First notes on the courtship behaviour of Black-throated Tody-Tyrant *Hemitriccus granadensis* in Colombia and Ecuador

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Received 2 December 2009; final revision accepted 20 October 2010
Cotinga 33 (2011): OL 25–26
published online 16 March 2011

Describimos por primera vez el comportamiento de cortejo del Picochato carinegro *Hemitriccus granadensis*, un aspecto desconocido para la especie y demás miembros del género *Hemitriccus*. Observamos machos en vuelo sostenido en frente de las hembras por un minuto o más, algunas veces moviéndose de lado a lado en un ángulo de hasta 15°, mientras producían un fuerte sonido mediante la vibración de sus alas. La duración del vuelo sostenido varió ampliamente entre las observaciones. El número de despliegues consecutivos o la duración de los mismos podrían ser un indicativo para la hembra del potencial desempeño reproductivo del macho.

The tyrannid genus *Hemitriccus* includes 21 species of forest-associated birds found throughout the Neotropics[2]. Species in this genus have flat and narrow bills and long tarsi, traits that are related to their foraging behaviour[1,2]. Their natural history is little known and their systematics unclear, partly because some species exhibit atypical reproductive habits for the genus[2]. Recent molecular phylogenies indicate that *Hemitriccus* is polyphyletic[6,8].

One of the better-known species is Black throated Tody-Tyrant *Hemitriccus granadensis*. This locally common understorey bird is often found at edges or in clearings inside forests at 1,800–3,000 m, and can be common in dense thickets or other second growth[2,4]. As with most members of the genus, little is known about its breeding biology, other than records of birds in breeding condition in March–July[2]. Nothing has been published concerning courtship behaviour in *Hemitriccus* or closely related genera (e.g. *Atalotriccus*) other than brief explanatory notes to sound-recordings of *H. granadensis*: 'wing whirr of displaying male hovering below female'[5]. Here we describe this courtship behaviour of *H. granadensis*.

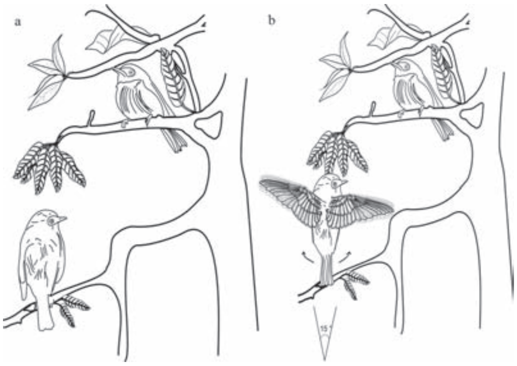

Figure 1. Diagram of courtship display by male Black-throated Tody-Tyrant *Hemitriccus granadensis*: (a) male perched 8—10 cm below the female's perch during display pauses; (b) male hovering in front of the female, moving from side to side (Alvaro Monroy)

Observations and courtship display

Our observations were made in 1998 and 2007 by NK at the Tapichalaca Reserve, Ecuador, and in 2008 by EB-D at El Dorado Reserve, Sierra Nevada de Santa Marta, Colombia. We observed males in different months in January–August hovering in front of females perched 3.2–4.1 m above ground, in dense thickets near open areas. The males used perches 8–10 cm below the female's perch during pauses between displays (Fig. 1a). The duration of these flights averaged 11.82 seconds (n=12), but varied considerably, from two to 65 seconds. There were 1–7 pauses per display, lasting a mean 4.2 seconds and ranging from 0.15 to 30.0 seconds (n=11).

Males made short flights to hover below and in front of the female at a distance of 6–10 cm, sometimes moving from side to side within an angle of <15° (Fig. 1b). During these, a sound was apparently produced by the male's wings, similar to that reported for congenerics during territory patrolling or foraging[2,4], and is probably produced by very fast wingbeats and not by modifications to the wing feathers[1]. The sounds produced by the males were recorded using a ME67 Sennheiser directional microphone on Type 1 cassettes in a Sony TCM5000 tape-recorder, and some were published by NK in 2001[5].

While foraging or patrolling, birds produced a similar sound that matched the duration of their short flights perfectly. Wing-whirring during short flights usually lasted <0.59 seconds. The whirring fundamental frequency was nearly 1.50 kHz (Fig. 2a), somewhat lower (but not significantly different) than the courtship hover, which exhibited a fundamental of 1.50–1.60

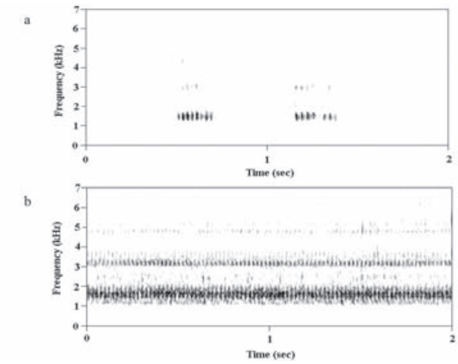

Figure 2. Sonograms of wing-whirring produced by male Black-throated Tody-Tyrant *Hemitriccus granadensis*, El Dorado Reserve, Sierra Nevada de Santa Marta, Colombia (top) and Tapichalaca Reserve, Ecuador (bottom): (a) during foraging or patrolling act, and (b) during courtship display.

kHz (Fig. 2b). The incipient higher values of the courtship display were related to a higher mean wingbeat frequency of 42.7 beats per second (SD = 0.95) compared to a mean 35.9 beats per second (SD = 1.02) during patrolling or foraging movements. This was measured by counting the silent intervals on the spectrogram for both sounds. The reason for this beat frequency is that the bird must move its wings faster to stay still in front of the female than for movement between perches.

Discussion

This courtship is clearly different from all reported behaviours for Tyrannidae, although the family exhibits a high degree of variation in displays[2,7]. Among these, there are acrobatic flights with quick flapping of the wings in *Tyrannus* (executed by both sexes), leks or similar displays in the polygynic species and the elaborated manoeuvres of many Fluvicolinae[2,7]. In those displays that involve flights or postures, use of vocalisations is common[2,7]. However, our observations suggest that in the case of *H. granadensis* the displays are not accompanied by any vocalisation.

Compared to many species, this seems to be a more complex display than might be expected for a monogamous bird. However, evolutionary explanations exist, suggesting reproductive conflicts between sexes as a possible cause for this pattern[3]. Under this scenario, the development of more elaborated courtship rituals by males could permit them to exploit biases in females' responses, increasing the chance of copulation irrespective of parental performance[9]. Whatever the cause, it is probable that the number of consecutive displays or the duration of fluttering could be interpreted by the female as a measure of a male fitness.

Acknowledgements

Special thanks to Fundación ProAves for all facilities at El Dorado Reserve and for their cooperation. Christian Olaciregui provided helpful information at El Dorado, and Francisco Sornoza was part of the team at Tapichalaca Reserve. Carlos Daniel Cadena, Jorge E. Botero, Gloria Lentijo and Christian Olaciregui made valued comments on earlier versions of this manuscript, and Thomas Schulenberg important suggestions concerning the final version. We also thank Alvaro Monroy for his artwork.

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