

SHORT COMMUNICATIONS

NOTES ON THE STRUCTURE OF THE UPPER EYELID OF POTOOS (*NYCTIBIUS*)

JOSÉ IGNACIO BORRERO H.

Departamento de Biología
Universidad del Valle
Cali, Colombia

The Potoos (*Nyctibius*) have been studied by various authors, among them Goeldy (1896), Haverschmidt (1948, 1958), Borrero (1970), and Skutch (1970). The information presented in this study is based on both day and night observations of two captive and five free-ranging *N. griseus* (Common Potoo), one *N. aethereus* (Long-tailed Potoo), and various *N. grandis* (Great Potoo).

Skutch (1970), who has presented the most complete study of *Nyctibius griseus*, described how, on becoming aware of an observer, the bird slowly lifts its head to a vertical position and simultaneously almost closes its eyes. Only a slight aperture, opened from time to time, is apparent. Haverschmidt (1958) described this same behavior for *N. griseus* from eastern South America. Recently, I confirmed that this behavior pattern takes 17–23 sec. I observed the same behavior in *N. grandis*, near Villavicencio in eastern Colombia, and in *N. aethereus*, in the tropical forest near Buenaventura on the Pacific coast of Colombia. Possibly it is common behavior for all the *Nyctibiidae*.

During the day, when *N. griseus* is studied by an observer from a great distance with the aid of a telescope, it can be seen that the head is held in a horizontal position with the eyes usually closed. Occasionally the eyes open, possibly due to some disturbance. When open, the eyes of this bird appear black with yellow borders, or yellow with large or small black central points. This difference in appearance is caused, of course, by the voluntary dilation or contraction of the pupil as it regulates not only the amount of light entering the eye but also the depth of focus. This would be especially important in nocturnal birds if, as Pumphrey (1961) stated, their focal length is fixed. If a flashlight is shined on the eye from close range, the pupil is opened intermittently during a period of from a few seconds to a minute.

Close range observations of captive *N. griseus* disclose an unusual structure in the upper eyelid (fig. 1). This morphological peculiarity, which apparently has not been described previously, consists of two notches on the edge of the upper eyelid, located toward the commissures. The notches result in two small openings or fissures when the eyelids appear to be completely closed. According to Richard Zusi (pers. comm.), there are three notches in some specimens of *N. grandis* in the collection of the United States National Museum. Olivares (pers. comm.) found these notches in three females of *N. griseus* but not in *N. grandis* in the collection of the Instituto de Ciencias Naturales, Universidad Nacional de Co-



FIGURE 1. Lateral view of *Nyctibius* showing the two notches in the upper eyelid.



FIGURE 2. Cryptic position of *Nyctibius*. Eyes partially closed.



FIGURE 3. Resting position of *Nyctibius*. Eyes completely closed.



FIGURE 4. Rear view of *Nyctibius*. The feathers behind the eye are compressed so the animal can see posteriorly as described in the text.

lombia, Bogota. He says that possibly the structure is present but difficult to see in prepared specimens.

These small notches are always open. This feature may be related to the mimetic behavior whereby the adult bird places its head in a nearly vertical position, partially closes its eyes, compresses its plumage, and elongates its body (figs. 1 and 2).

At close range it is easy to see that when the eyes are closed, the pupil dilates and the eye receives light only through the two apertures of the upper eyelid. Neither the function nor the adaptive value of these structures is known, but it seems possible that they could function as follows: while in the cryptic position, the bird may be able to see up and down simultaneously thereby enabling it to watch for aerial and ground predators simultaneously. When the bird rests with its head in a horizontal position, the notches may give a wide-angle view of objects both in front and behind (fig. 3). Figure 4 shows that the plumes behind the eye can be compressed and the eyes apparently made to protrude so the field of vision is about 180°. Upon detecting an observer, the bird does not move its body, but may turn its head a few millimeters to one side or the other to see better. Responses of two captive and five wild birds indicate that they can detect moving objects approaching from any direction (see figs. 1, 2, 3, 4).

Another interesting adaptation is that the two eyelids can open and close independently. When closed, they rotate synchronously over the eye, so the notches can be positioned as desired without moving the head. As in other birds, the eye itself cannot rotate.

Other adaptations of the visual structures of birds which adopt cryptic positions have been noted.

Pumphrey (1961) has stated that when a bittern (*Botarus*) points its beak upward, it can project its eyes from the orbits and direct them downward to see approaching objects. Walls (1942) makes reference to the position of the eyes of the American Woodcock (*Philohela minor*), a species which has the eyes placed posteriorly. While feeding with its beak buried in the mud, it can see toward the rear. The eyes of *Nyctibius* are also placed posteriorly thereby facilitating viewing from behind.

LITERATURE CITED

- BORRERO, J. I. 1970. Photographic study of the Potoo in Colombia. *Living Bird* 9:257-263.
- GOELDY, E. A. 1896. On the nesting of *Nyctibius jamaicensis* and *Sclerurus umbretta*. *Ibis* 7:299-310.
- HAVERSCHMIDT, F. 1948. Observations on *Nyctibius grandis* in Surinam. *Auk* 65:30-32.
- HAVERSCHMIDT, F. 1958. Notes on *Nyctibius griseus* in Surinam. *Ardea* 3/4:144-148, figs. 1-4.
- PUMPHREY, R. J. 1961. Sensory organs: Vision, Pt. 1. In A. J. Marshal [ed.], *Biology and comparative physiology of birds*, Vol. 11, Chapter XV: 55-68. The Monash University, Victoria, Australia. Academic Press, London.
- SKUTCH, A. 1970. Life history of the Common Potoo. *Living Bird* 9:265-280.
- WALLS, G. L. 1942. The vertebrate eye and its adaptive radiation. *Cranbrook Inst. Sci. Bull.* No. 19.

Accepted for publication 19 December 1972.