

*The Wilson Journal of Ornithology* 120(1):200–201, 2008

## First Observation of Duetting in the Olive-backed Euphonia (*Euphonia gouldi*)

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**ABSTRACT.**—I observed a pair of Olive-backed Euphonias (*Euphonia gouldi*) in the Caribbean lowlands of Costa Rica singing a prolonged antiphonal duet on 28 February 2006. The male and female were perched near one another within a larger conspecific flock, and exchanged closely-coordinated notes in phrases lasting ~5 sec. This appears to be the first report of duetting behavior for this species or for any member of family Fringillidae. Received 24 January 2007. Accepted 28 April 2007.

Duetting behavior in birds has been reported for more than 200 species (Farabaugh 1982) and is the subject of increasing research attention (Langmore 1998, Hall 2004). Functions of duetting remain unclear, but likely include joint territorial defense, mate guarding, and the formation or strengthening of pair bonds (Morton 1996, Langmore 1998, Hall 2004). Duets vary widely in complexity among species (Farabaugh 1982) and may serve different or even multiple purposes in different settings (Marshall-Ball et al. 2006). Duetting is relatively uncommon in northern temperate regions, but occurs more regularly in the tropics where year-round territoriality and long-term pair bonds are common and may encourage its development (Morton 1996, Slater and Mann 2004). Documenting the extent of this behavior in the tropics is far from complete and remains a research priority (Hall 2004). This paper describes the first record of duetting in the Olive-backed Euphonia (*Euphonia gouldi*) and discusses the observation in the context of related literature.

### OBSERVATIONS

I observed a pair of Olive-backed Euphonias singing a complex, antiphonal duet on 28 February 2006 in Cantón Sarapiquí, Costa

Rica. These observations occurred in the understory of unlogged primary lowland rainforest at the La Selva Biological Station (McDade et al. 1994). I watched a male and female perched ~10 cm from one another on the same branch within a conspecific flock of at least eight individuals. The species is dichromatic and the male and female roles in the duet were identifiable from sex-specific plumage patterns. The female interspersed staccato chips and single-notes seamlessly between the more varied whistled tones of the male. Completed phrases lasted 4–5 sec and were repeated with variations after a brief pause for >2 min. The rest of the flock was dispersed in nearby undergrowth vocalizing with a range of simple whistle tones and calls. No other duets were heard or observed in >10 min of observation.

### DISCUSSION

The song of the Olive-backed Euphonia has been described as “a rapid, jerky, rambling melody of rolling *chrrs*, staccato notes, short, clear whistles and more nasal, slurred whistles” (Stiles and Skutch 1989:421). In my observations, the ‘staccato notes’ and perhaps what Stiles and Skutch describe as ‘short, clear whistles’ were supplied by the female. The resulting song was continuous and I would have ascribed it to the male alone if both individuals had not been in clear view at close range. Euphonias often frequent the canopy or dense edges and secondary vegetation (Stiles and Skutch 1989), and can be difficult to view clearly. It remains to be learned whether duets are common in this species and what function they might serve. My observations occurred during the beginning of the breeding season (Stiles and Skutch 1989), a time when duets may be involved in regulation of reproductive synchrony (Hall 2004), or the establishment or reaffirmation of pair bonds (Farabaugh 1982).

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I am unaware of reports of duetting from any other member of the subfamily Euphoniinae or the family Fringillidae as currently defined (American Ornithologists' Union 1998). Distinctive and prolonged vocalizations are common in this group, however, and the closely-related Thick-billed Euphonia (*E. laniirostris*) and Violaceous Euphonia (*E. violacea*) are well-documented mimics (Snow 1974, Morton 1976, Remsen 1976). Stiles and Skutch (1989: 420) describe vocalizations for the female Yellow-throated Euphonia (*E. hirundinacea*) as "thin, dry notes, sometimes high-pitched and almost trilled," but they do not report duetting. Future efforts should explore the frequency and purpose of duets in the Olive-backed Euphonia, and observers should be on the alert for duetting behavior in its congeners.

#### ACKNOWLEDGMENTS

This work was supported in part by NSF-IGERT grant 0114304. The author thanks two anonymous reviewers for helpful comments on the manuscript.

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*The Wilson Journal of Ornithology* 120(1):201–204, 2008

## The Display of a Reddish Hermit (*Phaethornis ruber*) in a Lowland Rainforest, Bolivia

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**ABSTRACT.**—The Reddish Hermit (*Phaethornis ruber*) is a commonly encountered hummingbird within the understory of tropical forests from Venezuela to

south-east Brazil. Reddish Hermits, like many hummingbirds, perform elaborate displays associated with mate and territory acquisition. We provide the first detailed description with supporting illustrations of intricate displays between two male *P. ruber* to which we refer as "Rotation" and "Arc" displays. *Received 28 December 2006. Accepted 17 July 2007.*

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The Reddish Hermit (*Phaethornis ruber*) is a common inhabitant of tropical forest under-

story from Venezuela to south-east Brazil and is one of the smallest ( $\sim 2.4$  g) known hummingbird species (Oniki 1996). Like many hummingbirds, Reddish Hermits form leks where several males display to females which visit these assemblages to choose a mate (Snow 1973). The displays of Reddish Hermits at leks and in captivity often involve visually spectacular and elaborate aerial maneuvers (Mobbs 1971).

Davis (1934:732) observed the display of a Reddish Hermit in October 1931 and suggested that it “must be seen for its beauty to be appreciated”. Over the ensuing decades, several researchers have provided written accounts of Reddish Hermit displays in the wild (Snow 1973) and in captivity (Mobbs 1971). One of these accounts (Snow 1973:171) describes a display performed by a visiting male in front of a territorial male within a lek. The visiting male is described as hovering “8–10 cm above and in front of the owning male” and, as it hovered, “the bird’s rear swayed side to side by about an inch while the head remained stationary”. Our objective in this paper is to provide the first detailed description, with supporting illustrations, of what appears to be a similar but more extensive display, which we suggest was by a male intruding into the territory of a neighboring male.

#### OBSERVATIONS

One of us (AF) was conducting bird surveys on 23 August 2004 within the lowland subtropical humid forest (Holdridge Life Zone System) of the Guarayos Forest Reserve, Departamento Santa Cruz, Bolivia. This concession is  $\sim 300$  km north of the lowland city of Santa Cruz. The forest varies in altitude from 230 to 390 m with an average elevation of 320 m. The mean annual temperature is  $25^{\circ}$  C with mean annual precipitation of  $\sim 156$  cm. The region experiences a distinct dry season from May to October. One survey point was in a  $471\text{-m}^2$  logging gap ( $15^{\circ} 40' 07$  S,  $62^{\circ} 45' 77$  W) created by felling a 60-cm dbh tower tree (*Schizolobium parahyba*; Caesalpinaceae).

The following observations and sound recording were made in the understory of adjacent pioneer vegetation of two Reddish Hermits at 0620 hrs. The temperature was  $14^{\circ}$  C with 100% cloud cover and no wind. No conspecifics were noted within the vicinity during

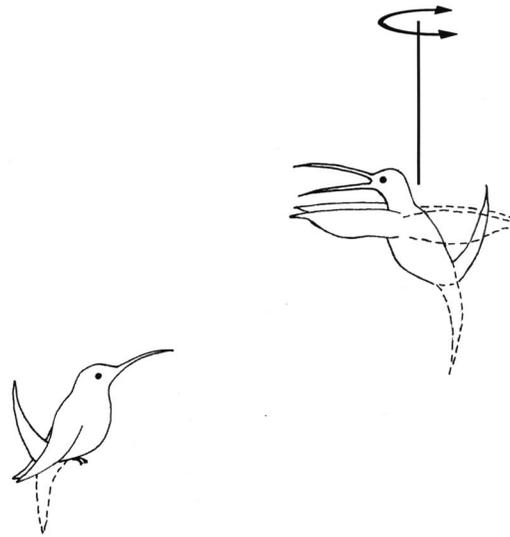


FIG. 1. Illustration of the rotation display of the Reddish Hermit with the perched individual to the left and the displaying individual to the right.

these displays, but the observed situation is not inconsistent with the circumstances expected to be found within a lek (Snow 1973).

We observed an individual *P. ruber* perched on a branch  $\sim 1$  m above ground. The perching individual would flick its tail up and down, and occasionally fly to a different perch briefly during the displays of the other individual before returning to the original perch (Fig. 1). The displaying conspecific engaged in an intricate flying display  $\sim 25$  cm to the front and above the perched individual.

*Rotation Display.*—We refer to the first display as the “rotation display” (Fig. 1). The displaying individual conspicuously erected white plumage near its flanks, presumably of its thigh feathers. With its back arched and head raised, the bird increased its stroke amplitude to what we perceived was the point of contact (Altshuler and Dudley 2003), due to an accompanying continuous rapid droning sound, which was distinct from that produced during normal flight. We were under the impression that the wings collided at both the ends of the upstroke and the downstroke. The tail was simultaneously raised and lowered with a speed that blurred its image to the human eye. Concurrently the bird yawed through  $300^{\circ}$  of movement. This was one of the most mesmerizing aspects of the display due to the

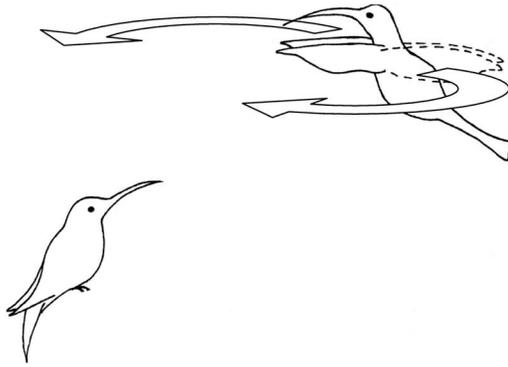


FIG. 2. Illustration of the arc display of the Reddish Hermit with the perched individual to the left and displaying individual to the right.

individual's capacity to avoid any corresponding rolling, pitching, or translational movement. This was done in a punctuated movement (at the start and end point of each arc), taking  $\sim 1$  sec to complete an arc. At the same time, it rhythmically opened and closed its bill, thereby displaying the vibrant yellow coloration of the gape. All of these movements were characterized by extreme speed and precision and continued in repeated bouts that ranged from 3 to over 75 sec (mean = 15.4 sec;  $n = 5$ ).

The rotation display was accompanied by a high pitch repetitious song that was made by either the displaying individual or the perched

individual. Like Mobbs (1971), we do not feel confident categorically assigning the song to one individual or the other. It consisted of high pitched ascending and descending individual notes and trills (zee'zee'zee'zeezezeze ze'zee), similar to that described by Nicholson (1931) as heard from a *P. ruber* lek in northern Guyana.

*Arc Display.*—The individual at times switched to alternate, but equally transfixing behavior between rotation displays, which we refer to as the “arc display” (Fig. 2). The displaying individual during this phase remained facing the perched individual and moved laterally over a  $\sim 100^\circ$  arc, as if tethered at the chest to its perching audience. Tail movements may have been related more to controlling flight, than to display. We estimate the amplitude (horizontal distance moved) of this display was  $\sim 30$  cm. The displaying individual could complete 3 arcs within 1 sec with each arc punctuated by a “diu” call (Fig. 3). This call was consistently between  $\sim 1,000$  and  $2,000$  kHz, inconsistent with the frequency of their normal “tsi” call. The arc display was flanked both before and after by the rotation display, and was the shorter of the two displays. The arc display ranged from 1.0 to just over 3.3 sec in length (mean = 2.0 sec,  $n = 8$ ). The entire display ended suddenly with both individuals moving from the field

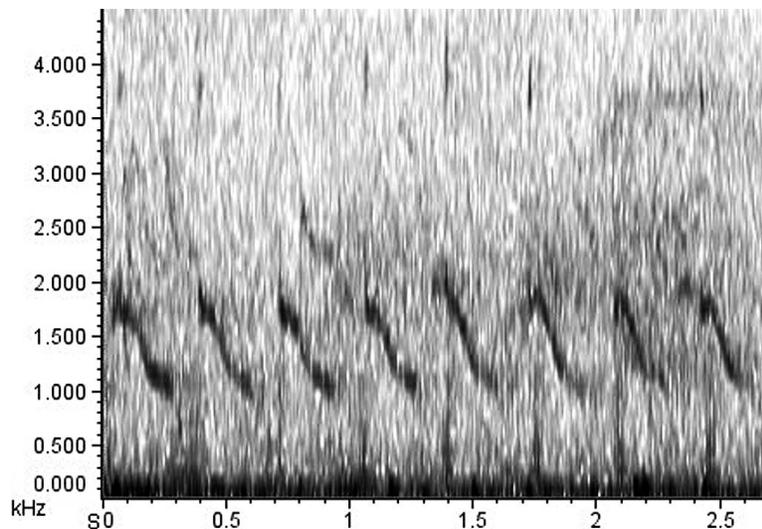


FIG. 3. Spectrogram of “diu” sounds made by Reddish Hermit while performing the arc display.

of view. We are uncertain whether one chased the other away.

#### DISCUSSION

We have several reasons for suggesting that both individuals were males and this observation was an antagonistic display similar to that described by Snow (1973). Among the hummingbirds, the hermits (Phaethorninae) are notable for their lack of sexually dimorphic characteristics (Höglund 1989). However, it is possible to use plumage characteristics for distinguishing male *P. ruber* from females (Höglund 1989). Both male and female *P. ruber* have a rufous breast, but the male's breast is marked by a black 'V' with the female lacking this mark altogether or possessing an obscure black blemish in its place (Davis 1958, Oniki 1970, Höglund 1989). Both the displaying and the perched individuals in our observations had a black 'V'. We are confident that both individuals were males and the observed behavior was not a courtship display.

Notably, it was the individual with the stronger male coloration that was perched with the displaying individual's black chest bar fainter. This may indicate the displaying individual was a less mature male. This would be concordant with the description by Snow (1973) of a male attempting to displace a more established neighboring territorial owner.

The other indication this display represents antagonistic behavior between two males over what appears to be a lek territory is the season in which the observation occurred. Breeding records for *P. ruber* in this region of Bolivia are absent, but records from Brazil (Oniki 1970), Guyana (Davis 1934, 1958), and Trinidad (Snow 1973) consistently show the breeding season overlaps with the local dry season. The observed display occurred during the middle of the dry season in this region of Bolivia and we are confident this was a breeding-related display.

We believe the most parsimonious explanation for the observed behavior is that it consisted of an encounter between a resident

(perching individual) and intruding (displaying) male within what was likely a lek territory. We suggest that more systematic observations are needed before we can gain a thorough understanding of these intricate displays.

#### ACKNOWLEDGMENTS

This project was supported through the generous financial assistance of the American Ornithologists' Union, Sennheiser Australia, and the Lincoln Park Zoo, Chicago. We thank the personnel of IBIF, Agroindustria Forestal La Chonta Ltd., Proyecto de Manejo Forestal Sostenible (BOLFOR), and Birdlife Bolivia (Armonia) for providing logistical support, especially Marielos Peña and Todd Fredericksen. Eugenio Mercado provided integral assistance during all phases of the field work and the advice of Ross Cunningham greatly contributed to the design of this project. We thank Dan Brooks and an anonymous reviewer for helping us to improve an earlier version of this manuscript. We thank the Australian Red Cross without whom this project could not have been completed. All research was approved by the relevant authorities and this study was conducted within the ethical guidelines of Australia and Bolivia.

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