REPTILES & AMPHIBIANS

Cuban Green Anoles (*Anolis porcatus*): Communal Nesting in Bromeliads

L. Yusnaviel García-Padrón

Sociedad Espeleológica de Cuba, La Habana, Cuba; Sociedad Cubana de Zoología, La Habana 12000, Cuba (yusnaviel@gmail.com)
Photographs by the author.

Anoles (*Anolis* spp.) lay single eggs buried in soil, under rocks and logs, in leaf litter, in tree holes, in bromeliads, in rock crevices, or attached to walls or ceilings of caves (Andrews and Rand 1974; Andrews 1985; Losos 2009). Many anoles, including a number of Cuban species, deposit eggs communally (Dunn 1926; Hardy 1957; Rand 1967; Silva Rodríguez et al. 1982; Novo Rodríguez 1985; Estrada and Novo Rodríguez 1986; Estrada 1987; Garrido and Pareta 1994; Henderson and Powell, 2009; Losos 2009).

Bromeliads hold considerable amounts of rainwater and offer shelter, humidity, food, and suitable sites for reproduction for many amphibians and reptiles (Lehtinen et al. 2004; Henderson and Powell 2009). Of four cases of Cuban anoles laying eggs in plants, two were in bromeliads (Henderson and Powell 2009), both involving solitary eggs. Herein I report the first record of communal nesting by any Cuban anole in bromeliads.

I examined ten One-spiked Guzmanias (*Guzmania* cf. *monostachya*) at heights of 0.4–2.0 m above the ground in riparian Caribbean Pine (*Pinus caribaea*) forest at El Moncada, Viñales, Pinar del Río Province, Cuba (22°32'20"N, 83°50'04"W; WGS 84; elev. 230 m asl). All of the bromeliads contained water, leaf litter, and organic debris. At 0930 h, temperature and relative humidity in the bromeliads were 27.2 °C and 89.9%, respectively. I found a total of 29 lizard eggs among the exterior-most leaves of the rosettes of five bromeliads (Fig. 1). The higher bromeliads contained larger numbers of eggs, but I found no correlation because of the small sample size. I also encountered frogs (two Cuban Bromeliad Frogs, *Eleutherodactylus varians*, and one Cuban Streamside Frog, *E. riparius*) in two bromeliads, but never in the same plants where lizards had deposited eggs.

Mean (± one SD) length, width, and volume of six eggs were 13.5 ± 1.0 mm (11.9–15.3 mm), 9.3 ± 0.6 mm (8.0–10.5 mm), and 623.1 ± 121.2 mm^3 (394.8–877.7 mm^3), respectively. I calculated volumes using the formula for an ellipsoid: $V = 4/3\varpi\ (L/2)\ (W/2)^2$ (Magnusson et al. 2003). The wide range of sizes in even this small sample suggests that the eggs were deposited by multiple females over a period of time.

In order to identify the eggs, I incubated three eggs over a period of 22 days. I measured temperature and rela-

Fig. 1. A One-spiked Guzmania (*Guzmania* cf. *monostachya*) in which Cuban Green Anoles (*Anolis porcatus*) had laid eggs communally.

Reptiles & Amphibians ISSN 2332-4961

Fig. 2. A Cuban Green Anole (*Anolis porcatus*) hatched from a communally deposited egg in a bromeliad.

Fig. 4. A One-spiked Guzmania (*Guzmania* cf. *monostachya*) on which Cuban Hutias have fed.

tive humidity twice each day at 0700 h and 1900 h. Mean morning temperature and relative humidity were 25.3 ºC (23.4–28.4 ºC) and 87.2% (76.8–93.7%); mean afternoon temperature and relative humidity were 30.2 ºC (24.8–33.5 ºC) was 79.6% (65.1–93.7%). After ten days of incubation, the first egg hatched; the hatchling (Fig. 2), now definitively identified as a Cuban Green Anole (*Anolis porcatus*), had a SVL of 23.83 mm and a total length of 47.6 mm. The second egg hatched after 16 days (hatchling SVL = 21.5 mm, total length = 43.9 mm). The third egg did not hatch.

Some Cuban anoles are known to occupy bromeliads, including *A. porcatus* (García-González et al. 2014), but the only records of ovipositioning in epiphytic bromeliads are for the Blue-eyed Twig Anole (*A. alutaceus*) (Dunn 1926) and the Cuban White-fanned Anole (*A. homolechis*) (Schwartz and Henderson 1991; García-Padrón, pers. observ.). Communal nesting in plants by Cuban Green Anoles has been documented in a Coconut Palm (*Cocos nucifera*) and in Royal Palms (*Roystonea regia*) (Dunn 1926).

A scarcity of suitable ovipositioning sites might be the main cause of communal nesting in anoles (Rand 1967). At this site, the availability of suitable sites was likely affected by flooding after heavy rains during the wet season (May to October), which coincided with the principal reproductive period of *Anolis porcatus* (Rodríguez Schettino 1999). Also, destruction of the forest (especially bromeliads) by humans (Fig. 3) and a resultant scarcity of plant food resources for some herbivores (e.g., Cuban Hutias, *Capromys pilorides* and *Mysateles prehensilis*) (Fig. 4) as well as refuges and reproductive sites for frogs and lizards will lead to a loss of biodiversity in the area.

Fig. 3. Destruction of the forest at the study site by humans. Note the many bromeliads on the fallen trees.

Acknowledgements

I thank the staff of the Centro Nacional de Entrenamiento Espeleológico "Antonio Núñez Jiménez" for logistical help, Kenay Gómez Carmenate and M. Matilde Delgado Albizar for help during fieldwork, Dr. Jorge Ferro Díaz for identifying the bromeliads, and Javier Torres for valuable comments on an early version of this manuscript.

Literature Cited

Andrews, R.M. 1985. Oviposition frequency of *Anolis carolinensis*. *Copeia* 1985: 259–262. https://doi.org/10.2307/1444828.

Andrews, R. and A.S. Rand. 1974. Reproductive effort in anoline lizards. *Ecology* 55: 1317–1327. https://doi.org/10.2307/1935459.

Dunn, E.R. 1926. Notes on Cuban anoles. *Copeia* 1926: 153–154.

García-González, A., L.Y. García Padrón, F. Delgado Fernández, and F.B. Riverón-Giró. 2014. Anfibios y reptiles asociados a tres especies de bromelias de tanque en el Parque Nacional Guanahacabibes, Cuba. *Cuadernos de Investigación* 6: 87–97.

Estrada, A.R. 1987. *Anolis argillaceus* (Sauria: Iguanidae): un nuevo caso de puestas comunales en Anolis cubanos. *Poeyana* 353: 1–9.

Estrada, A.R. and J. Novo Rodríguez. 1986. Nuevos datos sobre las puestas comunales de *Anolis bartschi* (Sauria: Iguanidae) en la sierra de los Órganos, Pinar del Río, Cuba. *Ciencias Biológicas* 15: 135–136.

Garrido, O.H. and L. Pareta. 1994. Puestas comunales de *Anolis allisoni* (Larcetilia: Iguanidae) en Cuba. *Revista Biología* 8:145–147.

Hardy, J.D., Jr. 1957. Observation on the life history of the Cuban lizard, *Anolis lucius*. *Herpetologica* 13: 241–245.

Henderson, R.W. and R. Powell. 2009. *Natural History of West Indian Reptiles and Amphibians*. University Press of Florida, Gainesville, Florida, USA.

Lehtinen, R.M., M.J. Lannoo, and R.J. Wassersug. 2004. Phytotelm-breeding anurans: Past, present, and future research. *Miscellaneous Publications, Museum of Zoology, University of Michigan* 193: 1–9.

Losos, J.B. 2009. *Lizards in an Evolutionary Tree. Ecology and Adaptive Radiation of Anoles*. University of California Press, Berkeley, California, USA.

Magnusson, W.E., A.P. Lima, W.A. Silva, and M.C. Araújo. 2003. Use of geometric forms to estimate volume of invertebrates in ecological studies of dietary overlap. *Copeia* 2003: 13–19. https://doi.org/10.1643/0045-8511(2003)003[0013:UOGFTE]2.0.CO;2.

Novo Rodríguez, J. 1985. Nido comunal de *Anolis angusticeps* (Sauria:Iguanidae) en Cayo Francés, Cuba. *Miscelánea Zoológica* 28: 2–3.

Rand, S. 1967. Communal egg laying in anoline lizards. *Herpetologica* 23: 227–230.

Rodríguez Schettino, L. 1999. *The Iguanid Lizards of Cuba*. University of Florida Press, Gainesville, Florida, USA.

Schwartz, A. and R.W. Henderson. 1991. *Amphibians and Reptiles of the West Indies: Descriptions, Distributions, and Natural History*. University of Florida Press, Gainesville, Florida, USA.

Silva Rodríguez, A., V. Berovides Álvarez, and A. Estrada Acosta. 1982. Sitios de puestas comunales de *Anolis bartschi* (Sauria:Iguanidae). *Miscelánea Zoológica* 15: 1.