | Outcome Unknown |
|--------------------|----------------|--------------|------------------------|-----------------|
| Starling | | | | |
| Adult | 109 | 37 (36%) | 8 (7%) | 6 (5%) |
| Fledgling | 6 | 4 | | |
| Crow ^b | 3 | 3 | | |
| Song Sparrow | 1 ^c | 0 | | |
| Robin ^d | 23 | 8 (35%) | 1 (4%) | 6 (26%) |

^a Both the original owner and the attacker lost the worm when it escaped during the attempted steal.

^b Each time a crow flew at least 15 m from a lamp post or tree at the edge of the Rainier Vista to a Robin with a worm on the lawn, displacing the Robin and taking the worm.

^c The Song Sparrow (*Melospiza melodia*) attempted to take an adult lepidopteran from a Robin.

^d Only cases where an adult bird attempted to rob another adult are included because of the difficulty in determining whether juveniles were robbing or being fed by a parent.

TABLE 2
STEALING BY STARLINGS AS A FUNCTION OF THE STAGE OF WORM CAPTURE BY ROBINS

| | Attempts | Known Steals | Worm Lost ^a | Not Successful |
|---------------------------------|----------|--------------|------------------------|----------------|
| Robin pulling at worm | 16 | 9 (56%) | 5 (31%) | 2 (13%) |
| Robin holding or preparing prey | 23 | 9 (39%) | 1 (4%) | 13 (57%) |

^a Both the Robin and the Starling lost the worm when it escaped during the attempted steal.
 $\chi^2 = 19.83$, d.f. = 2, $P < 0.01$

recorded). Twenty attempts, however, came as the Robin probed the earth or cocked its head prior to striking. None of these proved successful for the Starling; they may sometimes pay off because Starlings are capable of removing a worm by their own efforts and they often carefully examined the area the robin had been inspecting or probing. More importantly perhaps, by starting their rush early they may sometimes arrive just as the Robin is pulling a worm from the ground. As Table 2 shows it is at this moment that the Robin is most likely to drop its catch.

Robins appeared to take no action to avoid searching near Starlings although they would sometimes move ahead if a foraging Starling was moving directly toward them. Frequently the two species hunted within 3 m of one another. Moreover, Robins were surprisingly unresisting when threatened with the loss of a worm. The Robin simply dropped its catch and backed off running or walking away on 47 of 72 complete records of a Starling-Robin interaction (65 percent). On 23 occasions the Robin flew off carrying the worm often with a Starling in pursuit. The outcome of these chases was usually impossible to determine but several times the Robin quickly dropped its catch before disappearing from sight. Only twice (3 percent) did the attacked bird defend its prey by fighting. In contrast Robins vigorously contested with sharp vocalizations and leaps into the air six of 23 attempts to steal by conspecifics (26 percent). In addition, we have three records of Robins pulling large worms from the soil and then charging nearby Robins, aggressively driving them from the area. Such behavior appears to anticipate an attempt at stealing by fellow Robins.

Conceivably the generally passive response of Robins to Starling thievery may be adaptive. Even if they could win an interspecific dispute with this highly aggressive species, it might not be worth it because of the time and energy costs involved. Particularly in areas of high worm density (such as Rainier Vista) the Robin may be a more efficient forager if it simply ignores the Starlings present and cedes a worm or two to a thief rather than trying to keep a large distance between itself and all Starlings, fighting one when attacked, or flying off and being pursued long distances.

The presence of Starlings means that Robins may have to pay a certain price in possible thefts when they choose to search for worms. This may be a characteristic disadvantage associated with the search for and capture of relatively large prey, particularly if the searcher has interspecific competitors for that resource. Large prey may be worth stealing because they are so valuable energetically. Moreover, the fact that they usually demand a good deal of handling time to subdue, prepare, and consume means that large prey are vulnerable to a robber whereas a small prey may be grabbed and swallowed so quickly that there is no time to steal it. This potential cost of hunting for large prey should be taken into account in developing models of foraging for alternate food items (e.g. Schoener, *Ann. Rev. Ecol. Syst.*, 2:369-404, 1971).

These observations were made while the second author was supported by NSF grants GB-28714X, GB-28714X1, and GB-35269.—JOAN BIRD, 4300 4th Ave. NE, Seattle, Washington 98105, JOHN ALCOCK, Department of Zoology, Arizona State University, Tempe Arizona 85281, AND W. JAMES ERCKMANN, Department of Zoology, University of Washington, Seattle, Washington 98195, 12 January 1973.

Nest records of Cerulean Warbler in Delaware.—The Cerulean Warbler (*Dendroica cerulea*), first described by Wilson from specimens taken along the Schuylkill River in eastern Pennsylvania, remains a rare, but locally fairly common, species in the Atlantic Piedmont region. A nest found near the White Clay Creek in northern Delaware on 13 May 1972 represents the first known state record of a Cerulean Warbler nest; however Rhodes (Auk, 22:194–205, 1905) reported Cerulean Warblers in June 1903 along the Choptank River in Maryland's Eastern Shore and at Seaford, Delaware, approximately 70 miles below the fall-line in the Atlantic Coastal Plain. Because of the Cerulean Warbler's sporadic occurrence and the expressed notion that the breeding status and range might be changing (Bull, Birds of the New York area, Harper and Row, New York, 1964; Fables, Annotated list of New Jersey birds, Urner Ornithol. Club, 1955) the location of some easternmost breeding populations is noteworthy. In northern New Jersey breeding birds have been reported at ten locations along streams in the Appalachian Highlands and the Piedmont Plateau, but not below the fall-line (Stone, Bird studies at Old Cape May, Delaware Valley Ornithol. Club, 1937; Bull, op. cit.; Fables, op. cit.). The White Clay Creek breeding record in northern Delaware is in the lower Piedmont, while in nearby Maryland a breeding colony was reported in the lower Susquehanna River Valley (Stewart and Robbins, Birds of Maryland and D. C., U.S. Fish and Wildlife Serv. N.A. Fauna 62, 1958), and another breeding population has been observed in an arm of the Oak-Chestnut Piedmont section extending below the fall-line: Elk Neck in the upper Chesapeake Bay. A breeding population at Piscataway in southern Maryland (A.O.U. Check-list of North American birds, 1957) is also located slightly below the fall-line; however the Eastern Shore record of Rhodes is the real anomaly. Habitat descriptions of that Eastern Shore area do not fit the streamside mature open forest type of habitat reportedly preferred by Cerulean Warblers (Bent, U.S. Natl. Mus. Bull., 203, 1953). Several other breeding species generally associated with cooler climates occur regularly in the Eastern Shore section, (Stewart and Robbins, op. cit.), but those species, including Tree Swallow (*Iridoprocne bicolor*) and Swamp Sparrow (*Melospiza georgiana*), are Coastal Plain birds.

The rich transitional habitat in the White Clay Creek Valley in northern Delaware numbers such southern species as the Yellow-throated Warbler (*Dendroica dominica*) and Blue Grosbeak (*Guiraca caerulea*) along with such northern species as Least Flycatcher (*Empidonax minimus*) and Veery (*Catharus fuscescens*) among the 90 species listed as breeding along a 6 mile stretch of the creek floodplain (Dyer, Delmarva Ornithologist, 8:24–30, 1973). Two nests, 0.7 miles apart, found near the White Clay Creek in 1972 culminated yearly searches since discovery of Cerulean Warblers there by Frederick Lesser in late May of 1963. The first nest, 40 feet high in a small crotch in a white ash (*Fraxinus americana*) was approximately 200 yards away from where the birds were normally seen and heard in tall sycamores overhanging the stream. The nest habitat, an old field overgrown with sumac, blackberry and black gum, and the location, away from the stream, appear atypical. The second nest, while close to the stream (approximately 20 yards away), varied from most nest site descriptions in being only 17 feet high (equal to the lowest of 12 nests listed in Bent) and overhanging a busy road and parking area.