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A molecular and morphological characterization of Oliver's parrot snake, *Leptophis coeruleodorsus* (Squamata: Serpentes: Colubridae) with the description of a new species from Tobago

JOHN C. MURPHY^{1,4}, STEVLAND P. CHARLES², RICHARD M. LEHTINEN³ & KRISTA L. KOELLER³

¹Science & Education, Field Museum of Natural History, 1400 S. Lake Shore Drive, Chicago, IL 60605 USA

²Department of Biology, Howard University, Washington, DC 20059 USA

³Department of Biology, 931 College Mall, The College of Wooster, Wooster, OH 44691 USA

⁴Corresponding author. E-mail fordonia1@comcast.net

Abstract

Currently, two snake species of the genus *Leptophis* occur in Trinidad and Tobago. One, *L. stimsoni*, is endemic to Trinidad's Northern Range and known from relatively few specimens. The second is the diurnal, arboreal, brightly colored parrot snake *Leptophis coeruleodorsus* Oliver. It was originally described based on 23 specimens from Trinidad, Tobago, and four locations in northern Venezuela but remains poorly known. It was later assigned as a subspecies of *Leptophis ahaetulla*; a widespread, polytypic species. Here we compare 11 specimens of the *L. ahaetulla* Group using DNA sequences from two mitochondrial genes (cytochrome b and 16S, 1,383 bp total) from island and mainland populations, report on the variation in the morphology of 54 museum specimens of *Leptophis a. coeruleodorsus*; describe the previously undescribed holotype of *L. coeruleodorsus* Oliver, and restrict its type locality. Additionally, we describe a new species of *Leptophis* from the island of Tobago that can be distinguished from *L. coeruleodorsus* on the basis of snout shape, upper labial architecture, elongated prefrontal scales, and ventral scale counts. The new *Leptophis* raises the number of endemic Tobago amphibians and reptiles to 11 taxa.

Key words: Arboreal snakes, new species, speciation, systematics, taxonomy, Trinidad, Venezuela

Introduction

The South American landscape was dramatically shaped by tectonic events combined with the often associated changes in river systems, climate, sea levels, and coastlines. This repeating geological remodeling of the continent strongly influenced the ecological and evolutionary trajectories of the biota producing the spectacular Neotropical biodiversity present today (Hoorn & Wesselingh 2012). Evidence is rapidly accumulating that Neotropical diversity has been underestimated for virtually all major clades of vertebrates: fish (Cooke *et al.* 2012), amphibians (Funk *et al.* 2012), reptiles (Sallaberry-Pincheira *et al.* 2011), birds (Werner *et al.* 2012), and mammals (Clare 2011). A portion of the undiscovered diversity is represented by cryptic species.

Cryptic species have challenged the way we think about evolution, ecology, and conservation. While cryptic species are often considered sister species that represent recent divergence, deep genetic divergence can exist between cryptic forms and therefore cryptic taxa may represent distinct lineages despite their superficially similar appearances (Bickford *et al.* 2007; McLeod 2010). Morphological stasis despite genetic divergence may result from changes in non-visual communication. Snakes for example, rely heavily on chemical communication (Shine & Mason 2011); populations that alter the molecular structure of their pheromones may diverge genetically but show little morphological differences. Cryptic species may be allopatric with geographic barriers separating them or they may be sympatric and syntopic (Cogger & Heatwole 2006; McLeod 2010; Pyron & Burbrink 2010).

Snakes of the genus *Leptophis* are widespread in the Neotropics and they tend to be encountered frequently because they are diurnal, relatively large, and brightly colored. Recently, Pyron *et al.* (2013) recovered *Leptophis*