

FROM FIELD AND STUDY

Speed of the Allen Hummingbird While Diving.—To perform the power dive that is such a spectacular part of the display of Allen Hummingbirds (*Selasphorus sasin*), a male climbs 50 feet or more into the air and then under what appears to be full power swoops down toward the earth. The velocity during this dive must be close to maximum for the species.

Early in March of 1960, a male Allen Hummingbird displayed frequently to one or more females feeding and perching in some flowering quince bushes in Orinda, California. Next to these bushes I erected two 20-foot poles marked in 1-foot intervals and took motion pictures of the diving bird with a stationary camera fixed 33 feet from one of the poles and 40 feet from the other. The camera was aimed to record the part of the dive extending from about 25 feet above the ground down to about 15 feet. The bottom of each dive was at about 6 feet. When all went well I obtained a series of four to ten exposures of one of the poles and of the bird during that part of the dive when its speed would be expected to be greatest. The shutter opening was closed to one-quarter of the usual setting, to shorten the duration of each exposure, and the indicator on the camera was set at a speed of 64 frames per second. By photographing the face of an electric clock I found that this gave an actual speed of 69 exposures per second.

As each dive was photographed, I recorded in my notes the direction from which the bird approached one of the poles and, when the bird swooped in from one side, an estimate of how many feet from the pole it had passed. The developed strips of film were projected, exposure by exposure, in a photographic enlarger and a tracing made of the position of the bird in successive pictures. The distance between successive images of the bird was then measured, compared with the 1-foot marks on the pole in the same photograph, and corrected for being closer to or farther from the camera than the pole was. The pictures show that in the middle of its dive the bird was descending at an angle of about 45° from the horizontal. Consequently, the bird's distance from the camera was changing rapidly during all dives except those in which he approached the pole from either the right or the left; in the latter examples he provided a profile view of the arc of his dive. Using only the five dives that were recorded satisfactorily in profile and in which the bird was judged to have passed less than 4 feet from one of the poles, the speed was calculated to be 53, 53, 58, 63, and 64 miles per hour.

Some of the variation in these determinations arises from actual differences of speed in different dives, from inaccuracies in measurement of the projected images, from slight deviations from strictly profile views, and especially from errors in estimating how far away from the pole the bird passed. With the camera 33 feet from the pole and with the lens used (focal length 25 mm.), an error of 3 feet in estimating pole-to-bird distance would introduce an error of about 10 per cent in the answer.

A rough check on the accuracy of these measurements can be obtained by estimating the height of the dive and the elapsed time. The bird appeared to dive about 60 feet in slightly more than 1 second, which gives an average speed of 40 miles per hour, but this includes a period of acceleration at the beginning of the dive and a period of deceleration near the bottom.

Shortly before the bottom of many of the dives, the bird begins a long, clear, whistling note that arises from the vibration of certain tail feathers (Aldrich, Condor, 58, 1956:126). To determine the speed at this time, a few series of pictures were taken as the bird levelled off and passed over or through the top of the bush. From three such series of pictures, the speed at the bottom of the dive, as the bird moved horizontally, was calculated to be 34, 39, and 45 miles per hour.—OLIVER P. PEARSON, *Museum of Vertebrate Zoology, Berkeley, California, May 10, 1960.*

Thyroid Activity in Nestling Vesper Sparrows.—Although the importance of the thyroid glands to growth and development is widely appreciated, no analysis has been made of their functional state as it relates to the establishment of homeothermy in young altricial birds. It was therefore of interest to carry out a histological study of these endocrine glands in young Vesper Sparrows (*Poocetes gramineus gramineus*) of known age, whose growth and temperature regulation have been analyzed (Dawson and Evans, Condor, 62, 1960:329-340). Height of the secretory epithelium has been used as an index of thyroid activity.

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