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AGGRESSIVE NOCTURNAL BEHAVIOR IN THE STRAWBERRY POISON FROG *OOPHAGA PUMILIO* (SCHMIDT, 1857) (DENDROBATIDAE)

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Abstract: Territorial behavior in males of *Oophaga pumilio* has been reported as a defensive diurnal display of resident-intruder aggressive behaviors. We observed a previously undescribed nocturnal territorial behavior in a resident-intruder confrontation between two strawberry male frogs in Costa Rica. Such behavior was characterized by aggressive interactions and vocalizations that differ from those emitted during diurnal territorial displays.

Key Words: Amphibia, Anura, defensive behavior, territoriality, vocalizations, Costa Rica.

Resumen: B. Hilje y M. Yglesias. "Comportamiento agresivo nocturno en la ranita roja venenosa *Oophaga pumilio* (Schmidt, 1857)(Dendrobatidae)". El comportamiento territorial entre machos de *Oophaga pumilio* ha sido reportado como un despliegue defensivo diurno de comportamientos agresivos entre residente e intruso. Observamos un comportamiento territorial nocturno, que no ha sido descrito previamente, entre dos machos de la ranita roja venenosa en Costa Rica. Este comportamiento se caracteriza por interacciones agresivas y vocalizaciones que difieren de aquellas emitidas durante el comportamiento territorial diurno.

Palabras Clave: Amphibia, Anura, comportamiento defensivo, territorialidad, vocalizaciones, Costa Rica.

INTRODUCTION

Oophaga pumilio is a small, red, diurnal frog found in leaf-litter on the Atlantic lowlands of Nicaragua, Costa Rica and Panama (Guyer and Donnelly 2004, Savage 2002)(Fig. 1). It usually occurs in a variety of habitats from abandoned anthropogenic open areas to undisturbed forests throughout its range (Donnelly 1989, Savage 2002). It is an abundant diurnal species and males show territoriality, actively defending territories against intruders (McVey *et al.* 1981, Pröhl 1997). Territorial defensive behaviors may occur at different times of the day and include energetically expensive displays (Gardner and Graves 2005). The territorial behavior of *O. pumilio* includes vocalizations and direct resident-intruder pinning, chasing, grappling, and tracking, among other antagonistic behaviors (Bunnell 1973, Savage 2002). Body postures such as elevation using the forelimbs and statue behavior are also present in male-male interactions (Baugh and Forester 1994). Resident frogs usually remove intruders by displaying greater aggressiveness (Baugh and Forester 1994, Savage 2002).

UNDESCRIBED DEFENSIVE BEHAVIOR

On 15 July 2003, we observed a previously undescribed territorial defensive behavior in *Oophaga pumilio* at El Surá Trail (10˚26´N, 83˚59´S) in La Selva Biological Station, Costa Rica. We observed a nocturnal fight between males starting at 20:08 h and ending at 21:43 h. The encounter started with both individuals emitting vocalizations. At first they were facing each other, separated by a few centimeters; then one individual (resident and intruder could not be identified) approached his opponent with several head bashes, making the other frog falling on his back. The abruptly collision of their heads did not include grasping each other's limbs. After the first attack, one of them bounced back and their heads collided again. A few minutes later they assumed an amplexus-like position, with the pelvic region of the top specimen aligned with the head of the other. Both emitted vocalizations very different from those emitted during diurnal territorial displays. Vocalizations varied in pulse rate, length and frequency; presenting unusually lower pitches with high frequencies at the end of the vocalization instead of the regular pulse repetition. After a while, the individuals released each other and performed occasional leaps, one individual jumping from a perch to make the other fall on his back. Direct fighting occurred repeatedly intermittent with a few minutes in between. At 21:43 h the rain interrupted the encounter, and after three minutes of inactivity, one individual emitted a loud vocalization from a perch one meter above

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ground. His opponent, presumably the intruder, did not respond and abandoned the territory. All antagonistic interactions occurred in a 1.5 x 1.5 m leaf-litter plot.

Oophaga pumilio has been regarded as a strictly diurnal species (Guyer and Donnelly 2004, Savage 2002, Forester *et al.* 1993) and, to the best of our knowledge, this report seems to be the first nocturnal territorial antagonistic behavior ever reported for this taxon. Moreover, our observations radically differ from other territorial behaviors reported for the species (Baugh and Forester 1994); suggesting that there might be important variations in resident-intruder interactions during antagonistic encounters related with different activity patterns.

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FIG. 1. Adult male of *Oophaga pumilio* in the Sarapiquí region of Costa Rica. Photo by E. Arévalo.

Macho adulto de Oophaga pumilio *en la región de Sarapiquí, Costa Rica. Fotografía de E. Arévalo.*

REFERENCES

Baugh, J.R. and D.C. Forester. 1994. Prior residence effect in the poison-dart frog, *Dendrobates pumilio*. Behaviour 131:207–224.

Bunnell, P. 1973. Vocalizations in the territorial behavior of the frog *Dendrobates pumilio*. Copeia 2(1973):273-284.

Donnelly, M.A. 1989. Demographic effects of reproductive resource supplementation in a territorial frog, *Dendrobates pumilio*. Ecological Monographs 59(3):207-221.

Forester, D.C., J.C. Cover and A. Wisnieski. 1993. The influence of time of residency on the tenacity of territorial defense by the dart-poison frog *Dendrobates pumilio*. Herpetologica 49(1):94-99.

Gardner, E.A. and B.M. Graves. 2005. Responses of resident male *Dendrobates pumilio* to territory intruders. Journal of Herpetology 39(2):248-253.

Guyer, C. and M.A. Donnelly. 2004. Amphibians and reptiles of La Selva, Costa Rica and the Caribbean slope: A comprehensive guide. University of California Press. United States of America.

McVey, M.E., R.G. Zahary, D. Perry and J. MacDougal. 1981. Territoriality and homing behavior in the poison dart frog (*Dendrobates pumilio*). Copeia 1(1981):1–8.

Pröhl, H. 1997. Territorial behavior of the strawberry dart frog, *Dendrobates pumilio*. Amphibia-Reptilia 18(4):437-442.

Savage, J.M. 2002. The amphibians and reptiles of Costa Rica: A herpetofauna between two continents, between two seas. The University of Chicago Press. Chicago, Illinois, USA.