Also, the staccato, fricative, vocal note is sometimes given with the boom and the same vocal note is usually repeated in quickening cadence while the bird is mounting for a long dive. These longer dives were all observed in full daylight.

It may, then, be concluded that the boom note of the nighthawk is produced by the vibration of the wing feathers, probably the primaries. The vibration is caused by the down turning of the wings at the bottom of the boom dive. The intensity of the sound is more or less proportional to the speed attained. The character of the sound is such as to suggest the vibration of feathers. The dive may be made and checked without the boom or the turning of the wings, and entirely at the bird's pleasure. The dive is usually at an angle of 70 degrees with the ground, ending in a sharp turn and upward glide at a 60 degree angle; but the turning point, height, and vocal notes accompanying vary with the occasion. If the performer is on exhibition, he makes the most of himself, while if playing, the act is more haphazard.

There are, of course, still many facts in connection with the boom flight not yet known, and further experimentation on the curiosity of the nighthawks may lead to interesting results. Seemingly the birds fell for an army hat, and perhaps another style would affect them differently. Lastly, it should be understood that some of my conclusions could not be made entirely on my own observations; therefore, I have considered information before published in order to substantiate my opinion.

Los Angeles, California, February 6, 1925.

THE WINKING OF THE WATER OUZEL

By CHARLES W. TOWNSEND

IT IS COMMONLY stated that the Dipper (*Cinclus mexicanus unicolor*) winks with its nictitating membrane. Thus, Grinnell and Storer, *Animal Life in the Yosemite,* p. 544, say: "The nictitating membrane or 'third eyelid' is whitish in the Dipper, and when drawn backward across the eye, as it is frequently when the bird is above water, can be seen at a considerable distance. This membrane probably is drawn over the eyeball when the bird is working beneath the surface of the water." Dawson, *Birds of California,* II, p. 733, says of this bird: "Ever and again he delivers a slow wink, upside down, with the white nictitating membrane."

I hesitate to disagree with such authorities; but my observations, made under very favorable circumstances and mainly with this point in view, lead me to think that the winking is done with the upper eyelid. My studies of other birds, to be detailed later, confirm me in the belief that it is not the nictitating membrane of the Dipper which makes such conspicuous and easily seen winks.

On November 28, 1924, I studied three Water Ouzels at Pecos River, New Mexico, and on March 7, 1925, one at the Merced River in Yosemite. In both cases I was able to watch them with eight-power binoculars within twenty or twenty-five feet. The part moved is pure white and it contrasts strongly with the dark plumage. As the movement in every case seemed to me to be from above downwards, it was apparent that it was the upper eyelid that winked and not the nictitating membrane; for the movement of the latter is from the inner angle of the eye outwards. In the Yosemite bird, which was winking constantly and at the same time singing *sotto voce,* I noticed several times that a narrow upper white edge of the eye was noticeable momentarily after the winking, as if the upper lid at these times was not at once returned to its place.

The fact that the part moved is white in an otherwise dark bird has doubtless led to the belief that this is the nictitating membrane, which in most birds is of a milky white color; but the direction of the winking in a vertical and not in a horizontal or slightly oblique plane proves this belief to be erroneous. An examination of a number of skins of this bird showed both upper and lower eyelids to be clothed with short pure white feathers.

Coues in his *Key to North American Birds,* 5th Edition, 1903, says of the nictitating membrane, or "winker" as he calls it: "While the other lids move vertically and have a horizontal commissure, the winker sweeps horizontally or obliquely across the ball from the side next the beak to the opposite." In Newton's *Dictionary of Birds,* vol. I, pp. 233 and 234, there is a curious error, for it is stated that the nictitating membrane arises from the "upper outer margin of the eye" and is pulled towards the "inner angle". The rudiment of the nictitating membrane, which is a fold of the conjunctiva, may be seen in the *inner* angle of the human eye.

I had previously seen several wild birds wink with their eyelids as well as with their nictitating membranes, but as those in captivity are more easily studied I have recently watched a number of birds in zoos, with the following results: Several parrots winked frequently with their upper eyelids which were nearly white in color. When asleep, they covered most of the eyeball with the lower lid, a small portion only with the upper lid. Exactly the same may be stated of the Great Horned Owl where observations were easily made upon captive birds. A Canvasback Duck asleep had its eyeballs covered with the lower lids which were clothed with fine white feathers. From time to time it opened its eyes, but I did not see it wink.

A Golden Eagle that remained in the same position on the ground for over an hour, and who looked sick, winked frequently, sometimes rapidly, but generally slowly with its milk-white nictitating membrane, which moved from the inner to the outer angle of the eye. A California Murre, disabled by oil on the shore at Pacific Grove and too exhausted to move when I approached it closely, winked frequently and slowly with its milk-white nictitating membrane. My impression is that sick birds are apt to wink often and generally slowly with their nictitating membranes which are easily distinguished from the lids. In vigorous and wide-awake birds, my observations would lead me to think that, as a rule, the nictitating membrane is flashed very quickly across the eye.

It is sometimes stated that birds cover their eyes with the nictitating membrane when under water, as in the quotation from Grinnell and Storer above. As these membranes are translucent and not transparent, this action is highly improbable, for the membrane would obscure the sight of the bird in its search for food. Moreover, it would be unnecessary to protect the eyes thus, for even man is able to keep his unprotected eyes open under water. In the case of the captive Canvasback Duck, I succeeded after long watching in seeing its eyes open under water, not covered by the nictitating membrane.

Boston, March 24, 1925.