



## INTRODUCED SPECIES

# Confirmation of the Mourning Gecko, *Lepidodactylus lugubris* (Duméril and Bibron 1836), on Isla de Utila, with Remarks on the Island's Invasive Reptiles

 Tom W. Brown<sup>1,2</sup> and Flavia Diotallevi<sup>1</sup>
<sup>1</sup>Kanahau Utila Research and Conservation Facility, Isla de Utila, Honduras (tom@kanahau.org)

<sup>2</sup>School of Geography, University of Nottingham, Nottingham NG7 2RD, United Kingdom

The Mourning Gecko (*Lepidodactylus lugubris*) is a small nocturnal gecko native to southeastern Asia and many Pacific islands (Hoogmoed and Avila-Pires 2015). This parthenogenetic lizard is considered among the most successful reptilian invaders (Bomford et al. 2009; Cuéllar and Kluge 1972). The rapid means of reproduction might be particularly advantageous when invading new localities as the introduction of a single female could conceivably establish a population. Additionally, the eggs are resistant to exposure to salt-water and/or desiccation (W.C. Brown and Alcalá 1957; S.G. Brown and Duffy 1992), aiding overseas dispersal and

establishment in new coastal habitats (Jiménez and Abarca 2014). The first evidence of this species in Central America, in Colon, Panama, dates to over a century ago and was verified by Smith and Grant (1961). It has now been recorded definitively in the USA, Nicaragua, Costa Rica, Ecuador (the Galapagos), Colombia, Venezuela, Peru, Guadeloupe (French Antilles), Suriname, and Brazil (for comprehensive reviews of the distribution of *L. lugubris* in the Western Hemisphere see Hoogmoed and Avila-Pires 2015; Señaris et al. 2017). To date, the only Caribbean islands from which this species has been recorded are Guadeloupe (Lorvelec et al. 2017), the



**Fig. 1.** Adult Mourning Geckos (*Lepidodactylus lugubris*) at the Hotspot Café (Wetspot Dock) in Utila Town, Utila, Bay Islands, Honduras. Photographs © Tom W. Brown.



Bahamas (Krysko and MacKenzie-Krysko 2016; Giery et al. 2019), Cuba (Bosch and Paez 2017), and Grand Cayman (Goetz and Burton 2018).

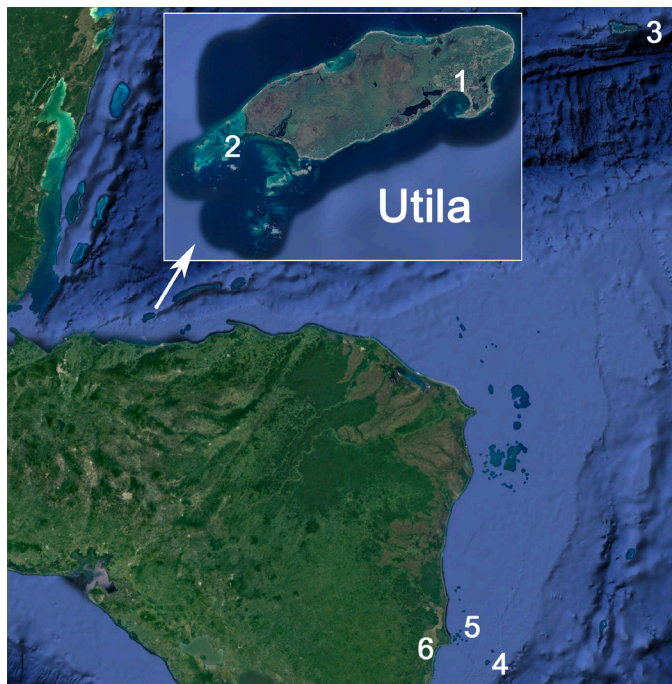
Herein we report the first record of *Lepidodactylus lugubris* (Fig. 1) from two locations in the Bay Islands of Honduras (Fig. 2). From 10 August 2018 to 15 March 2019, we encountered numerous *L. lugubris* at the Hotspot Café (Wetspot Dock) in Utila Town (−16.09711°N, 86.89661°W; Garmin 64sc, datum WGS 84) at an elevation of 1–2 m less than 10 m from the sea. These geckos first caught our attention while active on the wooden rafters of the building during the late afternoon (1500–1700 h). During more than 20 subsequent daytime visits, we consistently located individuals seeking refuge between wooden roof crevices. To confirm identification and allow for the collection of standard morphological data, we captured and photographed two individuals. The captured individuals had SVLs of 35 and 42 mm, tail lengths of 38 and 40 mm, respectively, and weighed 1–2 g; both were gravid. No voucher specimens were collected, but photographic vouchers have been deposited in the Milwaukee Public Museum (MPM VZP 918–920). Robert Powell verified the identity of the species from photographs. We found no *Hemidactylus frenatus* (Fig. 3) sharing the building, although they are abundant in the immediate vicinity in Utila Town and are now the “most commonly observed gecko species across Utila” (T.W. Brown and Arrivillaga, 2019).

Utila is the smallest and westernmost of the three major Bay Islands (Utila, Roatan, and Guanaja) and part of

the Cayos Cochinos Archipelago, which is situated off the Caribbean coast of Honduras. Of these major islands, Utila is positioned closest to the mainland, located approximately 32 km NNW of the city of La Ceiba in the Honduran Department of Atlántida. Considering its comparatively small size (ca. 41 km<sup>2</sup>), Utila hosts an impressive 42 species of amphibians and reptiles (5 frogs, 18 lizards, 14 snakes, 4 turtles, and 1 crocodile; McCranie and Valdéz-Orellana 2014), the greatest herpetofaunal diversity of the Bay Islands and the Cayos Cochinos. Of these 42 recorded species, four lizards (*Ctenosaura bakeri*, *Anolis (Norops) bicaorum*, *Anolis (Norops) utilensis*, *Sphaerodactylus poindexteri*) are endemic to Utila and a further two (*Phyllodactylus palmeus*, *Sphaerodactylus rosaurae*) are endemic to two or more of the Bay Islands. Representing the family Gekkonidae, Utila has five native geckos belonging to the genera *Phyllodactylus*, *Thecadactylus*, *Sphaerodactylus*, and *Eublepharus*, and one known invasive species of *Hemidactylus* (McCranie and Valdéz-Orellana 2014). The observations reported herein raise the total number of herpetofaunal species recorded on Utila to 43, and extend the known range of *L. lugubris* by 600–700 km (linear) from the closest previously reported localities in Nicaragua (Big Corn Island, Pearl Cay, Bluefields; Henderson et al. 1976; Villa 1993) and Grand Cayman (Cypress Pointe; Goetz and Burton 2018).

Prior to our observations, a single “unverified” report of *L. lugubris* from Utila Town was listed online by D.J. McNeil on 4 February 2017 (iNaturalist.org 2019). Assuming that *L. lugubris* populations have been present on Utila for over two years, local eradication of these geckos may no longer be an option — such efforts would be near impossible considering the species’ small size and its ability to hide and reproduce rapidly. Moreover, considering the firm establishment and ongoing impact of *H. frenatus* (e.g., the Bay Island endemic Leaf-toed Gecko, *Phyllodactylus palmeus*, has already been extirpated from edificarian environments by *H. frenatus*; see McCranie and Hedges 2013), the more recent introduction of *L. lugubris*, by comparison, appears to be of little concern.

The second locality we report for *L. lugubris* is Sandy Cay, Cayos Utila (−16.06959°N, 86.99969°W; Garmin 64sc, datum WGS 84) at an elevation of 1–2 m. The Cayos Utila are nine tiny cays off the southwestern coast of Utila. Sandy Cay (3,167 m<sup>2</sup>) is ca. 11.5 km (linear) from the site of our observations of *L. lugubris* on Utila. This naturally formed miniature island retreat is privately owned, available to rent, and consists of a sandy beach, coconut palms, and basic living facilities. During an overnight stay on 1 September 2018, we encountered two individuals of *L. lugubris* sheltering amidst dry coconut palms during the day, and four active on palm trunks and around the outdoor lights of the building at night. We captured two adults to confirm identification but released them immediately and collected no morphological data.



**Fig. 2.** Google Earth © map showing the locations of *Lepidodactylus lugubris* on Utila Island (1) and Sandy Cay (2) in Honduras, Central America; 600–700 km from the closest known localities in the Cayman Islands (3) and Nicaragua (4, 5, 6).





**Fig. 3.** An adult Mourning Gecko (*Lepidodactylus lugubris*) on Utila Island, Honduras (top), showing the distinct dorsal pattern and hindfoot lamellae with divided terminal scansors, and an adult female Common House Gecko (*Hemidactylus frenatus*) from Utila and completely divided hindfoot lamellae. Photographs © Tom W. Brown.

Remarkably, in addition to *L. lugubris*, we also encountered a few individuals of *H. frenatus* and the critically endangered Utila Spiny-tailed Iguana (*Ctenosaura bakeri*) on Sandy Cay (the landowner later explained the iguanas had been introduced by locals from Utila for tourism-related aesthetics). Prior to our brief visit, the herpetofauna of the Cayos Utila had not been examined, but McCranie and Valdéz-Orellana (2014) remarked that “The herpetofauna of those cays is unknown, but can at best be insignificant.” In any case, we believe the confirmation of reptiles occurring on Sandy Cay warrants the future cataloguing, investigation, and monitoring of species across the Cayos Utila.

### Concluding Remarks

In recent decades, human populations in Utila and the other Bay Islands have grown rapidly as a consequence of them becoming increasingly popular tourist destinations. Unfortunately, the associated increase in accessibility and need for imported produce from the mainland and neighboring islands has facilitated the introduction of two other notoriously invasive reptiles on Utila; including the Asian House Gecko, *Hemidactylus frenatus* (Kohler 2001; McCranie and Rovito 2011) and the Brown Anole, *Anolis (Norops) sagrei* (McCranie et al. 2005; McCranie and Nuñez 2014; McCranie and Valdéz-Orellana 2014). While comprehensive research addressing the impacts of invasive species on Utila

is still required, observations suggest that these pose a significant threat to numerous island endemics (e.g., McCranie and Hedges 2013; Nicholson et al. 2015; T.W. Brown et al. 2017a, 2017b, 2018; T.W. Brown and Arrivillaga 2019). Until now, the most recently introduced reptile to Utila was *Anolis allisoni* from the adjacent island of Roatan (Martinez and Clayson 2013). McCranie and Köhler (2015) suggested that the one *A. allisoni* reported from Utila, likely was the same specimen photographed and collected by Martinez and Clayson (2013). In spite of these odds, *A. allisoni* has since become established in suburban areas of Utila Town amidst populations of *N. sagrei* (see T.W. Brown 2019).

Although the exact timing and means of the introduction to Utila or Sandy Cay are unknown, *L. lugubris* most likely was transported accidentally by tourists or via cargo. Besides a passport check, Utila Island has no extensive customs or biosecurity in place for traded produce and people traveling from the mainland by boat or air to Utila and between the Islas de la Bahia. This relative lack of security may be in part responsible for enabling invasive species introductions. Furthermore, as most products and travelers come through mainland Honduras before arriving on Utila, *L. lugubris* likely occurs unreported near the air or ferry port in La Ceiba or on neighboring islands. Owing to its close resemblance to the widespread genus *Hemidactylus*, the dispersal of this species may so far have gone unnoticed.

At present, any effort to determine the impact of *L. lugubris* on Utila or Honduras is premature. Nevertheless, the effects of invasive species on isolated island ecosystems with endemic species are especially high. Given the complex inter-specific interactions of invasive and native geckos, we intend to monitor these introduced populations. We also hope that this official record of *L. lugubris* in Honduras will lead to efforts to report and mitigate the spread of this invader in the country.

### Acknowledgements

We thank Alexander Rebelo, Bryan Cruz, Daniela Sansur, Daisy F. Maryon (who helped us locate the species), as well as the staff of Hotspot/Wetspot Café (Utila), Naomi Jackson, Eva, and Myra, for their kindness, continued support, and coffee. We also extend our sincere gratitude to everyone who has helped or supported the biodiversity research at Kanahau URCF. We conducted herpetological research and data collection under a valid permit issued by the Instituto Nacional de Conservación y Desarrollo Forestal, Áreas Protegidas y Vida Silvestre (ICF), Tegucigalpa, Honduras (Resolución DE-MP-054-2017; Dictamen técnico ICF-DVS-169-2017; Dictamen técnico DAP-068-2017).

### Literature Cited

- Bosch, R.A. and R.B. Páez. 2017. First record from Cuba of the introduced Mourning Gecko, *Lepidodactylus lugubris* (Duméril and Bibron, 1836). *BioInvasions Records* 6: 297–300.
- Brown, S.G. and P.K. Duffy. 1992. The effects of egg-laying site, temperature, and salt-water on incubation time and hatching success in the gecko *Lepidodactylus lugubris*. *Journal of Herpetology* 26: 510–513.
- Brown, T.W. 2019. Conservation concerns for loyal lizards: Habitat specificity, site fidelity, a localised territory and in-situ growth rates for *Anolis bicaorum* (Squamata: Dactyloidae), endemic to Isla de Utila, Honduras, pp. 14–21. In: J.T. Stroud, A.J. Geneva., and J.B. Losos (eds.), *Anolis Newsletter VII*. Washington University, St. Louis Missouri.
- Brown, T.W. and C. Arrivillaga. 2019. Notes on *Phyllodactylus palmeus* (Squamata: Gekkonidae), and a case of diurnal refuge co-inhabitancy with *Centruroides gracilis* (Scorpiones: Buthidae) on Utila Island, Honduras. *Captive and Field Herpetology* 3: 29–33.
- Brown, T.W., D.F. Maryon, and S.M. Clayson. 2017a. *Hemidactylus frenatus*. *Diet. Herpetological Review* 48: 645–646.
- Brown, T.W., D.F. Maryon., M.P. van den Burg, and G. Lonsdale 2017b. Distribution and natural history notes on *Norops bicaorum* (Squamata: Dactyloidae) endemic to Isla de Utila, Honduras. *Mesoamerican Herpetology* 4: 493–497.
- Brown, T.W., M.P. van den Burg., D.F. Maryon, and C. Arrivillaga. 2018. Arboreality and diet in Pacific Long-tailed Snakes, *Enulius flavitorques* (Squamata: Dipsadidae), and a potential adaptive hypothesis for egg attendance in Honduran Leaf-toed Geckos, *Phyllodactylus palmeus* (Squamata: Phyllodactylidae). *Reptiles & Amphibians* 25: 31–34.
- Brown, W.C. and A.C. Alcalá. 1957. Viability of lizard eggs exposed to sea water. *Copeia* 1957: 39–41.
- Giery, S.T., J.N. Pita-Aquino, J. Kolbe, and J. Piovio-Scott. 2019. Mourning Geckos (*Lepidodactylus lugubris*) established on Abaco Island, The Bahamas. *Reptiles & Amphibians* 26: 161–162.
- Goetz, M. and F.J. Burton. 2018. First record of the Mourning Gecko, *Lepidodactylus lugubris* (Duméril and Bibron 1836), on Grand Cayman, Cayman Islands. *Reptiles & Amphibians* 25: 158–159.
- Henderson, R.W., J. Villa, and J.R. Dixon. 1976. *Lepidodactylus lugubris* (Reptilia: Gekkonidae). A recent addition to the herpetofauna of Nicaragua. *Herpetological Review* 7: 173.
- Hoogmoed, M.S. and T.C.S. Avila-Pires. 2015. *Lepidodactylus lugubris* (Duméril and Bibron 1836) (Reptilia: Gekkonidae), an introduced lizard new for Brazil, with remarks on and correction of its distribution in the New World. *Zootaxa* 4000: 90–110.
- iNaturalist.org. 2019. *Lepidodactylus lugubris* (Duméril & Bibron, 1836). iNaturalist Research-grade Observations (D.J. McNeil 2017). <<https://www.gbif.org/occurrence/1880666456>>.
- Jiménez, R. and J. Abarca. 2014. Range extension of the Mourning Gecko (*Lepidodactylus lugubris*) in the Caribbean versant of Costa Rica. *Herpetotropicos* 10: 31–32.
- Krysko, K.L. and C. MacKenzie-Krysko. 2016. First report of the Mourning Gecko, *Lepidodactylus lugubris* (Duméril and Bibron 1836), from The Bahamas. *Caribbean Herpetology* 54: 1–2.
- Lorvelec, O., N. Barré, and A.M. Bauer. 2017. The status of the introduced Mourning Gecko (*Lepidodactylus lugubris*) in Guadeloupe (French Antilles) and the high probability of introduction of other species with the same pattern of distribution. *Caribbean Herpetology* 57: 1–7.
- Martinez, A. and S.M. Clayson. 2013. Geographic distribution: *Anolis allisoni* (Allison's anole). *Herpetological Review* 44: 624.
- McCranie, J.R. and S.B. Hedges. 2013. A new species of *Phyllodactylus* (Reptilia, Squamata, Gekkonidae, Phyllodactylidae) from Isla de Guanaja in the Honduran Bay Islands. *Zootaxa* 3694: 51–58.
- McCranie, J.R. and G. Köhler. 2015. *The Anoles (Reptilia: Squamata: Dactyloidae: Anolis: Norops) of Honduras: Systematics, Distribution, and Conservation*. Special Publications Series No. 1. Bulletin of the Museum of Comparative Zoology, Cambridge, Massachusetts.
- McCranie, J.R. and S. Nuñez. 2013. *Norops sagrei* (Brown Anole; Abaniquillo Costero). *Herpetological Review* 45: 91.
- McCranie, J.R. and L. Valdéz-Orellana. 2014. New island records and updated nomenclature of amphibians and reptiles from the Islas de la Bahía, Honduras. *Herpetology Notes* 7: 41–49.
- McCranie, J.R. and S.M. Rovito. 2011. Geographic distribution. *Hemidactylus frenatus* (Common House Gecko). *Herpetological Review* 42: 241.
- McCranie, J.R., L.D. Wilson, and G. Köhler. 2005. *Amphibians and Reptiles of the Bay Islands and Cayos Cochinos, Honduras*. Bibliomania!, Salt Lake City, Utah.
- Nicholson, D.J., C. Hassal, and J.A. Frazier. 2015. Comparison of a native and non-native insular reptile species. *Journal of Tropical Ecology* 31: 563–566.
- Señaris, C., F.J.M. Rojas-Runjaic, M.M. Aristeguieta, and G. García-Señaris. 2017. Second record of the invasive gecko *Lepidodactylus lugubris* (Duméril and Bibron, 1836) (Squamata: Gekkonidae) from Venezuela. *Check List* 13: 2082.
- Smith, H.M. and C. Grant. 1961. The Mourning Gecko in the Americas. *Herpetologica* 17: 68.
- Villa, J.D. 1993. Geographic distribution: *Lepidodactylus lugubris* (Mourning Gecko). *Herpetological Review* 24: 109.