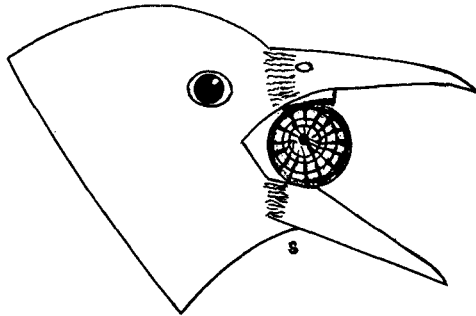


over the end of the pipe shutting off the escape of the air. When the air pressure has built up sufficiently, it causes the hose to straighten out and emit a small explosive report. The repeated flapping of the hose accompanied by the popping noises has kept this building entirely free of Starlings for two winters. Although the expense of installing such a system may be \$100.00 or more, according to Mr. Pfeiffer the cost of operating the compressor is only \$2.00 per month. He turns it on about an hour before dark. About two hours later, when the Starlings are settled for the night on neighboring buildings, he shuts down the apparatus. He finds that it can be left off for several days at a time, the Starlings having apparently established roosts elsewhere. A minor objection to the method is the noisy popping of the numerous swinging hose. Five other buildings have installed similar methods and all have been very successful, as shown by their clean window ledges and awnings. As more and more buildings adopt this compressed air system, it will be instructive to observe the final effect upon the winter habits of the Louisville Starlings.—HARVEY B. LOVELL, *Biology Department, University of Louisville, Louisville, Kentucky.*

**The Bronzed Grackle's Method of Opening Acorns.**—The writer has known for some time that the Bronzed Grackle (*Quiscalus quiscula aeneus*) splits the shells of acorns in order to secure the meat. While watching the feeding operations of this species at Madison, Wisconsin, in September, 1941, it occurred to me that the procedure might not be commonly known. The reference books consulted were silent beyond the statement that acorns form a portion of the Grackle's diet. Correspondence with J. Van Tyne resulted in reference to the paper by Alexander Wetmore (*Auk*, 36, 1919: 190-7) in which the method of splitting the acorns is described.

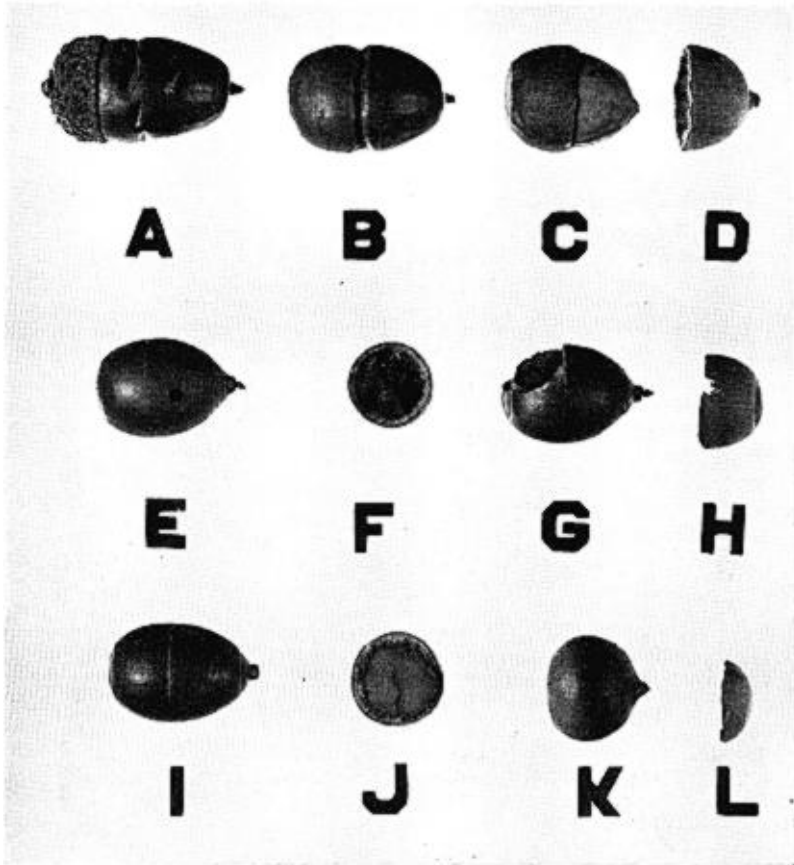
The cutting is done by a special ridge or keel in the Grackle's palate. The position of the acorn in the bill during shelling is shown in the accompanying



drawing. Pressure is applied and the acorn rotated until there is produced a circular indentation at right angles to the axis, the shell eventually falling into halves. On October 11, I chanced upon two men shooting Grackles in a field of standing corn which was infested with about a thousand of these birds. Fourteen males and eleven females were thus made available for examination. There was considerable individual variation in the height of the keel and this did not appear

to be due to wear. The keel in some cases was so low that a rule would barely strike it when drawn towards the commissure. There seemed to be no consistent differences correlated with sex.

Supplementary observations made in Wisconsin show that the Grackle opens the small acorns of the yellow oak (*Quercus velutina*), Hill's oak (*Q. ellipsoidalis*), scarlet oak (*Q. coccinea*), bur oak (*Q. macrocarpa*), and pin oak (*Q. palustris*). The normal acorns of the white oak (*Q. alba*) and the northern form of the red oak (*Q. borealis*) are too large to be manipulated. Attempts are made to open abnormally small acorns of the white oak but these are seldom successful as



shown on the accompanying plate (A, B, and C). This is due to the toughness of the shell and to the tendency of the meat of unripe acorns to stick to the shell. The largest acorn found with keel marks was 15.5 mm. in diameter.

No positive evidence was obtained that any portion of the shell is swallowed. The stomachs of the birds collected showed no shell fragments. In some cases half of the shell resisted separation (C) and this caused abandonment. Frequently the meats of the acorns of the yellow oak split with the shell. The fragment (J) was reworked in the bill and rejected if the meat did not dislodge.

A high percentage of the acorns (I) worked upon are rejected because of resistance to splitting. Frequently a bird will seize an acorn and fly into a tree where much more persistence is shown in the attempt to open it than when the bird is on the ground. It is not uncommon for the Grackles to feed on acorns that they pick from the tree.

Several pin oaks have been planted in Madison for ornamental purposes. Their acorns are approximately 12.5 mm. in length and the width usually exceeds this dimension. Curiously enough the shell fragments showed that the split was made about 3 mm. from the base (L) instead of near the middle as was the case with acorns from most species. When an acorn of the pin oak was placed in the bill of a freshly collected bird and pressure applied, the acorn automatically took such a position that the keel would cut near the base. Regardless of how the acorn was inserted on its side, the result was the same. This is due to the peculiar shape of the acorn (K), pressure causing it to incline from the perpendicular.

Wetmore stated that the kernel is swallowed entire. This appears to be the case; however, only fragments of the meat were found in the birds collected even early in the morning, the largest being 8 mm. in length. The gulping action is probably accompanied by crushing of the kernel. Unfortunately no bird was found in the act of swallowing a kernel where it could be collected with discretion. Secondary evidence for crushing is the fact that in no case was even so small an object as a grain of maize found entire in the stomach.

A large percentage of the acorns in this region are parasitized by weevils of the genus *Balaninus*. The egg is deposited in the growing acorn, the larva eventually cutting in the shell a hole by which it escapes to the soil. The Grackle appears to be unable to distinguish between sound and unsound acorns. Many opened acorns were found containing nothing but excreta and decayed portions of the meat (E, F, G, and H). In "H" it will be noted that the line of cleavage runs across the hole by which the larva made its exit. No evidence could be obtained that the acorns were opened from a desire to secure the larvae.—A. W. SCHORGER, 168 North Prospect Avenue, Madison, Wisconsin.

**Crossbills Breeding in Northern Michigan.**—During a field trip from January 27 to February 12, 1941, to the Huron Mountains of Marquette County, in northern Michigan, I observed unusual numbers of crossbills. Both the Red Crossbill (*Loxia curvirostra minor* Brehm) and the White-winged Crossbill (*Loxia leucoptera leucoptera* Gmelin) were present. Identification of specimens collected has kindly been made by Pierce Brodkorb, following Ludlow Griscom's revision (*Proc. Boston Soc. Nat. Hist.*, 41, No. 5, 1937). W. B. Barrows stated ("Michigan Bird Life," 1912: 472) that "Occasionally both forms are found in the same flock, but this is unusual . . ." In the present instance they occurred together, the Red Crossbills outnumbering the White-winged by more than three to one. There were literally hundreds of the birds throughout the region, often mingled with great numbers of Redpolls (*Acanthis linaria linaria*) and Pine Siskins (*Spinus pinus pinus*). Chickadees (*Penthestes atricapillus atricapillus*) were distinctly less common in the region at this period than in previous seasons, a fact possibly due to competition with the great numbers of these other birds.

A good crop of pine cones probably attracted the crossbills, which were found everywhere in conifer stands. However, Red Crossbills were also observed in virgin hardwood forests; and about a dozen pairs of White-winged Crossbills were present in a large swamp of alders and small spruces. At one group of buildings both species were commonly seen in white birches and nearby Norway pines. Often the birds were grouped about the bases of hard maples and hemlocks, pecking at the bark; also they were greatly attracted to spots of dog urine in the snow. During this period the temperature ranged approximately from 10° to 30° F., and the snow depth from 16 to 30 inches on the level.