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SHORT NOTE

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Extended range and observations on the natural history of the casquehead lizard *Laemanctus julioi* from Honduras

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INTRODUCTION

The family Corytophanidae, or casquehead lizards, comprises three genera and a total of 11 known species, nine of which occur in Honduras (Uetz et al., 2020). Two of the four *Laemanctus* species are endemic to Honduras (McCranie, 2018), *Laemanctus julioi* McCranie, 2018 and *Laemanctus waltersi*. *Laemanctus julioi* is found on the Pacific versant of south-central Honduras, in the Departamento de Francisco Morazán (holotype) and with an alleged distribution in Departamento de El Paraíso based on a casual observation in 1998 (McCranie, 2018). It has a reported altitude range of 650 to 1000 m, and it is restricted to Premontane Dry Forest (McCranie, 2018). There appears to be no information on the reproduction or feeding ecology of the species, although McCranie (2018) mentioned that these aspects are known for the related species *Laemanctus serratus*. Here, we increase the known geographical range of *L. julioi* into additional forest zones and to greater altitude, present new observations on behaviour, nutrition, reproductive ecology and report on total body length.

MATERIALS AND METHODS

During May and June 2017, May 2018, and October 2019, we obtained five new records for *L. julioi* in different locations in south-central and south-west Honduras. Four locations were documented with voucher photographs deposited in the Amphibian and Reptile Diversity Research Center of the University Texas Arlington, Texas, USA (UTADC) and one location documented with voucher photograph in the Colección de Registros Fotograficos de Vertebrados of the Universidad de San Carlos, Ciudad de Guatemala, Guatemala (USACF). We took morphometric data on UTADC 9461–9477 and USACF000003_1–5, photographed them, and identified each one using McCranie´s taxonomic keys (2018). Using a Garmin eTrex 10 Global Positioning System, we obtained their geographical coordinates (WGS 84) and altitude and mapped them using QGIS version 2.18. The forest types mentioned in this text are described by Holdridge (1967) and modified by McCranie (2011). We kept USACF000003_1–5 in captivity for eight months in the Centro Nacional de Conservación y Recuperación de Especies Rosy Walther to obtain nutritional and behavioural data. The colour codes used to describe the specimens are based on Köhler (2012).

RESULTS

We found *L. julioi* in five different locations (Fig. 1), as follows:

1) Lempira, Gracias, Parque Nacional Montaña de Celaque (PNMC), south-west Honduras; (14° 33’38” N, 88° 39’18” W) 1750 m a.s.l.. Three adult females UTADC 9478–9479 (Fig. 2A) were found laying eggs on the ground within an approximate 1 m^2, at 04:27 h on May 16th, 2017.

2) Francisco Morazán, San Antonio de Oriente, Escuela Agrícola Panamericana Zamorano, south-central Honduras; (13° 59’15” N, 86° 58’54” W) 770 m a.s.l.. One subadult of unknown sex UTADC 9480 (Fig. 2B), was found basking in a patch of Premontane Moist Forest near the Escuela Agrícola Panamericana Zamorano, at 17:43 h on June 30th 2017.

3) Intibucá, Jesús de Otoro, CA-11a highway, in west-central Honduras; (14° 32’04” N, 87° 58’32” W) 750 m a.s.l.. A gravid female UTADC 9481–9484 (Fig. 2C) was found as a road-kill, at 10:40 h on May 2nd 2018.

4) Lempira, Gracias, PNMC, south-west Honduras; (14° 33’46” N, 88° 38’34” W) 1,410 m a.s.l.. A gravid female UTADC 9461–9477 (Fig. 2D) was found basking on the decking of a visitors’ center with a portion covered by ferns. At the time of capture this individual was lime green in colour (105) but after two days in captivity its tonality changed to cinnamon-rufous (31), found at 07:54 h on May 8th 2019.

5) Lempira, Gracias, Thermal Waters, south-west Honduras; (14° 33’31.54” N, 88° 34’16.32” W) 890 m a.s.l.. An adult female USACF000003_1–5, (Fig. 3A–C) was found in a lethargic state after falling from a *Ficus benjamina* tree on the edge of a pool, it was cinnamon-rufous (31) in colour, the

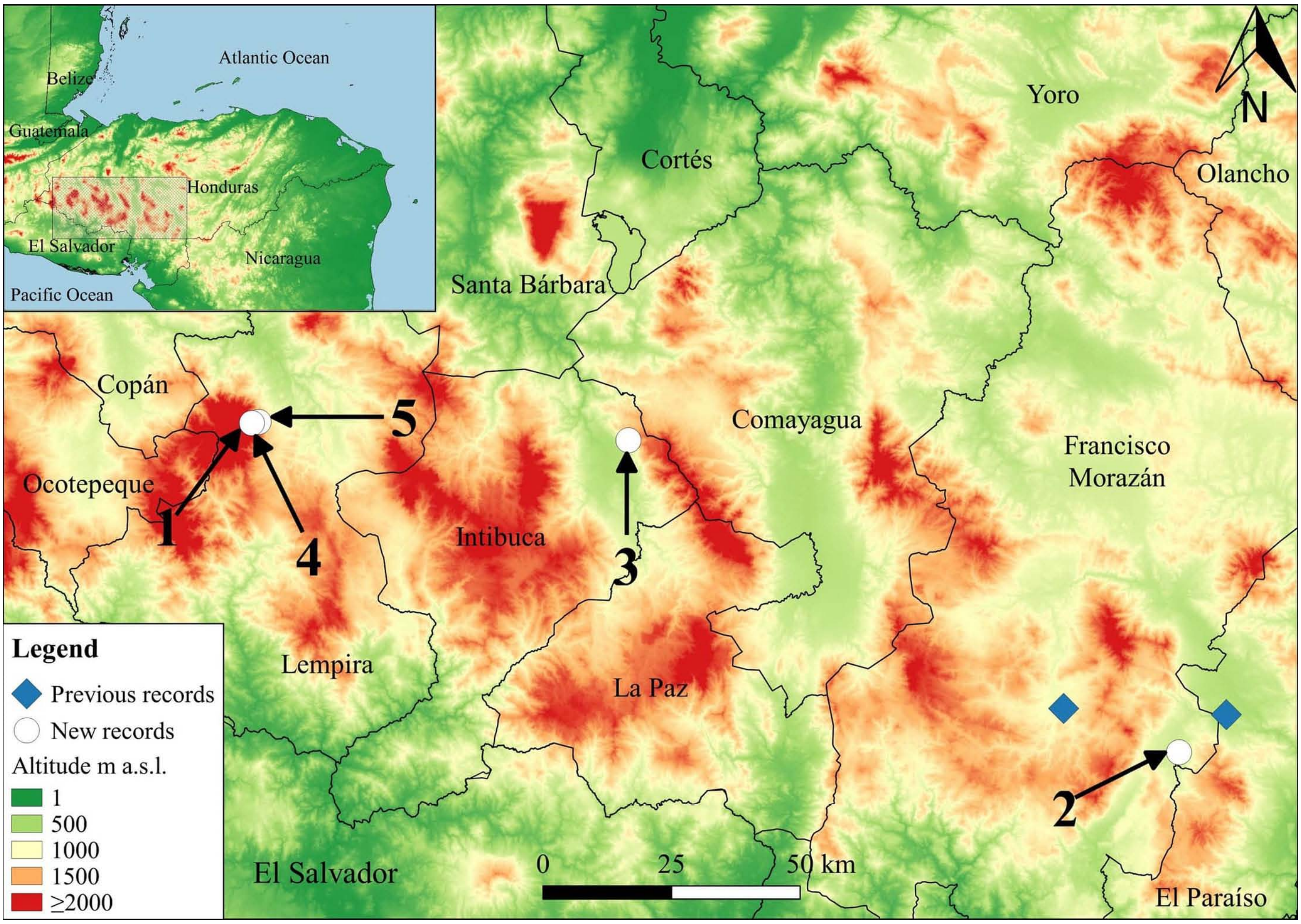

Figure 1. New locality records for *Laemanctus julioi* in Honduras, localities 1, 3, 4 and 5 are on the Atlantic versant. Numbers on the map match the locality records in the results section.

Figure 2. Aspects of *Laemanctus juloi* natural history- **A.**Three females UTADC 9478 in a group depositing their eggs close together, **B.** Subadult of sex unknown, UTADC 9480 in San Antonio de Oriente, Departamento de Francisco Morazán, Honduras **C.** An adult female of UTADC 9481 found deceased on the road, Jesus de Otoro, Departamento de Inti bucá, Honduras, **D.** Adult female UTADC 9477, from the PNMC, Sierra de Celaque, Departamento de Lempira, Honduras

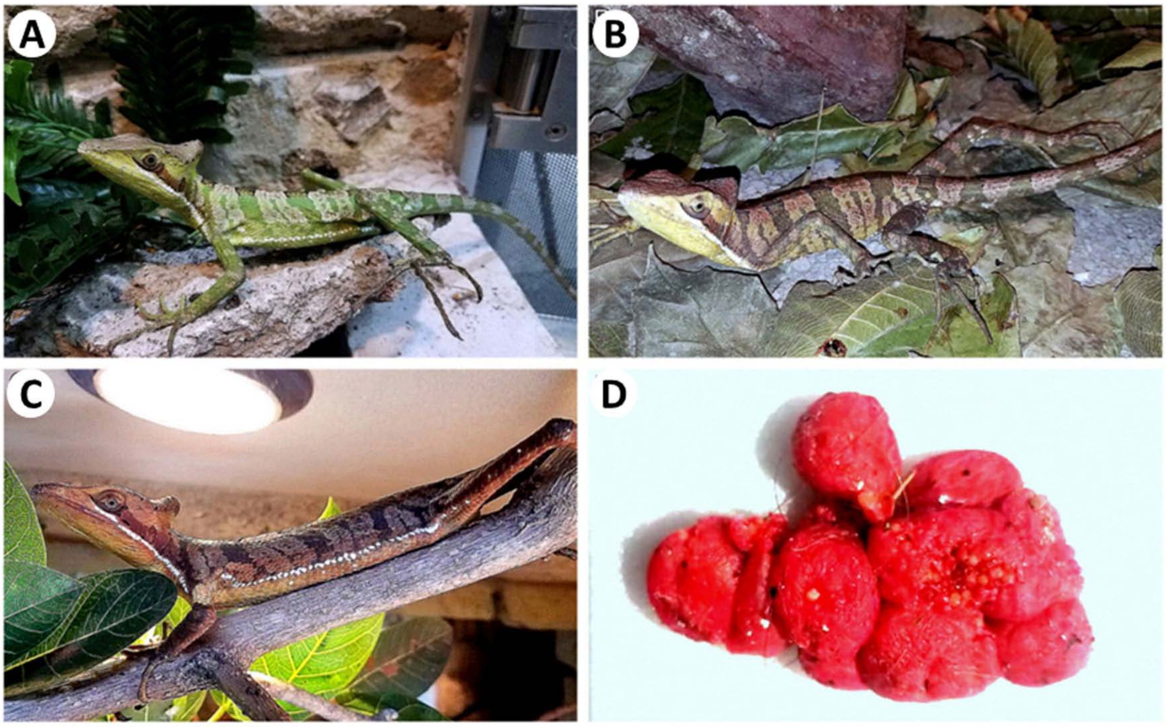

Figure 3. Aspects of *Laemanctus julioi* natural history – **A.** Adult female USACF000003_1 lime green in colour, **B.** USACF000003_2 with an intermediate shade of colouration between lime green and cinnamon-rufous, **C.** USACF000003_5 cinnamon-rufous in colour, **D.** Fruits of *Ficus benjamina* regurgitated by USACF000003_1–5 after its capture

next morning it regurgitated food remains inside its collection bag (Fig. 3D) and changed colour to lime green (105), found at 22:00 h on October 3th 2019.

DISCUSSION

We provide two new departmental records for *Laemanctus julioi*, Intibucá, and Lempira. The latter represents the westernmost distribution point in the Parque Nacional Montaña de Celaque. Also, for the first time, we record the presence of this species on the Atlantic versant, previously it was considered exclusive to the Pacific versant (McCranie, 2018).

We added two new types of forest habitat for the species, Lower Montane Moist Forest (UTADC 9461–9479 and USACF000003_1–5) and Premontane Moist Forest (UTADC 9480). Previously, individuals of this species were only recorded in Premontane Dry Forest (McCranie, 2018, in whole with our data from UTADC 9481). Our record UTADC 9478 made at 1750 m a.s.l. represents the highest altitude known for the species; 750 m above the highest altitude reported by McCranie (2018). Finally, USACF000003_1–5 is the longest measured individual with a snout-vent length of 145 mm making it distinctly longer than the holotype, another female measuring 115 mm. Compared with the holotype reported in McCranie (2018), this specimen also has a higher ratio tail to snout vent length, 4.10 compared to 3.82, and a higher ratio of helmet length to snout vent length, 0.30 compared to 0.29. These new data suggest that a taxonomic review of *Laemanctus* from western Honduras may be warranted, since the observations on external morphology and ecological observations seem to show some differences from those reported by McCranie (2018).

We consider this species may also be found in the Valle de Comayagua, which could be a link between the Valle de Choluteca and the Valle de Otoro (Wilson & McCranie, 1998). It may also be present in protected areas and their surroundings that connect to recorded populations, such as the Parque Nacional Montaña de Comayagua, Reserva Biologica Montecillos, Reserva Biologica Uyuca, Reserva Biologica Yerba Buena, and the Refugio de Vida Silvestre Mixcure, within the region of the Cordillera Sur de la Serranía. In which case, the species would have a distribution pattern similar to that of other lizards in the middle and upper zones such as *Sceloporus squamosus*, *Diploglossus bivittatus* and *Abronia salvadorensis* (McCranie, 2018). Having an overlapping habitat, previously or currently, with *L. longipes* in the north-west of their distribution and/or with *L. waltersi* in the north (see McCranie distribution, 2018), could result in competitive exclusion between species as mentioned by Lee (1980), although to test this assumption, it would be necessary have greater clarity of the distribution limits of each species.

We observed that female *L. julioi* lay their eggs between May and June; this is within the range reported for *L. serratus* (Lee, 1996; Köhler, 1999). There is no information on the timing of copulation. UTADC 9478 demonstrated communal oviposition, as far as we know the first report of such behaviour in the family Corytophanidae, although it is considered common in oviparous reptiles (Burghardt & Rand, 1982; Gillingham, 1987; Gregory, 1984; Gregory et al., 1987; Graves & Duvall, 1995). We suggest that this phenomenon may occur due to - 1) mutual attraction to features of the environment with limited availability, which may occur incidentally, and/or 2) a mutual attraction among individuals (Graves & Duvall, 1995).

The specimen USACF00003_1–5 was maintained in captivity after its capture. Before it's capturing we observed the individual in a *Ficus benjamina* tree. Once inside the cloth bag it regurgitated fruits from the same tree. Consumption of small amounts of plant material has been reported in two other genera of the family Corytophanidae, *Corytophanes* and *Basiliscus* (Andrews, 1979; Cooper Jr. & Vitt, 2002). Typically, *Laemanctus* feeds on a wide variety of invertebrates; *L. longipes* in captivity ate crickets (McCranie, 2018). The stomach contents of *L. serratus* included snails, arthropods, insects (coleopterans and orthopterans), Anolis lizards (Martin, 1958), caterpillars, and the remains of leaves and stems of a monocot plant (Peters, 1948), the latter being the first report of ingestion of plant material. Therefore, we present the first data on *L. julioi* feeding in captivity and in its natural environment and what we consider to be the first record of fruit feeding in the genus *Laemanctus*. The intake of this fruit might be due to 1) direct intake, as it is a small easy to swallow fruit that is rich in sugar that may provide a high energy food source during hot days or in dry and poor trophic locations (Pérez-Mellado & Corti, 1993; Valido & Nogales, 1994; Passos et al., 2013; Brock et al., 2014; Mačát et al., 2015), or 2) accidental ingestion at the time that the lizard was actually feeding on insects attracted to fruit, as mentioned in the case of *Sceloporus occidentalis* (Clark, 1973). In captivity, USACF000003_1–5 fed on crickets and new born white mice (pinkies); however, the second offer of a pinkie after a few months was ignored by the individual, which thereafter fed only on crickets. Occasionally, the lizard was offered fruits of *Ficus benjamina* attached to a branch, but it never accepted any.

USACF000003_1–5 displayed several colour changes before it fell from a tree and was collected. In a lethargic state it showed a cinnamon-rufous coloration (31), whereas the next day, being in the water or after several hours without being manipulated, it presented a lime green coloration (105). Vaillant (1896) suggested that in the case of *L. longipes* such colour changes were due to sun exposure or emotional conditioning (stress), although patterns such as the black spots on the back or the white line behind the eyes remain unchanged. We exposed USACF000003_1–5 to the sun after being inside a terrarium with low lighting and an average temperature of 24 °C. Initially, it had a cinnamon-rufous coloration (31) but after one hour it had become lime green (105), we also observed that this individual presented light tones when slightly submerged in the water. In other observations, before the caretaker opened the terrarium facilities, the individual was lime green (105), despite the low temperatures at night. Once the manager manipulated objects inside the terrarium, the specimen became cinnamon-rufous (31). According to these data presented, we consider that the tonality changes in *L. julioi* (Fig. 3A–C), may be responses to stress stimuli caused by the presence of a possible threat, temperature changes and light or the availability of food and water. Rapid colour changes of this kind involve the movement (dispersion or concentration) of pigments within chromatophores, for example, the dispersion of melanosomes (melanin pigment-containing organelles) through the long dendritic processes ("arms") of the starry melanophores, causing the darkening of the reptile's skin (Olsson et al., 2013).

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REFERENCES

Andrews, R. (1979). The lizard *Corytophanes cristatus*: an extreme ´sit-and-wait´ predator. *Biotropica* 11: 136–139.

Brock, K.M., Donihue, C.M. & Pafilis, P. (2014): New records of frugivory and ovophagy in *Podarcis* (Lacertidea) lizards from East Mediterranean Islands. *North-Western Journal of Zoology* 10: 223–225.

Burghardt, G.M. & Rand, A.S. (1982). *Iguanas of the World: Their Behavior, Ecology, and Conservation*. Notes Publications, Park Ridge, New Jersey, USA. 496 pp.

Clark, W.H. (1973). Autumnal diet of the San Joaquin fence lizard, *Sceloporus occidentalis biseriatus* Hallowell, in west-central Nevada. *Herpetologica* 29: 73–75.

Cooper Jr, W.E. & Vitt, L.J. (2002). Distribution, extent, and evolution of plant consumption by lizards. *Journal of Zoology* 257: 487–517.

Gillingham, J.C. (1987). Social behavior. In *Snakes: Ecology and Evolutionary Biology*, 184–209 pp. Siegel, R.A., Collins, J.T., Novak, S.S. (Eds.). New York: McGraw-Hill.

Graves, B.M. & Duvall, D. (1995). Aggregation of squamate reptiles associated with gestation, oviposition, and parturition. *Herpetological Monographs* 9:102–119.

Gregory, P.T. (1984). Communal denning in snakes. In *Vertebrate Ecology and Systematics-A Tribute to Henry S. Fitch*, 57–75 pp. Siegel, R.A., Hunt, L.E., Knigh, J.L., Malaret, L., Zuschlag, N.L. (Eds.), Museum of Natural History of the University of Kansas, Lawrence.

Gregory, P.T., Macartney, J.M. & Larsen, K.W. (1987). Spatial patterns and movements. In *Snakes: Ecology and Evolutionary Biology*, 366–395 pp. Siegel, R.A., Collins, J.T., & Novak, S.S. (Eds.). McGraw-Hill, New York.

Holdridge, L.R. (1967). *Life Zone Ecology*. Revised Edition. Tropical Science Center, San José, Costa Rica. 149 pp.

Köhler, G. (1999). *Basilisken. Helmleguane und Kronenbasilisken*. Lebensweise, Pflege, Zucht. 2., neu bearbeitete, stark erweiterte Auflage. Herpeton, Verlag Elke Köhler, Offenbach. Germany. 95 pp.

Köhler, G. (2012). *Color Catalogue for Field Biologist*. Herpeton, Elke Köhler, Offenbach. Germany. 49 pp.

Lee, J.C. (1980). An ecogeographical analysis of the herpetofauna of the Yucatán Peninsula. *Miscellaneous Publishing Museum Natural History, University of Kansas* 67: 1–75

Lee, J.C. (1996). *The Amphibians and Reptiles of the Yucatán Peninsula*. Ithaca, New York: Comstock Publishing Associates, Cornell University Press. USA. 500 pp.

Mačát, Z., Veselý, M. & Jablonski, D. (2015). New case of fruit eating observation in *Podarcis siculus* (Rafinesque-Schmaltz, 1810) (Lacertidae) from Croatia. *Biharean Biologist* 9: 158–159.

Martin, P.S. (1958). A biogeography of reptiles and amphibians in the Gomez Farias region, Tamaulipas, Mexico. *Miscellaneous Publications Museum of Zoology, University of Michigan* 101: 1–102.

McCranie, J.R. (2011). *The snakes of Honduras: systematics, distribution, and conservation*. Society for the Study of Amphibians and Reptiles. USA. 714 pp.

McCranie, J.R. (2018). *The lizards, crocodiles and turtles of Honduras. Systematics, Distribution, and Conservation*. Bulletin of the Museum of Comparative Zoology. USA. 666 pp.

Olsson, M., Stuart-Fox, D. & Ballen, C. (2013). Genetics and evolution of color patterns in reptiles. *Seminars in Cell & Developmental Biology* 24: 529–541.

Passos, D.C., Zanchi, D., De Souza, Í.H.B., Gallão, M.I., & Borges-Nojosa, D.M. (2013). Frugivory of *Momordica charantia* (Cucurbitaceae) by *Ameivula ocellifera* (Squamata: Teiidae) in a coastal area of northeastern Brazil. *Salamandra* 49: 234–236.

Pérez-Mellado, V. & Corti, C. (1993). Dietary adaptations and herbivory in lacertid lizards of the genus *Podarcis* from western Mediterranean islands (Reptilia: Sauria). *Bonner Zoologische Beiträge* 44: 193–220.

Peters, J.A. (1948). The northern limit of the range of *Laemanctus serratus*. *Natural History Miscellaneous, Chicago Academy of Sciences* 27: 1–3.

Uetz, P. Freed, P., Hošek, J. (eds.) (2020). The Reptile Database. http://www.reptile-databse.org [Accessed: 03 March 2021].

Vaillant, L. (1896). Note sur les changements de coloration observés par M. Antoine Dugès sur le *Laemanctus longipes*. *Bulletin Museum Historie Natural Paris* 2: 318–319.

Valido, A. & Nogales, M. (1994). Frugivory and seed dispersal by the lizard *Gallotia galloti* (Lacertidae) in a xeric habitat of the Canary Islands. *Oikos* 70: 403–411.

Wilson, L.D. & McCranie, J.R. (1998). The biogeography of the herpetofauna of the subhumid forests of Middle America (Isthmus of Tehuantepec to northwestern Costa Rica). *Royal Ontario Museum Publications in Life Sciences* 163: 1–50.

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