is not a sufficient photoperiod to cause gonadal recrudescence in the Tree Sparrow (personal observation). Moreover, such a photoperiod did not greatly differ from the natural photoperiod at this time of year. At Urbana, Illinois, the time between sunrise and sunset on February 1 is 10:07 hours and increases to 12:36 hours by March 31, with an average photoperiod of 10:41 hours in February and 11:56 in March. The environmental conditions, to which the birds would normally be exposed locally, differed greatly from the experimental conditions in temperature. The mean local outdoor temperature during February 1958 was −4.9°C (23.1°F); over all recorded years the average is −0.3°C (31.5°F). February 1958 temperatures ranged from −21°C (−6°F) to 17.2°C (63°F). During March 1958, the temperature average 2.3°C (36.2°F); over all recorded years the average is 4.5°C (40.1°F). March 1958 temperatures ranged from −4.4°C (24°F) to 14.4°C (58°F).

The fact that the keratin structures of the birds kept at high temperatures differs significantly in many respects from those of either wild birds or those maintained under identical conditions at lower temperatures suggests strongly that high air temperature is the causative agent. One possible explanation for the excess keratin production is that extreme high air temperature, approaching body temperature, increases the metabolic rate of the keratin producing cells. The increased growth would be the result of a faster mitotic rate of cells in the exposed epidermal stratum germinativum.—GEORGE C. WEST, *Department of Zoology, University of Illinois, Vivarium Building, Champaign, Illinois.*

The Function of the Depressor Mandibulae Muscle in Certain Passerine Birds.—The function usually ascribed to the depressor mandibulae muscle of birds is that of depressing the lower jaw. This action is accomplished by an upward pull on the lower mandible posterior to its articulation with the quadrate such that the mandible pivots downward anterior to this articulation. It has long been known, however, that in some non-passerine species this muscle has a second function—namely that of raising the upper jaw (see Hérissant, Mém. Acad. Sci. Paris 1748, 1752: 345–386). The only muscle of passerines commonly thought to have this function is M. protractor quadrati, which pulls the distal end of the quadrate forward, thereby moving the palatal and jugal struts forward and rotating the upper mandible dorsally around the frontonasal hinge. (See Beecher, Auk, **68**, 1951: 412–416, for a more complete discussion of jaw mechanics.) I believe that in certain passerine birds the depressor mandibulae serves in part to raise the upper jaw, thus complementing the action of the protractor quadrati.

The dual function of the depressor mandibulae may be explained in terms of its angle of pull to the long axis of the quadrate. If the muscle pulls parallel to the body of the quadrate, its sole action is depression of the lower jaw. On the other hand, if the muscle pulls forward with respect to the quadrate its forward component will be transmitted to the distal end of the quadrate through the lower jaw, swinging the quadrate anteriorly and raising the upper jaw. Furthermore, if there is resistance to depression at the tip of the lower jaw, the point of resistance then acts as the fulcrum of a second class lever and the force of the muscle is increased at the level of the quadrate. The forward component acting on the quadrate is therefore also increased.

Beecher has described the adaptations for feeding by "gaping" in certain species of Icteridae. Meadowlarks (*Sturnella magna*) "drive the closed bill into the ground and open it powerfully against the resistance of the earth" (*op. cit.*, p. 422). In

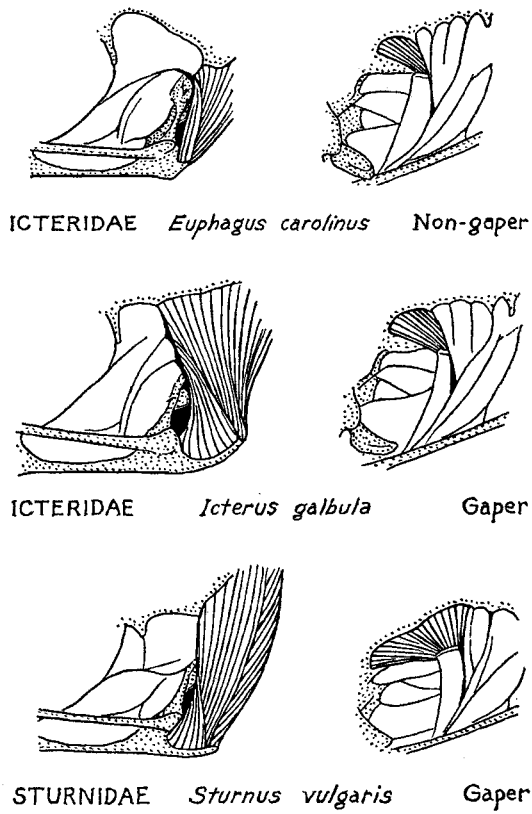

FIGURE 1. Jaw musculature of gapers and non-gaper. Left, lateral view showing M. depressor mandibulae in detail. Right, anterodorsolateral view showing M. protractor quadrati in detail. Modified from Beecher, 1951 and 1953.

orioles of the genus *Icterus*, "the feeding method involves the thrusting of the closed bill into the fruit, after which it is opened forcefully against the resistance of the pulp and skin" (p. 424). Oropendolas feed in a similar manner. Certain caciques (*Archiplanus*) "frequent larger branches and dead stumps where they pry in crevices and under bark with the bill partly opened" (p. 426). Beecher stated that in all of these birds, the depressor mandibulae and the protractor quadrati are relatively large and powerful. Associated with the increase in the depressor muscle is the enlargement of the retroarticular process, which increases the area of insertion of the muscle as well as its leverage.

Two striking features of the depressor mandibulae in gapers of the Icteridae were illustrated but were not discussed by Beecher: first, the depressor mandibulae is greatly enlarged while the protractor quadrati is only moderately enlarged (see Fig. 1); and second, the lateral portion of the depressor originates rather far anteriorly in the skull and runs at a considerable angle to the quadrate. The

lateral portion consequently pulls forward with respect to the quadrate, elevating the upper jaw while depressing the lower jaw. The efficiency of the depressor mandibulae in raising the upper mandible, as explained above, is increased by the resistance to depression of the lower mandible encountered while gaping. It seems likely to me that an important part of the force which raises the upper jaw in gapers within the Icteridae is contributed by the depressor mandibulae, and that its disproportionate increase in size relative to that of the protractor quadrati, and the alteration of its fiber direction, are adaptations to the gaping method of feeding.

In the starling (*Sturnus*), which "repeatedly parts the grass mat or probes by spreading the mandibles" (Beecher, Auk, **70**, 1953: 284), the depressor mandibulae pulls parallel to the quadrate and therefore has no effect on the upper jaw. Raising of the upper jaw is accomplished solely by the protractor quadrati, which is indeed much better developed in *Sturnus* than in non-gapers or in the gapers already mentioned (Fig. 1). The different patterns of muscle development found in gapers of the Icteridae and Sturnidae represent different structural adaptations to similar feeding methods which can be explained in terms of the dual function of the depressor mandibulae in the Icteridae.

I am grateful to William J. Beecher for reading the manuscript and making several helpful suggestions.—RICHARD L. ZUSI, *Department of Zoology, Coburn Hall, University of Maine, Orono, Maine.*

***Falco peregrinus pealei* shot in Northern Ohio.**—In February, 1958, the writer received a Peregrine Falcon frozen in the flesh through the courtesy of Mr. John A. Anderson, manager of the Winous Point Club in Ottawa County, Ohio. The bird had been shot and brought in for mounting for display in the trophy room by a hunter on November 15, 1957. Mr. Anderson presented the specimen to the University of Cincinnati, at the suggestion of Mr. Mike Nauer, then outdoor sports writer for a Cincinnati newspaper.

The bird, a beautiful immature female, was identified by the writer as belonging to the northwestern race, *F. p. pealei,* because of its generally very dark, coarsely marked plumage, particularly on the underparts. The specimen was sent for checking to Dr. Harry C. Oberholser, who confirmed the identification; pointing out that it is a typical example of this well-marked race. Dr. Oberholser showed the bird to Dr. John W. Aldrich and Dr. Herbert Friedmann, who concurred in the identification. The specimen apparently establishes the first record of this race of the Peregrine Falcon east of the Cascade and Sierra Nevada Ranges.—EMERSON KEMSIES, *Curator of Ornithology, University of Cincinnati, Cincinnati 21, Ohio.*

Probable Eskimo Curlew on Galveston Island, Texas.—On March 22, 1959, Messrs. Trevor Feltner and Dudley Deaver, members of the Texas Ornithological Society, saw on Galveston Island a curlew that attracted their attention because it was noticeably smaller than two Long-billed Curlews *(Numenius americanus)* between which it was feeding. On April 5, 1959, the same two men, accompanied by Messrs. Victor Emanuel and Roland Fowler, also members of the Texas Ornithological Society, saw the same, or a similar, bird on Galveston Island in a 200-acre grassy pasture about six miles north of the place of the previous observation. The party, which had a 30x telescope, identified the bird as an Eskimo Curlew *(N. borealis).* Emanuel saw it again on April 8, in the same pasture, and told me about