

VERTEBRATE REMAINS IN BARN OWL PELLETS

BY JOHN KEEVER GREER AND RICHARD L. GILSTRAP

A WELL KNOWN dietary phenomenon among owls is the regurgitation of pellets composed of undigested prey remains, the identification of which may reveal the owls' food preferences. If collections of pellets are regular, a study of them may indicate fluctuation in abundance or availability of prey species, increased food demands of maturing progeny, and change of season.

From the end of February to the end of September, 1967, we collected the pellets of a family of Barn Owls (*Tyto alba*) in central Oklahoma to learn what we could about the owls' food habits. We collected the pellets in the old mission building on the State Game Farm, three miles north of El Reno in Canadian County. The mission building is about a quarter of a mile from the North Canadian River. Along the river a common tree is the cottonwood. Throughout the countryside there are scattered patches of blackjack and post oak, as well as of untilled grassland. The area surrounding the farm is heavily cultivated, principally in alfalfa, wheat, and corn.

George B. Wint, Superintendent of the game farm, informed us that Barn



FOUR YOUNG BARN OWLS OF A BROOD OF SIX

Photographed 5 July 1968 by Ivy R. Brown at nest site in cotton gin at Sweetwater, Roger Mills County, west-central Oklahoma. The two birds at the left, the youngest of the brood, were at the nest site proper. The two at the right were somewhat older. The two oldest had already left the gin, fully fledged.

Owls had nested for many years in the mission building, but that he knew of no one who had attempted a regular collection and analysis of the owls' pellets. During the seven-months period of our study the owls reared a brood of five young. The nest was just above the eave in the space between the top (second) floor of the building and the roof. We made one collection each month and identified the vertebrate remains in the several dozen pellets collected. Before making the first collection we removed all pellets and prey remains from the raftered area of the nest site. By the end of our study all seven owls had, so far as we could tell, left the building.

The eleven mammal genera whose remains we found are listed in Table I. In addition to these, we found traces of two Starlings (*Sturnus vulgaris*) and what we believed to be the leg-spur of a medium-sized galliform bird. The weight of this bird we made no attempt to calculate, since we were not even sure that the bird itself had been eaten. One rather small amphibian we included in our calculations, as well as some very young Cottontail Rabbits (*Sylvilagus floridanus*) found in June and July. Diversity of prey species was similar to that reported by other authors for the Barn Owl (see, in particular, Anderson and Long, 1961, Amer. Mus. Novitates No. 2052: 1-3; Baker and Alcorn, 1953, J. Mammalogy, 34: 116; and Pettit, 1951, Trans. Kansas Acad. Sci., 54: 395).

Table I
Vertebrate Remains in Barn Owl Pellets

Species	Avg. Wt. in grams	Number of Individuals and Percentage of Biomass						
		Mar	Apr	May	Jun	Jul	Aug	Sep
Pocket Gopher (<i>Geomys bursarius</i>)	95	1(5%)	7(35%)	2(12%)	6(25%)	20(19%)	2(20%)	0(0%)
Cotton Rat (<i>Sigmodon hispidus</i>)	77	18(67)	7(27)	1(5)	12(40)	65(49)	3(24)	6(36)
Eastern Mole (<i>Scalopus aquaticus</i>)	72	1(4)	0(0)	0(0)	0(0)	5(4)	0(0)	0(0)
Pocket Mouse (<i>Perognathus hispidus</i>)	36	10(17)	8(15)	7(15)	15(23)	51(18)	14(52)	18(51)
Grasshopper Mouse (<i>Onychomys leucogaster</i>)	32	0(0)	1(2)	13(25)	3(4)	0(0)	2(4)	1(3)
White-footed Mouse (<i>Peromyscus</i> spp.)	20	7(7)	17(18)	31(37)	5(4)	20(4)	0(0)	1(2)
Short-tailed Shrew (<i>Blarina brevicauda</i>)	12	0(0)	1(1)	0(0)	0(0)	1(.1)	0(0)	0(0)
Harvest Mouse (<i>Reithrodontomys</i> spp.)	11	0(0)	3(2)	8(5)	3(1)	9(1)	0(0)	1(1)
Least Shrew (<i>Cryptotis parva</i>)	4	0(0)	2(4)	2(4)	0(0)	9(3)	0(0)	0(0)
Wood Rat (<i>Neotoma floridana</i>)	190	0(0)	0(0)	0(0)	0(0)	1(2)	0(0)	0(0)
Cottontail Rabbit (<i>Sylvilagus floridanus</i>)	75	0(0)	0(0)	0(0)	1(3)	2(1)	0(0)	0(0)
Starling (<i>Sturnus vulgaris</i>)	85	0(0)	0(0)	0(0)	0(0)	2(2)	0(0)	1(7)
Amphibian	10	0(0)	0(0)	0(0)	0(0)	2(.2)	0(0)	0(0)
Total Weight		2,053	1,917	1,651	2,338	10,172	965	1,258
Total Numbers		37	46	64	45	187	21	28

To ascertain the food value to the owls of their mammalian prey, we charted our findings concerning the four most frequently eaten species in such a way as to make possible a comparison of (a) numbers of individuals and (b) estimated biomass consumed each month (see Figure 1). In this chart the number

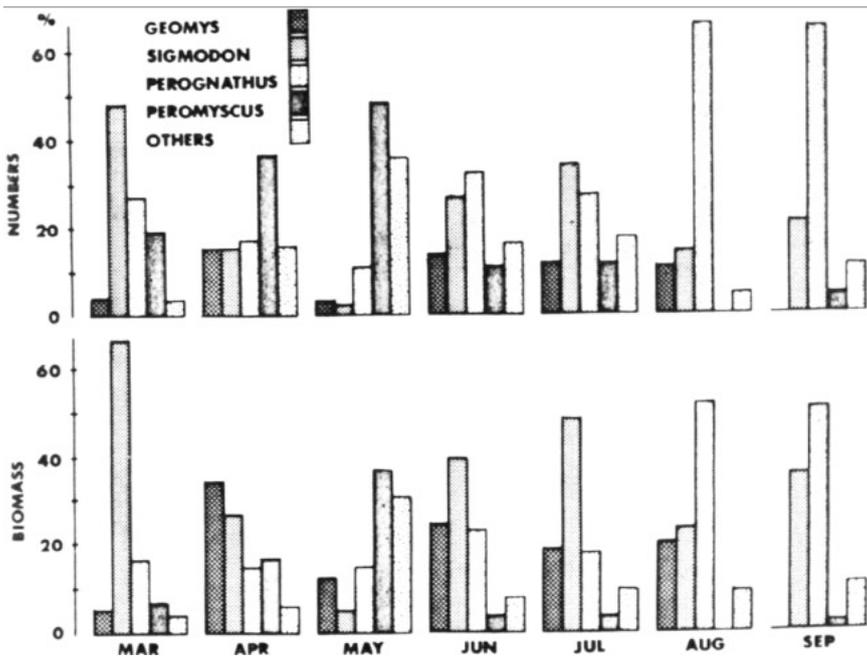


Fig. 1. Numbers of individuals and biomass of vertebrate prey of Barn Owls at the State Game Farm, El Reno, Oklahoma.

of individuals of each species is expressed as a percentage of the total number of individuals of all species found in the pellets each month. For example, the seven Pocket Gophers (*Geomys bursarius*) whose remains we found in the April collection represented 14% of the 49 individual mammals whose remains we found that month. These seven gophers, each weighing an estimated 95 grams and together weighing an estimated 665 grams, represented 35% of the estimated total weight (1,917 grams) of all vertebrate prey consumed in April. Throughout our study we based our estimate of average weights on actual weights recorded on labels of specimens in the vertebrate collections housed at the University of Oklahoma. Fully adult Pocket Gophers weigh considerably more than 95 grams each, but since the gopher remains found by us in this study were principally of immature animals, we believe the estimated average weight as stated to be about right.

We were obliged to make two assumptions in our calculating—first, that the remains of a given animal represented an entire animal eaten. We found a few

uneaten parts of mammals near the nest site and Sutton (1967, Oklahoma Birds, p. 252), writing of Barn Owls that nested in the mission building in 1959, when Cotton Rats (*Sigmodon hispidus*) were "abundant" on the game farm, reported that the owls fed their brood "almost exclusively" on the fore parts of the rats, leaving the hind parts scattered about the nest site. Second, we assumed that remains in pellets represented typical prey diversity even though we had no way of knowing how many pellets were regurgitated by the parent owls away from the nest site or of ascertaining what these pellets contained. Since some remains may not have represented entire animals eaten and since some pellets almost certainly were regurgitated away from the nest site, our calculations must be considered suggestive rather than final; they do make clear, however, which mammals were of the greatest food importance to the young owls month by month from the end of February to the end of September in 1967.

The Barn Owls studied by us took a variety of mammalian prey, but the mammals most frequently taken were Cotton Rats, Pocket Mice (*Perognathus hispidus*), Pocket Gophers, and "white-footed" mice of the genus *Peromyscus* (probably both *P. leucopus* and *P. maniculatus*). The owls consumed many Cotton Rats in March (67% of total biomass intake) and early summer (40-49%) and the Cotton Rat was a continuous food source throughout spring and summer. Pocket Mice provided more than half the food in late summer (52%) and early fall (51%), as well as a constant food source throughout the period of our study. Pocket Gophers also continued to provide food in spring and summer. Owing to the gopher's lack of agility above ground, this animal was probably easily caught. Ease of capture, coupled with greater weight, made possible a substantial gopher biomass intake (about 20% of total) with low expenditure of energy. We found the remains of only one fully adult gopher; as stated above, most gopher remains were of immature individuals. These young animals may have been moving from their original burrows to new living places. Mice of the genus *Peromyscus* constituted an important part (37%) of the diet during mid-spring; the large numbers consumed during this period suggest that these mice may often be a buffer element on which the owls depend when additional food is needed. The data indicate that July was the month in which the owls caught the most individual animals—a finding reflecting the need for more food during the latter stages of development of the young owls.

Analysis of pellets collected indicated that the Cotton Rat, with an average of more than 35% of the total biomass intake, was the most important food source for the young owls. Too, our study clearly showed that though the owls captured a variety of vertebrates, they preferred mammals. They obviously did not prey much on birds.

Craighead and Craighead (1956, Hawks, Owls, and Wildlife, pp. 284-87) found that the diet of owls studied by them reflected prey population densities. We

may deduce from our study that in 1967 mice of the genus *Peromyscus* were abundant on the game farm in May but uncommon or for some reason unavailable in September, and that Pocket Mice were abundant from June to September but uncommon or unavailable in April and May.

Further studies, including an intensive program of live-trapping of small mammals and of regular pellet collection, should be made while the Barn Owls are nesting at the game farm.

We wish to thank Mr. Wint and the personnel of the game farm for their assistance while we were making this study.

STOVALL MUSEUM OF SCIENCE AND HISTORY, UNIVERSITY OF OKLAHOMA, NORMAN, OKLAHOMA 73069, 11 JUNE 1969.

GENERAL NOTES

Winter record of Cinnamon Teal in Oklahoma.—In mid-afternoon on 1 January 1970 I observed a drake Cinnamon Teal (*Anas cyanoptera*) through a good binocular at about 50 yards in the "bay area" of Boomer Lake along the north edge of Stillwater, Payne County, north-central Oklahoma. The "bay area" is about a mile long and from 1/8 to 1/4 of a mile wide. The weather was clear and cold. Most of the lake was frozen. The teal was walking about on the ice not far from two hen Canvasbacks (*Aythya valisineria*). I noticed especially the teal's small size (it was considerably smaller than the Canvasbacks), the reddish brown coloration, the dark tail, and the light blue patch on the wing. The only other ducks that I saw at Boomer Lake that day were a few Buffleheads (*Bucephala albeola*). These were in an unfrozen part of the "bay area."

The Cinnamon Teal apparently has not been reported heretofore in Oklahoma in winter. The latest date for fall migration, according to Sutton (1967, *Oklahoma Birds*, p. 68), is December 1.—Dana D. Cole, 1820 S. Perkins Road, Stillwater, Oklahoma 74074, 30 January 1970.

Cinnamon Teal in Oklahoma in winter.—On 24 December 1969, while making a Christmas Count in the vicinity of Canton, Blaine County, central Oklahoma, I drove across the Canton Reservoir dam, observing waterbirds. A group of about 30 ducks that were loafing in the water near the rocky face of the dam—most of them obviously Mallards (*Anas platyrhynchos*) and Gadwalls (*A. strepera*)—flew up as I approached. Among them was a single bird with blue wing-patches. The company alighted about 25-30 yards from the dam. Using a 20X telescope, I located the moot bird, identifying it at once (from smallness as well as from coloration) as a drake Cinnamon Teal (*A. cyanoptera*). So far as I know, this is the first winter sighting in Oklahoma of *A. cyanoptera*, a species that has not heretofore been seen in the state between 1 December and 9 February (Sutton, 1967, *Oklahoma Birds*, p. 68).—W. Marvin Davis, Department of Pharmacology, University of Mississippi, University, Mississippi 38677, 2 February 1970.

Possible Iceland Gull in Tulsa County, Oklahoma.—On 6 January 1969 Anne and Bruce Reynolds saw an "all-white" gull among the many Ring-billed Gulls (*Larus delawarensis*) and Herring Gulls (*L. argentatus*) that were feeding—as those two species customarily do in winter—along the Arkansas River

in Tulsa County immediately below the Keystone Reservoir dam. Since the bird was plainly about the size of a Herring Gull, the Reynoldses decided that it could not be a Glaucous Gull (*L. hyperboreus*). The Reynoldses saw the white bird again below the Keystone dam on six different days between 8 and 19 January inclusive. On 19 January, Bruce Reynolds and I studied it for about 15 minutes with a 30X spotting scope as it stood—with one Herring Gull and several Ring-billed Gulls—on an exposed rock in the river below the dam. On that date it preened a good deal and sparred occasionally with one of the other gulls. From 26 January through 10 February the Reynoldses saw it four times in Mohawk Park, near Tulsa—on Yahola Reservoir, an impoundment approximately 18 miles east of Keystone dam; they saw it again on three occasions between 1 and 4 March below the Keystone dam. On 5 March it was seen for the last time. On that date Polly and Herbert L. Keating, Eleanor Sieg, and Ruth Phillips saw it flying above the river below the Keystone dam.

The Reynoldses, who studied the gull's colors, size, and proportions carefully with 20X and 30X scopes at 80 to 150 yards on 13 of the 14 occasions mentioned above, describe the bird as "about the same size as the Herring Gulls, not appreciably larger. It was seen swimming, flying, and standing on exposed rocks in the river bed, in close proximity to Herring Gulls and Ring-billed Gulls, so comparison of sizes was easy to make. The wing tips were an inch, perhaps less, longer than the tail when the bird was standing. The plumage was entirely creamy-white except for some buffy edges on the feathers of the belly, rump, and under side of tail. The legs and feet were pink. The bill was pale pink or flesh-color with dark end. The eyes were dark."

It is entirely possible that this bird was an Iceland Gull (*L. glaucoides*), a species mentioned though not listed, even hypothetically, by Sutton (1967, Oklahoma Birds, p. 215). The moot bird's plumage and leg- and bill-colors suggest that it was in second winter feather. The various plumages of the Iceland Gull are much like those of the Glaucous, a similarity mentioned by many authors and succinctly stated by Bent (1921, U. S. Natl. Mus. Bull. 113, p. 62), who calls the Iceland "a smaller edition" of the Glaucous. The moot Tulsa County bird looked much like the second winter Glaucous Gull figured on p. 140 of "A Guide to Field Identification Birds of North America," by Robbins, Bruun, and Zim (1966), and its pink, black-tipped bill and dark eye were much like those of the "second winter" Iceland Gull head pictured opposite p. 108 in "Birds of the Atlantic Ocean" by Ted Stokes (1968).

The bird could hardly have been an albino Herring Gull, for its bill had a dark tip and its eyes were not red or pink; they were "dark." Probably it was not an "albinic" or "albinotic" Herring Gull, either, for a bird of that sort would likely be white-spotted or white-blotched and without the creamy and buffy tones mentioned.

During the period when this gull was observed a Black-legged Kittiwake (*Rissa tridactyla*) in first-year plumage also was seen on 14 occasions along the same stretch of the Arkansas River below the Keystone Reservoir dam. The Iceland Gull and Black-legged Kittiwake summer on breeding grounds in the same general area in the northeastern part of the New World and both normally winter only as far south as the coast of New York and New

Jersey (A.O.U. Check-list, 1957, pp. 218, 230). It is perhaps not unreasonable to believe that whatever forces caused the kittiwake to wander so far south and west of its normal wintering range might also have caused an Iceland Gull to do so.—John S. Tomer, 5911 E. 46th St., Tulsa, Oklahoma 74135, 5 September 1970.

White-winged Dove in Greer County, Oklahoma.—From 29 June to 22 August 1969 we banded 286 adult and 649 young Mourning Doves (*Zenaidura macroura*) in southwestern Oklahoma in connection with a study of that species being conducted by the Oklahoma Cooperative Wildlife Research Unit at Oklahoma State University. We did much of our work in the vicinity of the village of Willow, in Greer County, 15 miles north of the city of Mangum.

At about 13:00 on 3 July, while we were driving eastward from Willow on Highway 34A, we saw a White-winged Dove (*Zenaida asiatica*) flying southward across the highway about 20 yards in front of us. We clearly saw the band of white across the middle of each wing and the rounded, somewhat stubby looking, white-cornered tail. The bird was about 15 feet above ground, heading for a small, shallow pond about 30 yards south of the highway, an impoundment whose banks were largely devoid of vegetation. We watched the dove alight on the barren, moist, nearly flat north bank, not far from the water's edge. Obviously alert, and holding its head high, it remained virtually motionless for about seven minutes, giving us ample opportunity to observe it through a good spotting scope (15 to 60 variable power) and a 7 x 35 binocular. It was plainly a bit stockier than a Mourning Dove. We carefully noted the dark ear-patch and the distinct, though narrow, white mark on the folded wing. The dove did not drink. Suddenly it took wing. When last seen by us it was flying westward, toward Willow. We did not see it again, nor did anyone tell us of seeing a dove with white in its wings.

Much wheat is grown near Willow, but no attempt is made to cultivate the rugged gypsum hills of the area and there are extensive xeric grassland flats throughout which grow scattered mesquite trees (*Prosopis juliflora*). The climate is semi-arid, the annual rainfall averaging only 20 to 25 inches. The pond at which the dove alighted was an impoundment of a small, northward-flowing, intermittent stream. In the five acres of pastureland surrounding the pond grew such trees as mesquite, elm, and willow. The sky was clear to partly cloudy during the afternoon of 3 July and the air temperature above 100° F.—as it had been at mid-day for several days. There had been little or no precipitation in the area during the two weeks or so preceding 3 July.

Cottam and Trefethen (1968, *Whitewings*, pp. 30-43) discuss twelve geographical races of *Zenaida asiatica*, four of which—*asiatica* (Eastern), *mernsi* (Western), *grandis* (Upper Big Bend), and *monticola* (Mexican Highland)—breed as far north as the southwestern United States. The northern limits of the species' breeding extend from the Aransas National Wildlife Refuge (along the Texas coast a little north of the city of Corpus Christi) northwestward through Wilson, Val Verde, and Culberson counties, Texas (p. 33), southwestern New Mexico (p. 36), central Arizona (p. 35), and southern Nevada (p. 36), then southwestward to southern California (p. 35). The part of the breeding range that is closest to Willow, Oklahoma, is in Val

Verde County, Texas, about 300 miles southwest of Willow.

Two other southern or southwestern doves whose breeding ranges are far removed from Oklahoma—the Ground Dove (*Columbigallina passerina*) and Inca Dove (*Scardafella inca*)—occasionally visit Oklahoma (Sutton, 1967, *Oklahoma Birds*, pp. 230, 235-36).—Jerry Sturdy and Roy Frye, *Oklahoma Cooperative Wildlife Unit, Oklahoma State University, Stillwater, Oklahoma 74074, 3 November 1969.*

Feeding behavior of a Roadrunner in winter.—What we know about the food of the Roadrunner (*Geococcyx californianus*) in winter along the north edge of the species' range has been based almost entirely on analysis of stomach contents. Very few observers in Oklahoma have made a point of watching Roadrunners closely at that season.

During the noon hour on 16 March 1969, in a flat, moderately rocky area not far north of the village of Kenton, in the Black Mesa country of Cimarron County, far western Oklahoma, I observed a Roadrunner carefully for about 35 minutes. When I first saw the bird it was walking slowly through snow about an inch deep among dead, two-foot-high stalks of broomweed (*Gutierrezia sarothrae*) and broadleaf gumplant (*Grindelia squarrosa*). It scrutinized the dry vegetation as it moved along, often lowering its head, peering under the leaves, and pecking at the base of the plants, thus vigorously shaking them. Occasionally, after pecking, it threw its head back, pointed its bill straight up, and opened its mouth wide as if swallowing.

Convinced that the bird had obtained a considerable amount of food, I collected it. It proved to be a very lean male (UOMZ 6560). Presumably it had been looking for food for some time, yet its stomach contained only the following: 1 small Damsel Bug (Nabidae); 1 Milkweed Bug (Lygaeidae); the hind legs of 1 True Grasshopper (Locustidae); and the snouts of 5 Snout Beetles (Curculionidae). The esophagus contained 6 small Leafhoppers (Cicadellidae). These were probably what the bird had been obtaining while I watched it. I wish to thank Dr. George J. Goodman, of the Department of Botany and Microbiology at the University of Oklahoma, for identifying the plants mentioned above, and David J. Shetlar for identifying the insect remains.—Kenneth N. Geluso, *Museum of Southwestern Biology, University of New Mexico, Albuquerque, New Mexico 87106, 17 November 1969.*

Fall records of the Golden-winged Warbler in Oklahoma.—On my acreage in Bethany, near Oklahoma City, in central Oklahoma, there is a neglected fruit orchard that has grown up in elms and hackberries, none of them very tall. Here I have observed Ruby-crowned Kinglets (*Regulus calendula*) and other more or less unfamiliar birds. On the afternoon of 7 October 1969 I walked to the orchard shortly after arriving home from the office at about 17:30. I had barely reached the area when I saw—no more than ten feet away and about at eye level—a Golden-winged Warbler (*Vermivora chrysoptera*) whose black bib and yellow wing-patches were plainly evident, but whose cheek-patch, which should have been black, or at least gray, was not obvious. After I had watched the bird for two or three minutes, it disappeared into a tall cottonwood at the edge of the orchard. Curious as to whether absence of the black cheek-patch meant an adult female or an immature bird of either sex, I called John G. Newell, who promptly drove over to see the bird for himself.

Just south of the orchard Newell found an adult male Golden-winged Warbler whose resplendent plumage (including a noticeable black cheek-patch) we both admired as the bird stood momentarily on the ground along the west edge of a plum thicket. When it moved out of sight, Newell went to the north side of the thicket, where he saw several Orange-crowned Warblers (*V. celata*) and Nashville Warblers (*V. ruficapilla*) and one Black-throated Green Warbler (*Dendroica virens*).

While Newell and I were standing under a cottonwood tree not far from the thicket I again saw a Golden-winged Warbler that did not have noticeable cheek-patches. It was almost 25 feet up. Newell did not get a good look at this bird before it flew off. I am convinced that he and I saw two Golden-winged Warblers that afternoon, one a fully adult male, the other an exceptionally bright adult female or possibly a young male in first winter feather.

According to Sutton (1967, *Oklahoma Birds*, p. 492), there have heretofore been no fall records for the Golden-winged Warbler in Oklahoma. There have been spring records for the following counties: Delaware 1, McCurtain 2, Tulsa 1, Alfalfa 1. On 5 October 1969, just two days before the above-discussed fall sightings, Anne Reynolds and Bruce Reynolds observed a Golden-winged Warbler for about 15 minutes in Mohawk Park, near Tulsa. The bird was, according to a statement in the November 1969 issue of the *Tulsa Audubon Society Newsletter*, "feeding low in a redbud tree and in some vines." *Vermivora chrysoptera* has never been collected in Oklahoma.—Nelson Hall, 5400 Mueller St., Bethany, Oklahoma 73008, 21 December 1969.

Boat-tailed Grackles feeding spadefoot tadpoles to nestlings.—While I was studying the breeding activities of the toad known as the Plains Spadefoot (*Scaphiopus bombifrons*) in Tillman County, southwestern Oklahoma, in the summers of 1968 and 1969, I had occasion to see a good deal of the Boat-tailed Grackle (*Cassidix mexicanus*), a bird that had only recently made its way into that part of Oklahoma. The toads were breeding in great numbers in temporary pools within the city limits of Tipton. I seldom saw the grackles at the pools in 1968; but in 1969 a colony of several males and about 20 females nested well above ground in large cottonwood trees not far from the pools. On 23 May 1969, at a pool that was rapidly drying up and that had a water surface of about five square feet on that date, I observed an almost continuous movement of female grackles back and forth—each bird with a spadefoot tadpole in its beak when it flew from the pool. The grackles carried the tadpoles, which measured about 1 to 1½ inches long and were in various stages of metamorphosis, directly to the nests. I did not climb to the nests so did not learn how large the nestling grackles were. The tadpoles swarmed in the shallow water with their backs exposed, so the grackles had no difficulty in capturing them. The muddy area surrounding the pool was covered with grackle tracks. All of the food-capturing was done by females; I did not see a male grackle at the pool. At no time in 1968 or 1969 did I see a Common Grackle (*Quiscalus quiscula*) in Tipton.

At temporary pools that were alive with tadpoles but that were outside the city limits of Tipton, I saw no Boat-tailed Grackles. To me it appeared that the grackles "in town" were depending largely (if not exclusively) on the tadpoles as food for their nestlings. It is conceivable that the colony es-

obtained tadpoles as food for themselves in the summer of 1968.

E. A. McIlhenny (1937, *Auk*, 54: 291) and A. Skutch (in Bent, 1958, *U. S. Natl. Mus. Bull.* 211, p. 347) mentioned tadpoles as food of nestling Boat-tailed Grackles. According to McIlhenny, whose statements were based on observations in Louisiana, "if tadpoles and small frogs are especially abundant, these will constitute the food for the young." In the area with which McIlhenny was familiar the Cricket Frog (*Acris gryllus*) was the species "most used." To the best of my knowledge, no one has heretofore reported the feeding of Plains Spadefoot tadpoles to nestling birds of any species. The tadpoles are abundant in southwestern Oklahoma when temporary pools form in summer; they may well be an important food for birds of several species as well as for certain other vertebrates.—Jeffrey Howard Black, *Department of Zoology, University of Oklahoma, Norman, Oklahoma 73069*, 28 October 1969.

Indigo Bunting as host to Brown-headed Cowbird in Oklahoma.—The Indigo Bunting (*Passerina cyanea*), a locally common-to-abundant summer resident in eastern Oklahoma, is known to be "very commonly imposed upon" by the Brown-headed Cowbird (*Molothrus ater*) in many parts of its range (Friedmann, 1929, *The Cowbirds*, pp. 230-31). Nice (1931, *Birds of Oklahoma*, p. 172) includes the Indigo Bunting among the 34 species that "have been found parasitized in Oklahoma." The only parasitized nests mentioned by Mrs. Nice were two found near Copan, Washington County, northeastern Oklahoma, by A. J. B. Kirn; these each held "cowbird eggs" presumably in addition to one or more bunting eggs (Nice, *op. cit.*, p. 175). The only other parasitized Oklahoma nests on record (so far as I know) were three found 16 May 1964 by Gerald W. Dickson along Hog Creek 17 miles northeast of Norman, Cleveland County, central Oklahoma. These held, respectively, one bunting egg and two cowbird eggs; one bunting egg and three cowbird eggs; and three cowbird eggs (Sutton, 1967, *Oklahoma Birds*, p. 580). The last may not have been "active"—i.e., it may have been deserted by the buntings before Dickson found it.

The point I wish to make is that according to data thus far available, cowbird parasitism of the Indigo Bunting has not been observed to go beyond the "egg stage" in Oklahoma. No one has reported seeing a young cowbird in an Indigo Bunting's nest, or a recently fledged cowbird attended by an Indigo Bunting. This being so, let me put on record the following: On 2 July 1968, in a gully just west of the University of Oklahoma Biological Station campus near Willis, Marshall County, south-central Oklahoma, I found an Indigo Bunting nest containing three bunting eggs and one cowbird egg. The nest was 3½ ft. up in a sapling rough-leaved dogwood (*Cornus drummondii*). The following day, after ascertaining that the nest still contained three bunting eggs and one cowbird egg, I found another cowbird egg, unbroken, on the ground. On 7 July the nest held three bunting eggs, which appeared to be at the point of hatching, and one cowbird egg. On 11 July the nest held two small bunting chicks, a cowbird chick easily twice the size of either bunting chick, and a fresh-looking cowbird egg (one bunting egg presumably had been thrown from the nest and a cowbird egg had been added). On 12 July the nest held a husky cowbird chick, a lively looking bunting chick, an emaciated bunting chick that refused to beg for food, and

a cowbird egg. On 13 July and again on 16 July the nest held a large cowbird chick, a healthy bunting chick, and a cowbird egg. Despite thorough search under the nest on 13 July I could not find the remains of the emaciated bunting chick. On 17 July the nest was empty. When last seen (16 July) the two chicks looked as if they would survive.—Freeman D. Thomas, 1920 West Main, Jacksonville, Arkansas 72076, 1 December 1969.

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Aline Romero, 3730 S. Yale Ave., Tulsa, Oklahoma 74135—*Scissortail*

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BY EMMA H. MESSERLY

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