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VERTEBRATE REMAINS IN BARN OWL PELLETS

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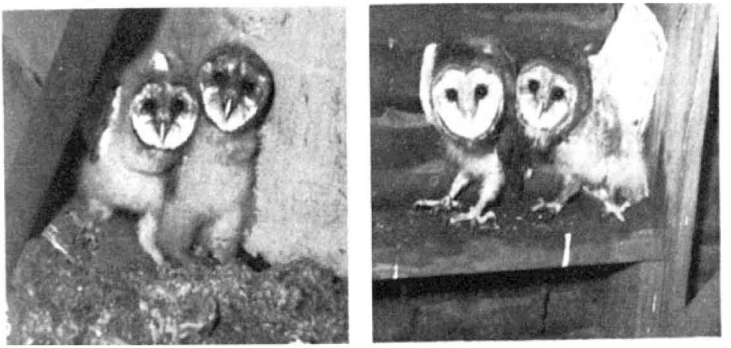
A WELL KNOWN dietary phenomenon among owls is the regurgitation of pellets composed of undigested prey remains, the identification of which may reveal the owls' food preferences. If collections of pellets are regular, a study of them may indicate fluctuation in abundance or availability of prey species, 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 Petitt, 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 (*Geomys bursarius*)	95	1(5%)	7(35%)	2(12%)	6(25%)	20(19%)	2(20%)	0(0%)
Cotton Rat (*Sigmodon hispidus*)	77	18(67)	7(27)	1(5)	12(40)	65(49)	3(24)	6(36)
Eastern Mole (*Scalopus aquaticus*)	72	1(4)	0(0)	0(0)	0(0)	5(4)	0(0)	0(0)
Pocket Mouse (*Perognathus hispidus*)	36	10(17)	8(15)	7(15)	15(23)	51(18)	14(52)	18(51)
Grasshopper Mouse (*Onychomys leucogaster*)	32	0(0)	1(2)	13(25)	3(4)	0(0)	2(4)	1(3)
White-footed Mouse (*Peromyscus* spp.)	20	7(7)	17(18)	31(37)	5(4)	20(4)	0(0)	1(2)
Short-tailed Shrew (*Blarina brevicauda*)	12	0(0)	1(1)	0(0)	0(0)	1(.1)	0(0)	0(0)
Harvest Mouse (*Reithrodontomys* spp.)	11	0(0)	3(2)	8(5)	3(1)	9(1)	0(0)	1(1)
Least Shrew (*Cryptotis parva*)	4	0(0)	2(.4)	2(.4)	0(0)	9(.3)	0(0)	0(0)
Wood Rat (*Neotoma floridana*)	190	0(0)	0(0)	0(0)	0(0)	1(2)	0(0)	0(0)
Cottontail Rabbit (*Sylvilagus floridanus*)	75	0(0)	0(0)	0(0)	1(3)	2(1)	0(0)	0(0)
Starling (*Sturnus vulgaris*)	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

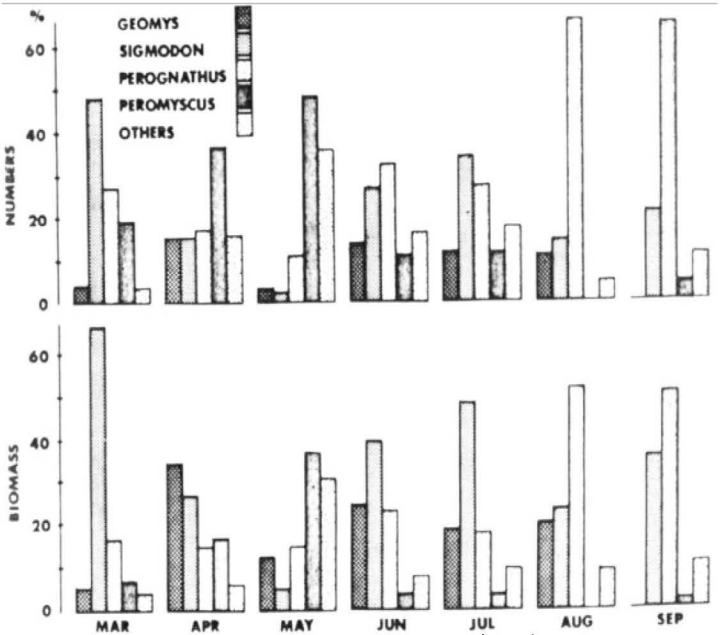


Fig. 1. Numbers of individuals and biomass of vertebrate prey of Barn Owls at the State Game Farm, El Reno, Oklahoma.

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