vast numbers of the animals were readily available. We had no way of knowing, of course, how long a period the pellets and pellet fragments represented, whether the two owls regurgitated all of their pellets at that particular roost, or just where the owls caught the bats — i.e., whether in the cave or while the bats were flying out of, or into, the cave.

When free-tailed bats have left Oklahoma for the winter, such important predators as the Great Horned Owl must turn their attention toward other sources of food. Now that we know something about the summer food habits of the Great Horned Owls that roost (and perhaps even nest) in free-tailed bat caves, these same birds should, if possible, be studied carefully during winter and spring. The owls are believed to be non-migratory. At this writing we can only assume that they continue to use the caves as roosts in winter, faring forth to obtain food other than bats outside the caves.

We wish to thank Dr. Charles C. Carpenter for identifying the lizard remains for us, and Kathy Nipper and Cecil R. Chesser for their assistance in obtaining the pellets.

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ON THE FEEDING BEHAVIOR OF THE RED CROSSBILL

BY GEORGE M. SUTTON

The Red Crossbill *(Loxia curvirostra)* visits Oklahoma irregularly in winter, presumably when coniferous trees west and north of Oklahoma fail to produce cones. It does not feed on seeds of conifers exclusively while here, but if it is known to be in a given area it certainly is to be looked for in that area's coniferous trees. Since moving to Oklahoma in 1952, I have seen the Red Crossbill chiefly in Cleveland County, in the central part of the state, though during this same period it has been reported from several other counties. In 1955-56 (17 November to 9 February), 1960-61 (5 November to 3 April), 1966-67 (13 October to 14 May), and 1972-73 (25 October to 1 May), I saw it almost daily on the University of Oklahoma campus in the city of Norman.

The species was especially common in 1966-67 and 1972-73. As a rule the ten to 30 birds that I continued to see during those winters were in a loose flock. They fed regularly in the 20-some fairly large Austrian pines (*Pinus nigra*) growing on the campus between the Zoology Building (Richards Hall) and Lindsey Street; but I saw them from time to time also in pines on the old golf course just east of the campus, in pines among dormitories just south of Lindsey Street, in a ragged stand of wild sunflower at the corner of Asp and Lindsey, and, toward the end of their stay during each period, on the ground under two large red cedars (*Juniperus virginiana*) at the northeast corner of

the Stovall Museum of Science and History on Asp Avenue.

The fact that I nearly always observed the crossbills feeding during the middle of the day (1100 to 1300) has led me to wonder whether warming of the air caused the mature pine cones to "open up" at that time. On cool mornings I often heard or saw the birds flying about rather than feeding. Their clearly enunicated *chi-chi, chi-chi-chip* callnotes were readily identifiable. Flying flocks did not bunch tightly except when suddenly flushed from a tree: a bird at the front of a flock moving from one feeding spot to another was often 20 yards or so from the other end of the flock.

While busy feeding, the birds were remarkably quiet. On many occasions I would not have known that they were above me had I not heard cracking sounds overhead or seen the light brown, paper-thin seed-wings floating to the ground. When a bird changed position from one branch to another it usually fluttered downward. When shifting thus, it sometimes gave a single or double *chip,* but while climbing from cone to cone on a given branch, a procedure that required no fluttering of wings, it almost invariably remained silent.

The birds were unsuspicious or "tame," at times astonishingly so. On 14 January 1973, while I was standing on a sidewalk watching a feeding flock, a student whom I did not know stopped to ask what I was looking at. I explained that crossbills were above us in the pine. Even as I spoke, a grayish olive bird fluttered down to a cone on a branch just above our heads, looked at us briefly, and started working at the cone. Saying to the student that the crossbills were "very tame," I reached my hand toward the bird. When my fingers had approached it to within about a foot, it looked closely at them, but not until I had grasped the needles and shaken the tip of the branch a little, did it depart. "I'd never have believed that," was the student's comment.

Precisely how crossbills use their bills in feeding has long been of interest to me. Until watching the birds closely here in Norman I have been under the impression that a feeding individual pushed its closed bill between the scales of a cone with head turned to one side, then brought its head to an upright position, thus prying the scales apart with the tips of the mandibles. I am now convinced that the usual procedure involves pushing the slightly opened bill straight in between the scales, thus prying them apart without a turning of the head, then opening the bill a little more, thus reducing the pressure on the scales and allowing them to return almost to their original position, at the same time permitting the strong, spoon-tipped tongue to move forward, scoop the seed from the thin, translucent "wing" that holds it, and bring it back into the mouth for swallowing. Judging from what I observed of the living birds (rather than from anything found in the gullet or stomach of specimens collected), the seed itself needs no husking, cracking, or "masticating" before being swallowed. The seed-wing floats off after the seed has been scooped from it. An interesting and readily perceptible phenomenon is the drifting ground-

ward of seed-wings from a tree in which crossbills are feeding. On more than one occasion I have watched the falling seed-wings, heard low cracking sounds and chipping overhead, seen a bird crawling or fluttering from one cone to another, and eventually counted up to twenty or more birds quietly feeding in the one tree.

Often I have watched one or more feeding birds only four or five feet away. Such birds did not twist their heads when forcing their bills between the scales of cones, nor did they twist their heads after pushing their bills in. Their jaw muscles are powerful, a fact that is instantly apparent to anyone who skins a specimen, but opening the bill after it has been pushed between the scales must not require much force since the returning to their original position of the pried-apart scales probably aids the opening of the mandibles as the bird moves its tongue forward.

The feeding behavior of captive Red Crossbills has been described in detail by Tordoff (1954, Condor, 56: 348), who states that the scales of a cone are "raised by lateral abduction of the lower mandible, that is, toward the side to which the mandible is deflected; this motion is produced by the powerful, asymmetrically developed muscles on this side of the skull." My never having witnessed this "lateral abduction of the lower mandible" may well have resulted from the fact that the tips of the mandibles are completely hidden while the scales are being pried apart. My observations do not agree with Tordoff's in one particular: the long axis of the heads of feeding birds observed by me was often parallel to the long axis of the cone. It occurs to me that the prying apart of scales may be accomplished in more ways than one. A direct pushing toward the cone's center with bill closed or slightly opened certainly could pry the scales apart. Perhaps the procedure varies with the "open-ness" of the cones.

TONGUES OF RED CROSSBILLS

Eight times actual size. The drawing, made by Martin T. Jensen, shows the remarkable distal modification that permits the bird to scoop seeds from cones or seed-heads into the mouth.

Tordoff states that his captive crossbills "fed adeptly" on sunflower seeds "only after considerable practise." Red Crossbills that I watched on 2 November 1972, while they were feeding on wild sunflower seeds, seemed to be having no difficulty. The seeds were not as large as commercial sunflower seeds, of course. It appeared to me that each bird was scooping the seeds from the seed-heads with its saliva-covered tongue, lifting or pulling each seed back into the mouth with the tongue, and, again using the tongue, working the seed into position between the tomia, where it was cracked.

As stated at the first of this paper, the crossbills did most of their feeding in the pines, but when the supply of pine seeds was exhausted the birds subsisted to a considerable extent on red cedar seeds picked up on the ground under the trees. The stomachs of crossbills collected while they were on the ground feeding held not the whole juniper berries, pulp and all, but only the seeds.

STOVALL MUSEUM OF SCIENCE AND HISTORY, UNIVERSITY OF OKLAHOMA, NORMAN, OKLAHOMA 73069, 1 APRIL 1975.

GENERAL NOTES

Scaled Quail in Custer County, Oklahoma.—On 17 January 1976, shortly after flushing a covey of about a dozen Bobwhites (*Colinus virginianus*) 4½ miles west and 1 north of Butler, Custer County, west-central Oklahoma, Russell Blanchard, Jr. shot a Scaled Quail (*Callipepla squamata*). The bird was by itself in moderately grazed short-grass pastureland that had little brush in it. Blanchard had no way of knowing whether it had been with the Bobwhites, but he was fairly certain that every bird in the covey that he had flushed was a Bobwhite. Head and chest feathers of the Scaled Quail have been preserved for reference. These do not appear to have come from a hybrid individual.

It is doubtful that *Callipepla squamata* has ever before been seen or taken in Custer County. Though the species is known to have ranged eastward irregularly as far as "Alfalfa, Woodward, Dewey, Caddo, and Jefferson counties" (Sutton, 1967, Oklahoma birds, p. 142), and though the map in Schemnitz (1959, Southwest. Nat., 4: 150) shows southwestern Custer County to be within the Scaled Quail's range, no actual sighting or capture within the county's borders has been reported, so far as I know.—J. Brent Giezentanner, *Washita National Wildlife Refuge, R.R. 1, Box 68, Butler, Oklahoma 73625, 19 January 1976.*

Third specimen of Glaucous Gull for Oklahoma.—About noon on 27 December 1974, I saw a very large white-looking gull near a duck blind along the east shore of Lake Hefner in the northwestern part of Oklahoma City, Oklahoma County, central Oklahoma. The gull was at the water's edge, not standing on its toes, but "sitting" with its bill pointed backward and tucked in between the scapulars and back feathers. I thought it was asleep, so approached it cautiously. To my surprise, I found that it was dead.

I showed the specimen to my friend Jack S. Roberts, who confirmed my belief that it was an immature Glaucous Gull (*Larus hyperboreus*) probably in first winter feather. Its plumage was largely white but mottled and suffused with pale buff throughout. Its bill was dark, almost black, at the tip, but pinkish flesh-color otherwise. Its legs, feet, and eyelids were pinkish flesh color, its eyes light brown.

On skinning it, I found it to be thin. In its stomach was a single item—a small quartzite pebble. The prepared skin is now in the bird collection at the University of Oklahoma (male, UOMZ 7913). It is the third specimen of *Larus hyperboreus* for Oklahoma. The first was taken along the Red River south of either Jefferson County or