EYE SHINE IN BIRDS, WITH NOTES ON THE FEEDING HABITS OF SOME GOATSUCKERS[1]

By A. J. VAN ROSSEM

IN MOST PARTS of North America night hunting has been prohibited for obvious reasons, but in practically all parts of Latin America it is still almost universally practiced, for it is by far the most practical method of securing maximum results with the minimum of effort. I refer particularly to 'jack-lighting' or hunting by means of artificial light which causes the eyes of some animals to reflect the light and to appear to glow or shine. For purposes of study, or as an aid to the collection of specimens, night hunting plays an important part, yet, with a few notable exceptions, this fact has been virtually ignored by most field parties which have worked in regions where it is permitted.

During a recent collecting trip to Salvador for Mr. Donald R. Dickey, Mr. R. A. Stirton and the writer did a good deal of night hunting as an auxiliary to the regular routine. As a result, several species of birds and mammals were taken which were encountered only rarely or not at all in daytime work. More important still were the notes made on the activities of nocturnal species, a few of which are incorporated in the present paper.

We tried out both electric torches and also the type of carbide hunting lamp commonly used in that country, and the latter was found to be the more satisfactory for general use. Its chief advantage is that the light is mounted on the forehead, so that one's eyes are always looking directly along the beam. This is absolutely necessary for obtaining clear or distant reflections.

When first undertaking this sort of work, the assortment of green, white, and red eyes which are met with is apt to prove puzzling, but in a short time they become readily identifiable as insects, mammals, or birds, as the case may be. Eventually one comes to know almost to a certainty that the owner of a given eye or pair of eyes belongs to definite *species* of bird or mammal. I say "almost" because large spiders, moths, and occasional strayed domestic animals are apt once in a while to upset calculations.

The color of the glow from the eyes of nearly all birds which reflect light at all, is an intense, brilliant orange-red. The color of a live coal is a good comparison, although the intensity varies with the type and power of the light used. A partially exhausted battery, for instance, will result in a darker return glow. Under favorable circumstances and with a good light, a Whip-poor-will's eye can be seen for over 100 yards, and the eyes of Giant Goatsuckers and Thick-kneed Plovers for twice that distance.

The following is a condensed summary of the species of birds observed, or of which I can find mention, whose eyes reflect light. The authority for including each species is given in the footnotes below, where based on other than Stirton's or my own observations. In cases where no trinomial is used, the subspecific status has not yet been determined.

1. *Brilliant orange-red, "glowing pink", or "dark red":*
   Oedicnemus bistriatus
   Oxyechus vociferus vociferus (not positively identified)
   Strix varia alleni (1)
   Nyctibius griseus (2 and 3)

[1] Contribution of the California Institute of Technology.

Antrostomus vociferus
Antrostomus carolinensis
Nyctidromus albicollis
Setopagis parvulus (4)
Phalaenoptilus nuttallii nuttallii (5 and 6) and *P. n. californicus* (6)
Chordeiles acutipennis texensis (6)

2. *Pale dull green:*
   Chordeiles acutipennis texensis
3. *Color not specified:*
   Struthio camelus (7)
   Bubo virginianus pallescens (8)
   Bubo virginianus (Salvador)
4. *No reflection of any sort observed under the most favorable circumstances:*
   Strix occidentalis occidentalis (8)
   Ciccaba virgata virgata
   Otus cooperi
   Otus asio gilmani (8)
   Bubo virginianus pacificus
   Glaucidium brazilianum ridgwayi
   Cochlearius zeledoni
   Heterocnus cabanisi
   Nycticorax nycticorax naevius
   Nyctanassa violacea
   Casmerodius albus egretta
   Butorides virescens
   Phalacrocorax vigua
   Anhinga anhinga

(1) Wetmore, MS.
(2) Beebe, Jungle Peace, 1918, p. 275.
(3) Shiras, National Geographic Magazine, vol. 28, 1915, p. 179.
(4) Wetmore, Bull. 133, U. S. Nat. Mus., 1926, p. 204.
(5) Bergtold, Auk, vol. 33, 1916, p. 81.
(6) Huey, MS.
(7) Wood, Fundus Oculi of Birds, 1917, p. 16.
(8) Loye Miller, MS.

We had excellent opportunities to observe at night the species of owls listed as giving no reflections, and have had all of them sufficiently close to see the eyes only as round black spots. Therefore I was surprised to receive the information from Dr. Wetmore that he had noted a bright red reflection from *Strix varia alleni.* A horned owl seen by Mr. Stirton in Salvador, and one seen by Dr. Loye Miller in California, gave a bright reflection clearly visible at long shot-gun range, but the glow was of no particular color. In the former case, the bird apparently closed its eyes to avoid the glare, a thing which the other owls listed certainly did not do. The herons and cormorants which I have listed were also seen on numerous occasions, as we were coasting along lake shores at night. Most individuals permitted a reasonably close approach, sufficiently near to see that their eyes, like those of most owls, appeared as round black buttons with no reflection whatever.

The observations outlined above will, I think, hardly support Mr. Shiras' supposition (*loc. cit.,* pp. 178-179) that ". . . practically all those [animals in general] of nocturnal habits possess this element [tapetum] of the eye", and that "the possession of the tapetum is directly associated with night vision". Mr. Shiras' paper was, of course, written before Dr. Wood's splendid monograph appeared, showing that reflection from the eye of at least one species of bird (Nubian Ostrich) comes from an analagous specialization and not from a true tapetum. But aside from this mere technicality, the point I wish to emphasize is that it is difficult to credit *Strix varia* which glows bright red, with a keener night vision than *Strix occidentalis* and most other owls which do not reflect light at all; nor does it seem likely that Night Herons are any less perfectly endowed in this respect than the Thick-kneed Plovers. There

seems to be no correlation between the color of the fundus and the reflection of light, for that of *Cochlearius* is red as in *Caprimulgus, Oedicnemus,* and *Strix,* while *Struthio* is dull red intermixed with gray (Wood, 1917). Nor is there seemingly any value for purposes of classification in the presence or absence of light-reflecting qualities in the eyes of birds, except that, as already noted by Mr. Shiras, apparently all of the goatsuckers are so gifted.

It was with this last mentioned group that our experience was most extensive, for every night excursion resulted in seeing from two or three to perhaps a hundred individuals. Because so common and so easily seen, *Nyctidromus albicollis* was more apt to be regularly met with than any of the other four species encountered in Salvador. These "pucuyos" have a most ludicrous habit of making vertical jumps when the light is turned on them, at the same time giving their characteristic gutturals and wails. We often saw them in flight in the early dusk, en route from their daytime forest hiding places to the feeding grounds. Any open area, such as a corn field or forest road, was the gathering place for all the "pucuyos" from the nearby jungle and in such places they would remain most of the night. I believe them to be ground feeders exclusively, and most of their food is probably procured by jumping and flopping. Their terrestrial habits are reflected in the long, strong legs and feet. Although we saw all told a total of several hundred, only one individual was seen perched off the ground. As the color, size and location of eyes are usually about the only clues to identity, we supposed this individual, which was perched on a bent-over corn stalk, was a Whip-poor-will, and only realized our mistake when it was collected.

Antrostomus vociferus is not a ground feeder in our experience, covering about twenty-five birds, nor were individuals ever discovered directly on the ground, even during the daytime. One was found dozing on a small oak branch half an inch thick which was lying on the ground beside some bushes; but with this exception every one was perched on a twig or branch at heights varying from a few inches to six feet. Their night or hunting stands were invariably at the edge of an open space and there was evidence that the same place was used night after night. We saw, on several consecutive evenings, Whip-poor-wills at the identical spots where first seen, and there was no reason to suspect them of being other than the same birds. The daytime perches often had sufficient excrement under them also to indicate a fixed roosting place. The eyes of this species seem to have the power of reflecting light even more brilliantly than those of *Nyctidromus.* We saw one on a stump in a corn field at a hundred paces, and the glow at that distince was plainly visible. This bird was characteristically tame and allowed me to approach within about 15 feet before taking flight. Once in the air it made every effort to outmaneuver the beam, for it was apparently strongly averse to leaving the locality, and for several minutes the glowing red eyes—sometimes one and sometimes two—whirled and zig-zagged and spiralled before coming to rest on a low dead branch in the bordering fringe of forest trees. If alarmed, Whip-poor-wills often faced us squarely, showing both eyes as if binocular vision was used, although ordinarily only one eye at a time is seen.

Chuck-will's-widows were rare and only two were found at night. One was on a four-foot fence post, at the edge of a cotton field; the other alternated between a fence post and a large horizontal branch twenty feet from the ground. This last bird was very active and made frequent short flights. Those flushed in the daytime were mostly well up in trees, and I suspect that they habitually hunt higher than Whip-poor-wills do.

Although Giant Goatsuckers (*Nyctibius*) were not particularly rare, I did not personally meet with them when using a light at night. Mr. Stirton shot one for me, from the top of a fifteen-foot dead stub in an open grass pasture. Its eyes were like

those of the smaller goatsuckers in color, but showed very much larger and they were first seen a long distance away. This individual appeared to use binocular vision at times. Our native hunter shot two from "very high" in trees at night, and one from a fence post. He located all of them by their eyes. I saw them flying in the dusk on several occasions. The flight is heavy and owl-like, and much less erratic than that of the smaller goatsuckers. Their food is correspondingly large, consisting of big beetles and moths.

The Texas Nighthawks were more varied in feeding habits than any of the others. During the winter they were very common in favorable lowland localities, and shortly after sundown would appear in hundreds, flying high and toward the sunset. A little later in the short interval of dusk, they flew much lower and the general direction was opposite to that taken at first. We supposed them to be working back to the localities from which they first started, feeding as they went. It was some time before we found out anything of their nocturnal activities, for their eyes gave only a pale green reflection, which was easily overlooked and not visible beyond a few feet. Many spiders gave a much brighter glow than these nighthawks, and only by careful search in suitable places, could we find them. All the individuals which we found after dark were on the ground in the open. *Chordeiles acutipennis* therefore hunts through three air levels, high in the air at sundown, closer to the ground at dusk, and on the ground after dark. Because of this versatility, its food must necessarily be more varied, and, because obtained from three strata of insect life instead of one or two, must be more regularly plentiful. It is not surprising, then, that in point of numbers and of geographic area occupied it is a more "successful" species than others which hunt in comparatively restricted life-zones.

Mr. Laurence Huey tells me that when out with an electric flashlight, working his mammal trap-line at night, he has seen Texas Nighthawks' eyes on many occasions, and that they shone red and were indistinguishable from those of Nuttall and California poor-wills. These facts suggest a seasonal change, possibly correlated with sexual activity; for Mr. Huey's birds were seen during the spring and summer months, while those noted by Mr. Stirton and myself were all seen during December and January. I may add that in both cases the observations cover the same subspecies (*texensis*).

Very little is known of the activities of nocturnal birds and other animals, and I suggest that occasional observations along the lines indicated above would profitably supplement the usual methods of daytime nature study.

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