



INTRODUCED SPECIES

New County Records for Introduced Reptiles in St. Lucie County, Florida, with Some Observations on Diets

Justin R. Dalaba, Michael R. Rochford, Edward F. Metzger, Christopher R. Gillette, Nathan P. Schwartz, Emily V. Gati, Sidney T. Godfrey, Domenick Altieri, and Frank J. Mazzotti

Department of Wildlife Ecology and Conservation, Fort Lauderdale Research and Education Center, University of Florida, Fort Lauderdale, Florida, USA (justindalaba@ufl.edu)

During field surveys from July through November 2018, the University of Florida (UF) documented new county records of several introduced reptilian species in St. Lucie County, Florida. Dr. Coleman Sheehy III, Florida Museum of Natural History, confirmed the identity of all species from the cited photographic vouchers.

Dumeril's Boa, *Acrantophis dumerili*, is a common constrictor in forests and cultivated areas of Madagascar (Raxworthy 2003; Glaw and Vences 2007). Eight introductions (to Broward, Miami-Dade, Collier, and Okaloosa Counties) have been reported previously from Florida (Hanslowe et al. 2015; www.eddmaps.org). On 10 September 2018, homeowners removed a neonatal *A. dumerili* (photographic voucher UF-Herpetology 188617; SVL 493 mm; Fig. 1) from their property in Fort Pierce, St. Lucie County, Florida (27.449966°N, -80.448940°W; datum WGS84) and reported it to the St. Lucie County Cooperative Extension, who relayed the specimen to UF. We were unable to determine if this snake represented a single escaped or released individual or offspring of a snake released by or escaped from a nearby pet distributor (Stage 2: survival and reproduction;

Colautti and MacIsaac 2004) who vacated the area at least two years ago (Kenneth Gioeli, pers. comm., 10 September 2018).

The Veiled Chameleon (*Chamaeleo calyptratus*), common in the pet trade, is native to mountainous plateaus and grasslands of Yemen and Saudi Arabia (Fritz and Schütte 1987; Meerman and Boomsma 1987; Showler 1995; Schmidt 2001). It was introduced to the United States in Hawaii (Kraus and Duvall 2004; Kraus 2009) and at least five sites in Florida (Alachua, Collier, Hendry, Lee, and Miami-Dade Counties; Enge 2008; Krysko et al. 2004, 2011b; Gillette and Krysko 2012; Edwards et al. 2014). At 1158 h on 13 August 2018, we collected a roadkilled *Chamaeleo calyptratus* along Orange Avenue, 0.27 km west of the Florida Turnpike in St. Lucie County, Florida (27.447601°N, -80.431949°W; datum WGS84). At 2024 h on 4 September 2018, we observed a live *C. calyptratus* sleeping out of reach in a tree 0.28 km west of the Florida Turnpike in St. Lucie County (27.447169°N, -80.430139°W; datum WGS84). At 1051 h on 26 October 2018, we collected a live adult male *C. calyptratus* (photographic voucher UF-Herpetology 188618; Fig. 2) that was foraging in a tree about 1 m above the ground



Fig. 1. Neonatal Dumeril's Boa, *Acrantophis dumerili* (photographic voucher UF-Herpetology 188617) collected in 2018 and transferred by Ken Gioeli, Fort Pierce, Florida. Photograph by Emily Gati.



Fig. 2. Veiled Chameleon, *Chamaeleo calyptratus* (photographic voucher UF-Herpetology 188618) collected in 2018 by Michael Rochford, Fort Pierce, Florida. Photograph by Justin Dalaba.

on Orange Avenue, 0.25 km west of the Florida Turnpike in St. Lucie County (27.447278°N, -80.430179°W; datum WGS84). On 29 October 2018, we collected another live adult male *C. calyptratus* (photographic voucher UF-Herpetology 188619; Fig. 3) basking on a fence at 1159 h, about 1 m above the ground and 0.1 km west of the previous sighting (27.44739°N, -80.431191°W; datum WGS84). The dominant vegetation surrounding the site is *Sabal palmetto*. The source of these animals is likely on adjacent private property that includes the former residence of a reptile dealer, where owners did not grant access and indicated that they will prosecute trespassers.

The Tokay Gecko, *Gekko gecko*, which is native to southeastern Asia, has been established elsewhere in Florida since the 1960s as a result of intentional releases around residences and independent introductions through the pet trade (King and Krakauer 1966; Krysko and Daniels 2005). At 2008 h on 7 November 2018, we collected a male *G. gecko* (photographic voucher UF-Herpetology 188620; Fig. 4) from the side of a bridge in St. Lucie County, Florida (27.447493°N, -80.427628°W; datum WGS84). Previous investigations of the diet of this species in Florida revealed primarily roaches,



Fig. 3. Veiled Chameleon, *Chamaeleo calyptratus* (photographic voucher UF-Herpetology 188619) collected in 2018 by Michael Rochford, Fort Pierce, Florida. Photograph by Michael Rochford.



Fig. 4. Tokay Gecko, *Gekko gecko* (photographic voucher UF-Herpetology 188620) collected in 2018 by Nathan Schwartz and Emily Gati, Fort Pierce, Florida. Photograph by Nathan Schwartz.

caterpillars, spiders, and beetles (Meshaka et al. 1997). However, *G. gecko* is known to readily consume other prey, including small vertebrates such as birds, reptiles, and rodents, which may have implications for the potential impact of this species on native wildlife in Florida (Bucol and Alcalá 2013).

We collected an adult male Red-footed Tortoise, *Chelonoidis carbonarius* (photographic voucher UF-Herpetology 188621; Fig. 5) at 1215 h on 31 October 2018 from the side of Orange Avenue, 0.27 km west of the Florida Turnpike in St. Lucie County (27.447296°N, -80.430179°W; datum WGS84). This species has been introduced into Florida via the pet trade, but without any evidence of reproduction (Meshaka et al. 2004; Krysko et al. 2011a). At least one reported sighting occurred in the same area months prior to our observation (EDDMS 2018), but this is the first vouchered individual for St. Lucie County. We documented the presence of Gopher Tortoises (*Gopherus*



Fig. 5. Red-footed Tortoise, *Chelonoidis carbonarius* (photographic voucher UF-Herpetology 188621) collected in 2018 by Sidney Godfrey and Domenick Altieri, Fort Pierce, Florida. Photograph by Sidney Godfrey.

polyphemus), a state-threatened species, in adjacent areas. Further investigation of the area may shed light on the potential for interspecific competition.

In addition to these new county records, we provide the first known dietary observations for Dumeril's Boa, *Acrantophis dumerili* Jan 1860, and Veiled Chameleon, *Chamaeleo calypttratus* Duméril and Bibron 1851, in their introduced ranges in southern Florida. This information, although anecdotal, can improve our understanding of potential effects on local ecosystems.

Acrantophis dumerili is an opportunistic feeder that can be active both nocturnally and diurnally and can exhibit both arboreal and terrestrial behavior (Raxworthy 2003; Vences and Glaw 2003; Gardner et al. 2017). The juvenile (Fig. 1) had attempted to consume an invasive Cane Toad (*Rhinella marina*) when found during the day. We performed a necropsy on the specimen and found the upper gastrointestinal tract (GI) empty. However, some remains in the lower GI revealed insect fragments, indigestible plant material, and detritus (grains of sand or quartz), all of which were probably ingested adventitiously while attempting to capture prey or originated in the gut of a prior prey item such as a lizard or amphibian (Pendlebury 1974).

Chamaeleo calypttratus is primarily arboreal and insectivorous and forages actively during the day (Schmidt 2001). We examined a fecal sample that one of the chameleons (Fig. 2) egested two days after capture. Most of the sample had been digested, leaving only chitinous insect fragments (Fig. 6) or



Fig. 6. Dietary sample from *Chamaeleo calypttratus* (photographic voucher UF-Herpetology 188618) collected in 2018 from Fort Pierce, Florida. Photograph by Justin Dalaba.

indigestible plant material. We identified insects to family when possible and found at least two individual broad-headed bugs (family Alydidae), one leaf-footed bug (Coreidae), one green lacewing (Chrysopidae), two wasps (Scoliidae and Tiphiidae), one cicada (Cicadidae), an unidentifiable beetle, and an unidentifiable caterpillar. Most of the ingested plant material consisted of Brazilian Pepper (*Schinus terebinthifolius*) seeds, a highly invasive plant in Florida sometimes dispersed through reptilian feces (Jackson and Jackson 2007).

Acknowledgements

Funding and support for this work was provided by the U.S. Fish and Wildlife Service. We thank Ken Gioeli of the UF/IFAS St. Lucie County Co-Op Extension for his collaboration in the collection and transfer of the Dumeril's Boa. We also thank William H. Kern for his assistance and expertise in identifying insect prey from dietary samples collected for this study. Sarah Cooke, Jenna Cole, Nicole Jennings, and Avishka Godahewa were instrumental in the collection of data during field surveys. Specimen collection was permitted by the Florida Fish and Wildlife Conservation Commission (EXOT-18-06).

Literature Cited

- Bucol, A. and A. Alcalá. 2013. Tokay gecko, *Gekko gecko* (Sauria: Gekkonidae) predation on juvenile house rats. *Herpetology Notes* 6: 307–308.
- Colautti, R.I. and H.J. MacIsaac. 2004. A neutral terminology to define 'invasive' species. *Diversity and Distributions* 10: 135–141.
- EDDMS (Early Detection & Distribution Mapping System). 2018. <<https://www.eddmaps.org/florida/distribution/>>.
- Edwards, J.R., M.R. Rochford, F.J. Mazzotti, and K.L. Krysko. 2014. New county record for the Veiled Chameleon (*Chamaeleo calypttratus* Duméril and Bibron 1851), in Broward County, Florida, with notes on intentional introductions of chameleons in southern Florida. *Reptiles and Amphibians* 21: 83–85.
- Enge, K.M. 2008. Geographic distribution: *Chamaeleo calypttratus* (Veiled Chameleon). *Herpetological Review* 39: 367.
- Fritz, J.P. and F. Schütte. 1987. Zur Biologie jemenitischer *Chamaeleo calypttratus* Duméril & Duméril, 1851 mit einigen Anmerkungen zum systematischen Status (Sauria: Chamaeleonidae). *Salamandra* 23: 17–25.
- Gardner, C.J., N. McDonnell, C. Ellis, and L.D. Jasper. 2017. Observations of aquatic behavior in Malagasy ground boas *Acrantophis madagascariensis* (Duméril & Bibron, 1844) and *A. dumerili* Jan, 1860. *Herpetology Notes* 10: 271–273.
- Gillette, C.R. and K.L. Krysko. 2012. New county record for the Veiled Chameleon, *Chamaeleo calypttratus* Duméril and Bibron 1851 (Sauria: Chamaeleonidae), in Florida. *Reptiles & Amphibians* 19: 130–131.
- Glaw, F. and M. Vences. 2007. *A Field Guide to the Amphibians and Reptiles of Madagascar*. 3rd edition. Vences and Glaw Verlag, Köln, Germany.
- Hanslowe, E.B., B.G. Falk, M.A. McEachern, and R.N. Reed. 2015. Observations of two non-native snake species in the same remote area of southern Florida. *Reptiles & Amphibians* 22: 90–92.
- Jackson, J.A. and B.J.S. Jackson. 2007. An apparent mutualistic association between invasive exotics: Brazilian pepper (*Schinus terebinthifolius*) and black spiny-tailed iguanas (*Ctenosaura similis*). *Natural Areas Journal* 27: 254–258.
- King, W. and T. Krakauer. 1966. The exotic herpetofauna of Southeast Florida. *Quarterly Journal of the Florida Academy of Sciences* 29: 144–154.
- Kraus, F. 2009. *Alien Reptiles and Amphibians: A Scientific Compendium and Analysis*. Springer, Dordrecht, The Netherlands.
- Kraus, F. and F. Duvall. 2004. New records of alien reptiles and amphibians in Hawaii. *Bishop Museum Occasional Papers* 79: 62–64.
- Krysko, K.L. and K.J. Daniels. 2005. A key to the geckos (Sauria: Gekkonidae) of Florida. *Caribbean Journal of Science* 41: 28–36.
- Krysko, K.L., K.M. Enge, and F.W. King. 2004. The Veiled Chameleon, *Chamaeleo calypttratus*: A new exotic species in Florida. *Florida Scientist* 67: 249–253.
- Krysko, K.L., J.P. Burgess, M.R. Rochford, C.R. Gillette, D. Cueva, K.M. Enge, L.A. Somma, J.L. Stabile, D.C. Smith, J.A. Wasilewski, G.N. Kieckhefer III, M.C. Granatosky, and S.V. Nielsen. 2011a. Verified non-indigenous amphibians and reptiles in Florida from 1863 through 2010: Outlining the invasive process and identifying invasion pathways and stages. *Zootaxa* 3028: 1–64.
- Krysko, K.L., K.M. Enge, and P.E. Moler. 2011b. Atlas of Amphibians and Reptiles in Florida. Final Report, Project Agreement 08013, Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.
- Meerman, J. and T. Boomsma. 1987. Beobachtungen an *Chamaeleo calypttratus calypttratus* Duméril & Duméril, 1851 in der Arabischen Republik Jemen (Sauria: Chamaeleonidae). *Salamandra* 23: 10–16.
- Meshaka, W.E., Jr., R.M. Clouse, and L. McMahon. 1997. Diet of the Tokay Gecko (*Gekko gecko*) in southern Florida. *Florida Field Naturalist* 25: 105–107.
- Meshaka, W.E., B.P. Butterfield, and J.B. Hauge. 2004. *The Exotic Amphibians and Reptiles of Florida*. Krieger Publishing Company, Malabar, Florida.
- Pendlebury, G.B. 1974. Stomach and intestine contents of *Corallus enydris*; A comparison of island and mainland specimens. *Journal of Herpetology* 8: 241–244.
- Raxworthy, C.J. 2003. Boas, Boidae, pp. 993–997. In: S.M. Goodman and J.P. Benstead (eds.), *The Natural History of Madagascar*. University of Chicago Press, Chicago, Illinois.
- Schmidt, W. 2001. *Chamaeleo calypttratus, the Yemen Chameleon*. Matthias Schmidt Publications, Natur und Tier-Verlag, Berlin, Germany.
- Showler, D. 1995. Reptile observations in Yemen, March–May 1993. *The Herpetological Bulletin* 53: 13–23.
- Vences, M. and F. Glaw. 2003. Phylogeography, systematics and conservation status of boid snakes from Madagascar (*Sanzinia* and *Acrantophis*). *Salamandra* 39: 181–206.