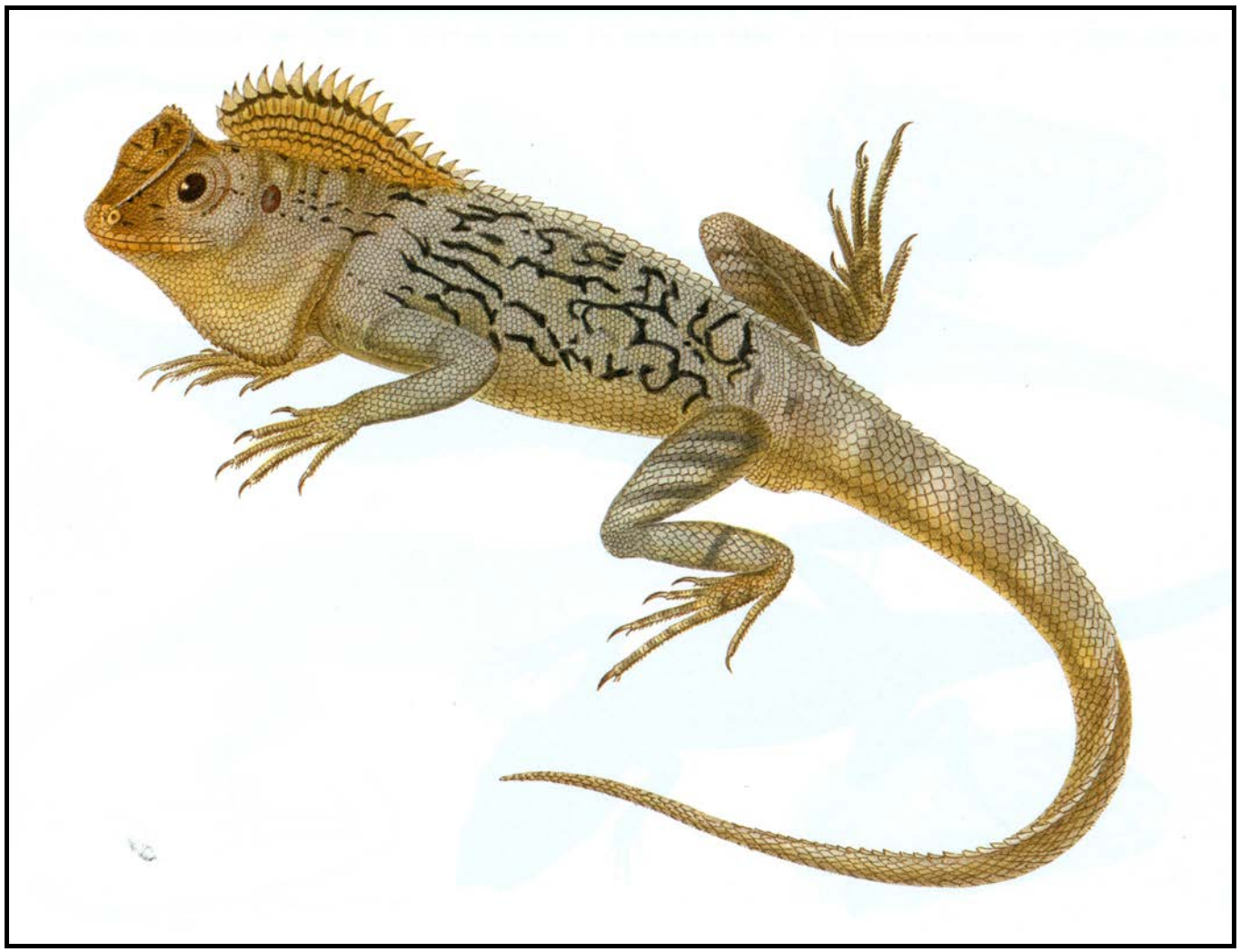
BULLETIN
of the
Chicago Herpetological Society

Volume 58, Number 8
August 2023



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Cover: Chameleon anglehead lizard, *Gonocephalus chamaeleontinus*. Drawing (as *Lophyrus tigrinus*) from Erpétologie Générale on Histoire Naturelle Complète des Reptiles—Atlas by A. M. C. Duméril, G. Bibron and A. Duméril, 1854.

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The *Bulletin of the Chicago Herpetological Society* (ISSN 0009-3564) is published monthly by the Chicago Herpetological Society, 2430 N. Cannon Drive, Chicago IL 60614. Periodicals postage paid at Chicago IL. **Postmaster:** Send address changes to: Chicago Herpetological Society, Membership Secretary, 2430 N. Cannon Drive, Chicago IL 60614.

Bulletin of the Chicago Herpetological Society 58(8):121-123, 2023

Unusual Bedfellows: Observations of Cohabitation Between Two Hylids and Paper Wasps in Central Wisconsin

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Introduction

Symbiotic relationships, specifically cohabitations, between anurans and arthropods are an interesting curiosity. Possibly the most famous examples, which have become quite memetic in pop science and science communication, are of the relationships between tarantulas and New World microhylids (e.g., between *Aphonopelma hentzi* and *Gastrophryne olivacea*, Blair, 1936; Hunt, 1980; Dundee et al., 2012; and between *Xenesthis immanis* and *Chiasmocleis ventrimaculata*, Cocroft and Hambler, 1989; Orlofske et al., 2012). In these apparent mutualisms, the tarantula keeps a "pet" microhylid frog to defend its burrow from invading ants, which prey upon the eggs of the tarantula (Hunt, 1980). In addition to larger, predator-sized arthropods, cohabitations of some frogs include ants in both South America and Africa (Rödel et al., 2013; de Lima Barros et al., 2016). However, few if any mutualistic relationships or cohabitations between anurans and wasps appear to have been described.

Description

Gray Treefrogs (*Dryophytes versicolor*) have a habit of residing in man-made cavities, as they mimic natural arboreal refugia (Johnson, 2005). As it happens, Northern Paper Wasps (*Polistes fuscatus*) also often build their nests in enclosed man-made spaces which mimic natural cavities (Stanback et al., 2009). In August 2022, JLO observed an unusual cohabitation of the two species inside the hollow metal pipe comprising a swing-gate (Figure 1). This gate is located along the Paper Mill Trail section of the Green Circle Trail in Whiting, Wisconsin (Portage County). The wasps had an established nest in the pipe for some time, but on 15 August, a Gray Treefrog was observed residing just above the nest within the pipe, with the wasps continuing about their behavior, evidently unbothered by its presence. The frog was observed in the pipe for four consecutive days. On 19 August, it was not present, but was seen in the pipe again on the 20th and 21st. After another string of absences, the frog was observed in the pipe one last time on the 30th. The wasps still displayed territorial aggression, as one chased JLO off while attempting to photograph the behavior, yet they never acted aggressively toward the frog.

Additionally, during the summers of 2021 and 2022, RCJ witnessed both Spring Peepers and Gray Treefrogs living with Northern Paper Wasps and their hive inside an outdoor resin deck box (Figure 2) at his property (44.48847°N, 89.78281°W, WGS 84) near Rudolph, Wisconsin. The frogs did not return in the summer of 2023 when RCJ hoped to photograph them with the wasps.

Although both *Dryophytes versicolor* (Gray Treefrog) and *D. chrysoscelis* (Cope's Gray Treefrog) are found in central Wisconsin, *D. chrysoscelis* has yet to be detected in Portage County, Wisconsin (Siddons, 2023a) and RCJ has yet to hear a *D. chrysoscelis* on his property (in Wood County, Wisconsin). Therefore, we consider both occurrences of this phenomenon to be in association with *D. versicolor*.

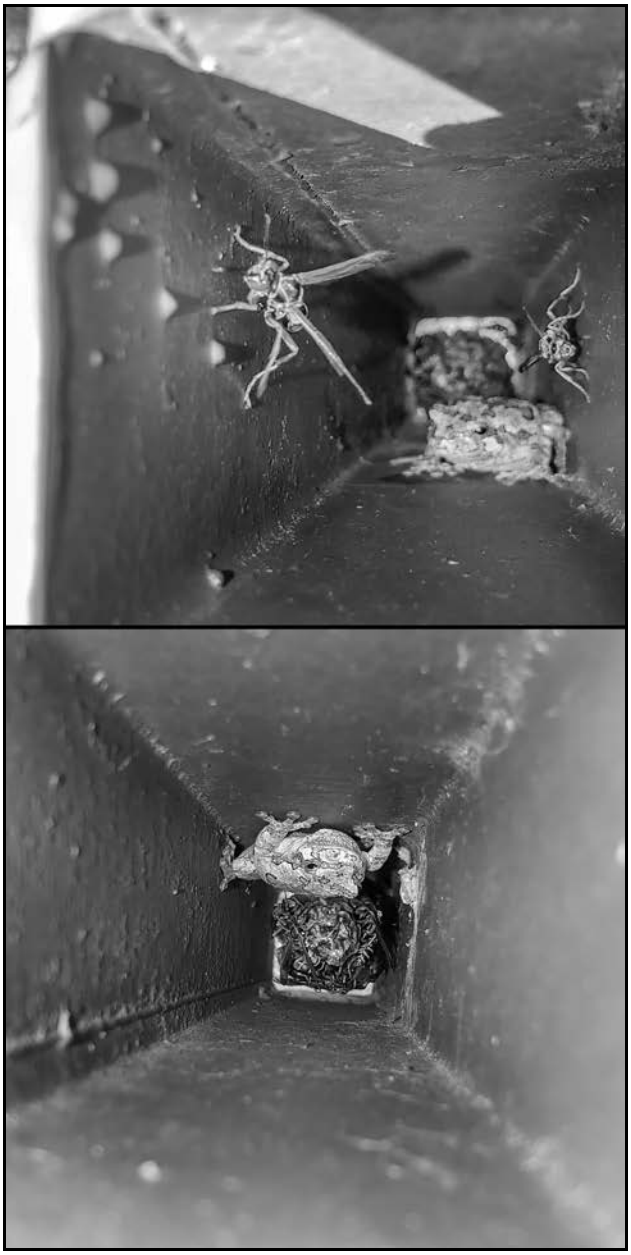

Figure 1. *Dryophytes versicolor* cohabiting with a *Polistes fuscatus* nest inside a metal pipe. Photographs taken by Juniper L. O'Leathlobhair at 10:43 A.M. on 15 August 2022 (top) and 12:44 P.M. on 18 August 2022 (bottom).

Figure 2. *Pseudacris crucifer* inside a Suncast resin outdoor deck box (dimensions = 21"L × 46"D × 24"H). On the opposite side of the box was a nest of paper wasps that would regularly occur near these frogs and Gray Treefrogs as they and the frogs moved throughout the summers of 2021 and 2022. Photograph taken by Robert C. Jadin at 9:25 A.M. on 15 July 2021.

Discussion

Why these wasps were living together with adult anurans is not clear. Numerous types of predators on anurans are available (Duellman and Trueb, 1994). However, wasps do not appear to be documented as a predator to adult anurans (Toledo, 2005; Wells, 2007). Additionally, Gray Treefrogs and Spring Peepers do not appear to actively eat wasps even though they eat a multitude of other arthropod taxa (Sweetman, 1944; Vogt, 1981; Butterfield et al., 2005; Cline, 2005; Badje and Peterson, 2023; Siddons, 2023b), nor did the frogs in this study appear to attempt to prey upon the wasps or their larvae.

Because Gray Treefrogs are likely eaten by a multitude of mammals and birds (Siddons, 2023b), it is possible that these frogs may be benefitting from living in and around wasps that would scare away such predators. But what benefit the frog might offer to the wasp remains unclear. If there is no direct benefit to the wasp, then the question occurs as to whether the frog is tolerated or by which manner the frog remains undetected to avoid the defense response of the hymenopterans in order to safely live within their nest. For example, in the two cases of cohabitation with ants cited above, the South American frog, *Lithodytes lineatus*, and the West-African savanna frog, *Phrynomantis microps*, are known to secrete special chemicals onto their skin that prevent the ants from stinging (Rödel et al., 2013; de Lima Barros et al., 2016), allowing them to dwell within the nests unharmed. We believe future research with this study system might be valuable in investigating ways to reduce aggressive behavior in these easily agitated wasps.

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Bulletin of the Chicago Herpetological Society 58(8):123-124, 2023

Fast or Slow, How Long Can Snakes Grow?

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In a previous issue of the *Bulletin of the Chicago Herpetological Society*, Barker et al. (2012) reviewed numerous estimates for the maximum recorded length of pythons and concluded that many of these estimates are unexplained (i.e., presented without identifying a source or specimen), or are based on measurements of questionable validity. Barker et al. (2012) reported that the largest confirmed total length for a captive reticulated python, *Malayopython reticulatus,* was a Pittsburgh Zoo resident aptly named "Colossus," who grew to an "immense" 6.35 m (20 ft 10 in). Barker et al. (2012) also reported that the largest confirmed total length for a captive Burmese python, *Python bivittatus*, was the amusingly named "Baby," who grew to a "gigantic" 5.74 m (18 ft 10 in). In a more recent issue of the *Bulletin*, Ehrsam and Barker (2022) reported on reticulated python specimens in the Natural History Museum of Denmark (Copenhagen) and in the Museum of Natural History, Basel, with total lengths of 7.10 m (23 ft 4 in) and 6.38 m (20 ft 11 in), respectively.

To understand whether these specimens represent the maximum possible body size in pythons, mathematical modeling may be used. A common, taxon-wide method for modeling variation in body size growth over ontogeny is the von Bertalanffy growth function (VBGF), which is appropriate for larger reptiles (Avery, 1994), including snakes (Shine and Charnov, 1992). In the present study, growth over ontogeny data on 200 captive-bred *P. bivittatus* were taken from Taggart et al. (2021). The VBGF was fitted to these data to obtain best-fit parameters for the asymptotic (ultimate) length and growth coefficient for this species. Code and data are made freely available online (Foxon, 2023).

Across all 200 specimens (1,093 observations), the average asymptotic length was 2.4 m (7 ft 9 in; 95% confidence interval: 2.3–2.4 m [7 ft 6 in–7 ft 12 in]), which is relatively small. However, we are not interested in averages; we are interested in outlier snakes, the Colossus kind. Restricting the analysis to just the largest specimen in the study from Taggart et al. (ID138, female) yields an asymptotic length of 3.7 m (12 ft 3 in; 95% confidence interval: 1.1–6.4 m [3 ft 8 in–20 ft 10 in]). The upper 95% confidence level of 6.4 m (20 ft 10 in) is in excellent agreement with "Baby" (5.74 m [18 ft 10 in]; *P. bivittatus*), "Colossus" (6.35 m [20 ft 10 in]; *M. reticulatus*), and the Basel specimen (6.38 m [20 ft 11 in]; *M. reticulatus*), but not the Copenhagen specimen (7.10 m [23 ft 4 in]; *M. reticulatus*). This may suggest that 6.4 m (20 ft 10 in) is a valid approximation for the largest physical length *P. bivittatus* can attain, but that the upper limit of length for *M. reticulatus* may exceed that of *P. bivittatus*. Future studies should extend these findings using growth-over-ontogeny data for the reticulated python specifically to better understand the upper limits of growth in that species.

Either way, this result does not bode well for claims of extraordinarily large extant snakes. Indeed, stories in South American folklore of the *sucuriju gigante,* and reports from officials of the Brazil-Columbia Boundary Commission of snakes purportedly measuring 30 m (115 ft) in total length (Heuvelmans, 1965), appear practically impossible when growth patterns for known snake forms are applied; if 30 m (115 ft) was the asymptotic length of Colossus, then the VBGF equation with the best-fitting growth constant for pythons suggests that he would have had to grow to 6.35 m (20 ft 10 in) by age 0.2 years. Colossus was in captivity for 14 years and did not exceed 6.35 m (20 ft 10 in) despite reportedly consuming more than 68 pigs, totaling 1,991 lbs of food (Barker et al., 2012).

To this author's knowledge, the longest wild *P. bivittatus*, captured on 10 July 2023, had a total length of 5.80 m (19 ft) (Conservancy of Southwest Florida, 2023). Perhaps this explains why so many published estimates for the maximum possible physical length of snakes are unsupported; they are simply not statistically likely.

Of course, even the largest extant snakes are dwarfed by extinct forms (Rivas, 2023); newborn titanoboas, *Titanoboa*

cerrejonensis, are thought to have measured 2.0 m (6 ft 7 in), and adults of this species are thought to have exceeded 10 m (32 ft 10 in).

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Bulletin of the Chicago Herpetological Society 58(8):124-128, 2023

Notes on Reproduction of Green Frogs, *Lithobates clamitans* (Anura: Ranidae), from Texas

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Abstract

I conducted a histological examination of gonadal samples from 38 *Lithobates clamitans* from Texas. All 22 adult males in my sample (April to June) were undergoing spermiogenesis. The smallest mature male in my sample measured 55 mm SVL and was from April. Fifteen of 16 females from February to August were in spawning condition. The remaining female (from March) was undergoing yolk deposition and would have spawned later in the year. The smallest mature female (spawning condition) measured 61 mm SVL and was from March. Three of 16 *L. clamitans* females (19%) contained atretic follicles. I found no evidence that *L. clamitans* spawns more than once in the same reproductive period in Texas.

*Lithobates clamitans** (Latreille, 1801) occurs in eastern North America from southern Canada, south to eastern Oklahoma and east Texas, eastward to northern Florida, and has been introduced in Hawaii, Washington and British Columbia, Canada (Frost, 2023). In Texas, the subspecies *Lithobates clamitans clamitans*, studied herein, occurs in the northeast corner (Tipton et al., 2012). *Lithobates clamitans* are common frogs found in a variety of aquatic habitats; calling occurs over an extended period in spring and summer (Dodd, 2023). Wells (1976) gave evidence that *L. clamitans* in New York produced multiple egg clutches during the same spawning season. The reproductive period extends from April through summer, depending on latitude (Pauley and Lannoo, 2005). Dates of breeding in different locations are in Pauley and Lannoo (2005), Meshaka et al. (2009), Dodd (2023) and Table 1. Eggs are deposited in shallow water and are attached to vegetation or free-floating (Tipton et al., 2012). Wright and Wright (1949) reported *L. clamitans* reproduction in the north occurred from May to mid-August. Stewart (1983) summarized the biology of *L. clamitans.* In the current paper I present data on the *L. clamitans clamitans* reproductive cycle from Texas utilizing a histological examination of gonadal material. The use of museum collections for obtaining reproduc-

* Frost (2023) has replaced *Lithobates clamitans* with *Aquarana clamitans*.

Table 1. Periods of reproduction for *Lithobates clamitans* from different areas. See Pauley and Lannoo (2005), Meshaka et al. (2009) and Dodd (2023) for additional lists of breeding times.

Locality	Reproductive Activity	Source
Alabama	April to August, September	Mount, 1975
British Columbia	late spring to early summer	Matsuda et al., 2006
Canada	Early summer to August	Fisher et al., 2007
Carolinas and Virginia	April to June	Beane et al., 2010
Connecticut	late May through July	Klemens, 1993
Eastern Canada	late May into July	Logier, 1952
Florida	April 11 to August 15	Carr, 1940
Florida	March to September	Krysko et al., 2019
Georgia	call March to July or August	Jensen et al., 2008
Great Lakes, U.S.A.	call May into August	Harding, 1997
Illinois	late April through July	Phillips et al., 2022
Indiana	May into July	Minton, 2001
Iowa	May through July	LeClere, 2013
Kentucky	May to August	Barbour, 1971
Louisiana	Late March to late August	Boundy and Carr, 2017
Maine	May to August	Hunter et al., 1999.
Maryland	March through August	Cunninghan and Nazdrowicz, 2018
Michigan	call May to August	Holman, 2012
Minnesota	May to mid-August	Moriarty and Hall, 2014
Missouri	mid-April into mid-July	Briggler and Johnson, 2021
New Brunswick	May to mid-August	Gorham, 1970
New England	April to August	DeGraaf and Rudis, 1983
New Jersey	April through August	Schwartz and Golden, 2002
New York	May to August	Wright, 1914
New York	call May to August	Gibbs et al., 2007
No locality	end of May to end of August (north)	Wright and Wright, 1949
North Carolina	April to August	Dorcas et al., 2007
Nova Scotia	June–July	Gilhen, 1984
Ohio	May to July	Walker, 1967
Oklahoma	May through July	Sievert and Sievert, 2021
Ontario	June and July	Johnson, 1989
Pennsylvania	April–May to August	Hulse et al., 2001
Rhode Island	mid-April to late August	Raithel, 2019
South Carolina	all year	Semlitsch et al., 1996
Southeast	March to September	Dorcas and Gibbons, 2008
Tennessee	mid spring to late summer	Niemiller and Reynolds, 2011
Texas	March to September	Tipton et al., 2012
Quebec and Maritimes	call June to August	Desroches and Rodrigue, 2004
Washington	late spring to early summer	Leonard et al., 1993
Wisconsin	calling 4 May to 8 July	Vogt, 1981

tive data avoids removing additional animals from the wild.

A sample of 38 *L. clamitans* from Texas collected 1936 to 2009 (Appendix) consisting of 22 adult males (mean SVL = 65.0 mm ± 5.4 SD, range = 55–75 mm) and 16 adult females (mean SVL = 71.9 mm ± 6.2 SD, range = 61–88 mm) was examined from the biodiversity research and teaching collection (TCWC) of the Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas, USA. An unpaired *t*-test was used to test for differences between adult male and female SVLs (Instat, vers. 3.0b, Graphpad Software, San Diego, CA).

A small incision was made in the lower part of the abdomen of the 38 adults and the left testis was removed from males and a piece of the left ovary from females. Gonads were embedded in paraffin, sections were cut at 5 μm and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Histology slides were deposited at TCWC.

The testicular morphology of *L. clamitans* is similar to that

Table 2. Two monthly stages in the spawning cycle of 16 adult female *L. clamitans* from Texas.

Month	*n*	Yolking condition	Ready to spawn condition
February	1	0	1
March	2	1	1
April	6	0	6
May	2	0	2
June	2	0	2
July	1	0	1
August	2	0	2

of other anurans as described in Ogielska and Bartmañska (2009a). Within the seminiferous tubules, spermatogenesis occurs in cysts which are closed until the late spermatid stage is reached; cysts then open and differentiating sperm reach the lumina of the seminiferous tubules (Ogielska and Bartmañska, 2009a). All 22 *L. clamitans* adult males were undergoing sperm formation (= spermiogenesis) in which clusters of sperm filled the seminiferous tubules. A ring of germinal cysts was located on the inner periphery of each seminiferous tubule. By month, numbers of *L. clamitans* males (N = 22) exhibiting spermiogenesis were: April (N = 14), May (N = 6), June (N = 2). The smallest mature male in my study (spermiogenesis) measured 55 mm SVL and was from April (TCWC 66167). Wright and Wright (1949) reported that adult *L. clamitans* males ranged from 52 to 75 mm in body size in the south and may reach 95 mm body size in the north.

The mean SVL of *L. clamitans* females was significantly larger than that of males ($t = 3.6$, df = 36, $P = 0.0009$). The ovaries of *L. clamitans* are typical of other anurans in consisting of paired organs located on the ventral sides of the kidneys; in adults they are filled with diplotene oocytes in various stages of development (Ogielska and Bartmañska, 2009b). Mature oocytes are filled with yolk droplets; the layer of surrounding follicular cells is thinly stretched. Two stages were present in the spawning cycle (Table 2): (1) "Yolking condition" in which ripening oocytes (accumulating yolk) predominated as reported in Uribe Aranzábal (2011); (2) "Ready to spawn condition" in which mature oocytes predominated. The smallest mature female *L. clamitans* (ready to spawn) measured 61 mm SVL (TCWC 22974) and was from March. Wright and Wright (1949) reported that adult *L. clamitans* females ranged from 58 to 75 mm in body size in the south, and may reach 100 mm in the north.

Atretic follicles were noted in the ovaries of 3/16 (19%) of the *L. clamitans* females (Table 2). Atresia is a widespread process occurring in the ovaries of all vertebrates (Uribe Aranzábal, 2009). It is common in the amphibian ovary (Saidapur, 1978) and is the spontaneous digestion of a diplotene oocyte by its own hypertrophied and phagocytic granulosa cells which invade the follicle and eventually degenerate after accumulating dark pigment (Ogielska and Bartmañska, 2009b). See Saidapur and Nadkarni (1973) and Ogielska et al. (2010) for detailed descriptions of follicular atresia in the frog ovary. Atresia plays an important role in fecundity by influencing numbers of ovulated oocytes (Uribe Aranzábal, 2011). Incidences of follicular atresia increase late in the reproductive period (Saidapur, 1978). Saved energy will be presumably utilized during a subsequent reproduction.

Despite a report that, *L. clamitans* produces multiple egg clutches in the same reproductive season in New York (Wells, 1976), I found no evidence that this occurs in Texas. Multiple spawnings would have been suggested by the presence of mature follicles (upcoming spawning) and the concurrent presence of postovulatory follicles (recent spawning) (*sensu* Redshaw, 1972).

Times of breeding for *L. clamitans* throughout its range are shown in Table 1. My finding of one *L. clamitans* February female (TCWC 68382) in spawning condition is one month earlier than reported for Texas by Tipton et al. (2012). Because I lacked *L. clamitans* female samples from autumn, the duration of female reproduction in Texas is not known.

Acknowledgments

I thank Toby J. Hibbitts (TCWC) for permission to examine *L. clamitans* and for facilitating the loan (2021-03).

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Appendix

Thirty-eight *L. clamitans* from Texas examined by county from the biodiversity research and teaching collection (TCWC) of the Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas, USA.
Brazos: TCWC 5054, 15343; **Camp:** TCWC 66167; **Fort Bend:** TCWC 75130; **Grimes:** TCWC: 29197, 29198; **Hardin:** TCWC 58590; **Harris:** TCWC 2810, 102552; **Houston:** TCWC 5046, 5051, 18718, 18719, 92094, 92095; **Jasper:** TCWC 65238. 78978, 78980, 78981, 104953; **Liberty:** TCWC: 94042, 94043; **Madison:** TCWC 13954; **Montgomery:** TCWC 27089, 27090; **Newton:** TCWC 48272; **Orange:** TCWC 27093; **Polk:** TCWC 4318; **San Jacinto:** TCWC 4321, 22974, 83085, 87548; **Walker:** TCWC 75, 76, 68382, 79805; **Waller:** TCWC 92093; **Williamson:** TCWC 4317.

Bulletin of the Chicago Herpetological Society 58(8):129-130, 2023

Mexican Geographical Distribution Notes 6: New Herpetological Records for Islands in the Gulf of California

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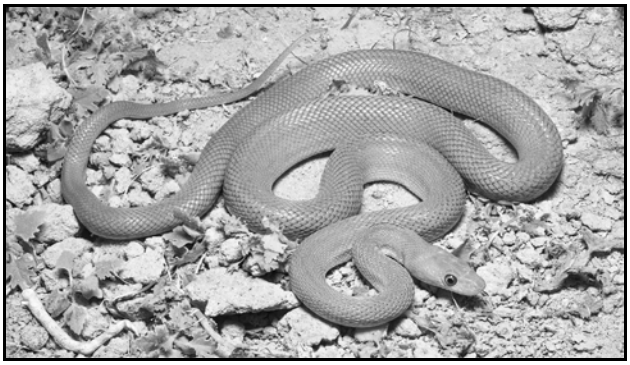
A recent herpetological expedition to multiple islands in the Gulf of California resulted in four new records of snakes from two islands, Isla Espíritu Santo and Isla San José, both in the municipality of La Paz, Baja California Sur. We report the new records below.

Isla Espíritu Santo

Bogertophis rosaliae (Baja California Ratsnake).
Mexico, Baja California Sur, Municipality of La Paz, Isla Espíritu Santo (24.4919°N, 110.3736°W; datum = WGS84; 19 m elev.), 12 October 2022. First record for the species on Isla Espíritu Santo. Previously known from the mainland of Baja California, as well as on Isla Danzante, in the Bay of Loreto, 165 km to the NNW (Grismer, 2002). Found active after dark at 19:45 in a dry river bed. Four individuals were observed, but only one was photographed. Photographed by Ricardo Ramírez-Chaparro, verified by Christoph I. Grünwald. Image deposited at the University of Texas Digital Catalogue (UTADC 9806).



Baja California Ratsnake, *Bogertophis rosaliae* (UTADC 9806), Baja California Sur, Municipality of La Paz, Isla Espíritu Santo.

†***Hypsiglena ochrorhynchus ochrorhynchus*** (Cape Nightsnake).
Mexico, Baja California Sur, Municipality of La Paz, Isla Espíritu Santo (24.4905°N, 110.3730°W; datum = WGS84; 36 m elev.), 12 October 2022. First record for the species on Isla Espíritu Santo. Previously known from the mainland of Baja California, as well as in 20 other islands of Baja California, the closest island record being at Isla Partida Sur, only 5 km to the north of the present record (Grismer, 2002). The snake was found active after dark at 21:48 in a rocky hillside. Five individuals were observed, but only one was photographed. Photographed by Ricardo Ramírez-Chaparro, verified by Christoph I. Grünwald. Image deposited at the University of Texas Digital Catalogue (UTADC 9807a-b).

Cape Nightsnake, *Hypsiglena ochrorhynchus ochrorhynchus* (UTADC 9807a-b). Mexico, Baja California Sur, Municipality of La Paz, Isla Espíritu Santo.

†***Hypsiglena slevini*** (Baja California Nightsnake).
Mexico, Baja California Sur, Municipality of La Paz, Isla Espíritu Santo (24.4905°N, 110.3730°W; datum = WGS84; 36 m elev.), 12 October 2022. First record for the species on Isla Espíritu Santo. Previously known from the mainland of Baja California, as well as from Isla Cerralvo, Isla Danzante and Isla

Baja California nightsnake, *Hypsiglena slevini* (UTADC 9883). Mexico, Baja California Sur, Municipality of La Paz, Isla Espíritu Santo.

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Margarita, the closest island record being at Isla Cerralvo, 50 km to the SE (Grismer, 2002). Found active after dark at 21:48 in a rocky hillside. Photographed by Ricardo Ramírez-Chaparro, verified by Christoph I. Grünwald. Image deposited at the University of Texas Digital Catalogue (UTADC 9883).

†***Trimorphodon lyrophanes*** (Baja California Lyresnake). Mexico, Baja California Sur, Municipality of La Paz, Isla Espíritu Santo (24.4905°N, 110.3730°W; datum = WGS84; 36 m elev.), 12 October 2022. First record for the species on Isla Espíritu Santo. Previously known from the mainland of Baja California, as well as from Isla Cerralvo, Isla Danzante and Isla Margarita, the closest island record being Isla Cerralvo, 50 km to the SE (Grismer, 2002). Found active after dark at 21:48 on a rocky hillside. Photographed by Ricardo Ramírez-Chaparro, verified by Christoph I. Grünwald. Image deposited at the University of Texas Digital Catalogue (UTADC 9884).

Baja California Lyresnake, *Trimorphodon lyrophanes* (UTADC 9884). Mexico, Baja California Sur, Municipality of La Paz, Isla Espíritu Santo.

Isla San José

Hypsiglena slevini (Baja California Nightsnake). Mexico, Baja California Sur, Municipality of La Paz, Isla San José (25.0108°N, 110.5772°W; datum = WGS84; 23 m elev.), 17 October 2022. First record for the species at Isla San José. Previously known from the mainland of Baja California, as well as from Isla Cerralvo, Isla Danzante and Isla Margarita, the closest island record being at Isla Cerralvo, 100 km to the SE (Grismer, 2002). Found active after dark at 23:03 in a dry river bed. Photographed by Ricardo Ramírez-Chaparro, verified by Christoph I. Grünwald. Image deposited at the University of Texas Digital Catalogue (UTADC 9808a-b).

Baja California Nightsnake, *Hypsiglena slevini* (UTADC 9808a-b). Mexico, Baja California Sur, Municipality of La Paz, Isla San José.

Lichanura trivirgata trivirgata (Mexican Rosy Boa). Mexico, Baja California Sur, Municipality of La Paz, Isla San José (25.0033°N, 110.5811°W; datum = WGS84; 49 m elev.), 18 October 2022. First record for the species at Isla San José. Previously known from the mainland of Baja California, as well as from several islands in the Gulf of California, the closest island record being at Isla Espíritu Santo, 60 km to the SE (Frick et al., 2016). The snake was found active after dark at 20:00 in a dry river bed. Photographed by Ricardo Ramírez-Chaparro, verified by Christoph I. Grünwald. Image deposited at the University of Texas Digital Catalogue (UTADC 9809).

Mexican Rosy Boa, *Lichanura trivirgata trivirgata* (UTADC 9809). Mexico, Baja California Sur, Municipality of La Paz, Isla San José.

Acknowledgments

We thank Luz Hurtado, Irma Gonzalez and Raol Preciado with CONANP and the Parque Nacional Archipiélago de Espíritu Santo for access to field sites. All work was funded by the National Geographic Society (NGS-61140R-19) to M.J.M., M.B., H.F-C., C.L.P., and J.L.S., the American Museum of Natural History (Theodore Roosevelt Memorial Grant) to M.J.M., and the University of South Florida to M.J.M. All work was conducted under permit SEMARNAT Oficio No SGPA/DGVS/04999/22 and USF IACUC IS00008275.

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† The time and geographic coordinates for these three species are the time and the spot at which the different team members got back to the boat after searching for rattlesnakes on a dry river bed on Isla Espiritu Santo. We did not take coordinates of those snakes, as they were not the goal of the excursion, but all were found within a 1.5-km radius from that spot.

Notes on the Herpetofauna of Western Mexico 30: Predation by the White-nosed Coati (*Nasua narica*) on the Western Spiny-tailed Iguana (*Ctenosaura pectinata*) in a Western Dry Forest in La Huerta, Chamela, Jalisco, Mexico

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Abstract

While sampling herpetofauna in the Chamela-Cuixmala Biosphere Reserve, we observed predation on an adult Western Spiny-tailed iguana (*Ctenosaura pectinata*) by a White-nosed Coati (*Nasua narica*).

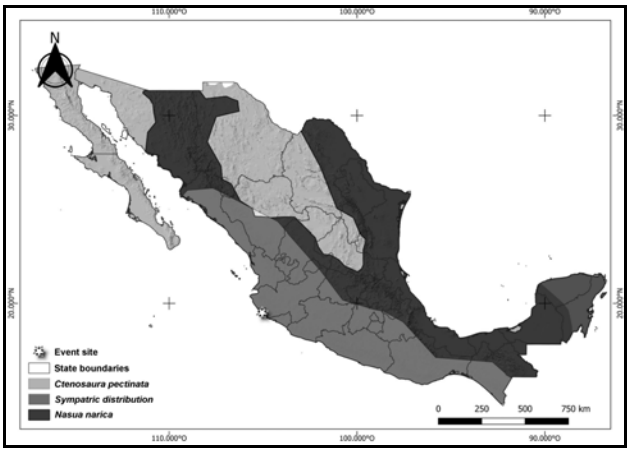
Resumen

En un muestreo de herpetofauna realizado en la reserva de la Biosfera Chamela-Cuixmala, observamos la depredación de un individuo adulto de iguana negra (*Ctenosaura pectinata*) por parte de un Coatí (*Nasua narica*).

On 23 April 2023, we were conducting sampling at the scientific station of the Universidad Nacional Autónoma de México (UNAM) in the locality of Chamela, when we found an adult male coati (*Nasua narica*) in a tree devouring an adult individual of the western spiny-tailed iguana (*Ctenosaura pectinata*). We did not observe when the lizard was captured and killed, and we don't know precisely how long the coati had been eating the lizard when we began the observation. Our observation began in the morning at 08:30 hours and ended at 09:10, when it finished eating the whole body, leaving only the skin and the tail. This event occurred in a fallen tree. about 2 meters up from the ground. The *C. pectinata* was an adult, about 1 m in length; the sex was not determined. The coati did not stop eating the iguana because of our presence; we were approximately 10 meters from the individual.

Background on the predator, *Nasua narica*

The white-nosed coati (*Nasua narica* Linnaeus, 1766) is a medium-sized mammal belonging to the family Procyonidae. It is one of six procyonids that inhabit Mexico (Aranda Sánchez, 2012; Espinoza-García, 2014). Its distribution extends from the southern United States through Colombia, Ecuador, and Peru, west of the Andes (Aranda Sánchez, 2012; Salcedo-Rivera et al., 2022). The habitats registered are temperate and humid forests from sea level to 3500 m, and these animals are normally seen in groups of females and offspring; adult males are often solitary. They are considered important seed dispersers and their reported predators are primarily large felids, such as cougars and jaguars (Gompper, 1995).



Distributions of *Ctenosaura pectinata* and *Nasua narica* in Mexico, and the site of the predation event.

Coatis are omnivores; their diet is principally fruits and invertebrates such as beetles, ants, crickets, and spiders. Vertebrates are also consumed, including mammals such as the North American least shrew (*Cryptotis parvus*), the Eastern Cottontail Rabbit (*Sylvilagus floridanus*), deer mice (*Peromyscus* spp.), and reptiles such as the spiny torquate lizard (*Sceloporus torquatus*). Some studies reported that 14.88% of its diet has been identified as vertebrates (mammals, reptiles and birds); only 6.51% of all its diet is represented by reptiles; vertebrates in general are consumed more frequently during the dry season (Ceballos and Galindo, 1984; Ceballos and Navarro, 1991; Valenzuela, 1998; Ceballos and Oliva, 2005; Altamirano et al., 2013). In many areas where they coexist near human settlements they become socialized, invading human garbage dumps (Marotta, 2017**)**.

Several carnivorous and omnivorous mammals belonging to the order Carnivora (procyonids, canids, felids, mustelids), some Chiroptera (e.g., *Vampyrum spectrum*), and some marsupials in the family Dasyuridae (Lintulaakso et al., 2023; Reuter et al., 2023) consume lizards.

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A white-nosed coati (*Nasua narica*) feeding on a western spiny- tailed iguana (*Ctenosaura pectinata*). Photographs by Elisheba Torres-Valencia.

Background on the prey, *Ctenosaura pectinata*

Ctenosaura pectinata is a long, robust iguana (up to 1200 mm total length); the body is compressed laterally, with a row of dorsal scales forming an elongated crest. The head is very long, flattened above, covered with small hexagonal scales. Dorsal scales are smooth, smaller than the ventral; femoral pores are present. The long tail has rings of enlarged scales each separated by two or more rows of small scales (Álvarez del Toro, 1982). Body color as adults is black with scattered white or yellowish spots (Ramírez-Bautista, 1994); the head is always black (Álvarez de Toro, 1982; Anonymous, 2023). Some iguanid lizards (*sensu* Frost and Etheridge, 1989) are insectivorous or eat only small amounts of plant material as hatchlings, but later become primarily herbivorous (Van Devender, 1982; Durtsche, 1999).

Most lizards cannot eat leaves because the high cellulose content makes them indigestible (Iverson, 1982). The few folivorous lineages, of which iguanids are the largest group, have specialized intestinal septa that the slow passage of food, allowing an intestinal flora to digest the cellulose (Iverson, 1982; Troyer, 1984; 1987). *Ctenosaura pectinata* (Wiegmann, 1834) of all ages consume flowers, but their consumption of insects and leaves varies ontogenetically (Durtsche, 1999). For hatchlings, insects make up most of the diet and leaves are only a small dietary component. Older juveniles eat some insects, but leaves are a much more important part of the diet. In adults, leaves are an important dietary component, and insects are eaten rarely if at all. There have been no behavioral studies of the ontogeny of diet. This is the case for the genus *Ctenosaura* and in particular *Ctenosaura pectinata* (Cooper and Lemos-Espinal, 2001).

Predation on *Ctenosaura pectinata* has been documented for various species, such as the lynx (*Lynx rufus*) (Charre-Medellin et al., 2020), and feral cats (Loc-Barragan and Madueño-Molina, 2017). Cannibalism has also been detected (Sanchez-Hernandez et al., 2017).

Ctenosaura pectinata is a Mexican endemic, distributed from southern Sinaloa to Chiapas, and penetrating the Balsas Basin to Morelos and the state of Mexico (González, 2001; Gómez-Mora et al., 2012). The IUCN Red List conservation status for *Ctenosaura pectinata* is Least Concern (IUCN, 2023) and its EVS (*sensu* Wilson et al., 2013) is 15, placing it in the higher vulnerability category. SEMARNAT (2010) lists this species as (Pr) = protección especial (special protection). Its greatest threats are the use as a food item for humans, habitat destruction, and illegal collecting. An unusual practice here in Mexico is that they are sold alive in markets, at which time the buyer asks the seller to decapitate the specimen and pour the blood into orange juice. According to Mexican folklore this concoction cures many diseases and gives one energy.

Background on the study site

Chamela is one of the most studied dry forests in Mexico and in the world. This area was one of the first Biosphere Reserves declared as such in the Mexican Pacific, and is located in the municipality of La Huerta. Its area is 131,142 hectares.

Characteristic vegetation includes 4 species of mangrove: red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*), black mangrove (*Avicennia germinans*) and button mangrove (*Conocarpus erectus*) (all threatened), induced grassland, low deciduous forest, tulares, halophytic vegetation, and coastal dunes.

The reserve is home to 72 species of mammals, 270 birds, 20 amphibians, and 46 reptiles. The beaches of Cuixmala and Teopa, located within the area of influence of the reserve, were declared sanctuaries for the protection of sea turtles in 1986 (Gobierno de México, 2023).

Several herpetological studies in different disciplines have been carried out in Chamela, including a field guide Ramirez-Bautista (1994), an ecological study (García and Cabrera-Reyes, 2008), and works on ecophysiology (García et al., 2008; Navarro-García et al., 2008).

Discussion

The western spiny-tailed iguana is quite common in areas of human settlement. Mena Maldonado (2021) documented an interesting study done at Parque Estatal Cerro de la Tortuga, Tetelpa, Morelos, providing an update on the information for the species, its value to the habitat, and its ethnoherpetology among the local population.

Acknowledgments

We thank all personnel working at the scientific station who supported our work.

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Calling Frog Survey in Lincoln Park, Chicago

Amelia Pollock [1], Maeve Callaghan [2] and Heather Bond [3]

The Calling Frog Survey (https://frogsurvey.org/) utilizes the help of educated volunteers each spring to collect and submit data on amphibian populations in northern Illinois. In 2014, the Chicago Academy of Sciences and its Peggy Notebaert Nature Museum became home to the program. The Lincoln Park Conservancy was excited to contribute a small team of volunteers and will continue to observe frog population developments at North Pond as restoration work there continues.

Thursday, April 13, 2023
Clear, light winds, warm
Listening began one half hour after sunset at 8 P.M.

What a fun time traipsing around after dark. No frogs detected. Our bullfrogs and green frogs at the Lily Pool will begin to call later in the season, and we will be excited to track the possible appearance of frogs over time at North Pond as restoration work continues. There may not have been frog activity, but there was plenty of life in the Park. At the Lily Pool, we saw a pair of (hopefully) nesting Cooper's hawks, along with evening wood ducks, mallards, and a Canada goose on her nest. We also saw a rabbit. Over North Pond, the sky was full of stars and planets, including Mars and Venus, and lots of bats and black-crowned night herons on the move. There was a smattering of ducks and herons along the shoreline of the Pond, and we also spotted our busy beaver, who is quite large, out for a nighttime cruise.

Thursday, May 11, 2023
Overcast, light winds, cool
Listening began one half hour after sunset at 8:30 P.M.

This evening's atmosphere was magical. We could feel the weather wanting to turn into summer and the wildlife was out on patrol. There were plenty of black-crowned night herons and one great blue heron flying over the Lily Pool. We also saw a large mystery creature dunk under the water, with a big splash and a flash of white, and never resurface. We heard one lone banjo twang of a green frog, even though we know there are both green and bullfrogs present in the Pool. At North Pond, we saw a pair of Canada geese with their goslings going for an evening swim, as well as mallards—who still pursued us for snacks in the dark—along with plenty of bats, rats, and the brand-new baby beaver, also out for an evening dip. Mom must have been close by. At the north end of North Pond, we may have seen two green frogs hopping away from us in the marshy area near North Pond Restaurant, but by the time we had lights on them they were out of sight. No luck with any other frog calls.

Wednesday, June 28, 2023
Hazy, no wind, mild
Listening began one half hour after sunset at 9 P.M.

Our third and final survey was a resounding success—another long, lonely call from a single green frog! So maybe not so much, but little to no data is still data and very important data at that. Our bullfrogs and green frogs are easily spotted during daylight hours, although this year we've had fewer daytime reports of calls and sightings, but we know they're out there. This spring and early summer have brought us some very strange weather, from wildly fluctuating temperatures and drought conditions to the eerie haze from the Canadian wildfires that's now settled over much of the Midwest. Our green frog call was heard at our Lily Pool listening point, same as last time, with no amphibious luck at North Pond, same as last time. Two magical elements to offset the hazy weirdness were: lots and lots of lightning bugs, and the prairie grass on the Lily Pool employee utility path that was taller than us. We also saw some, but not many, bats and black-crowned night herons, Canada geese and their rapidly growing goslings, and a great blue heron. Better luck next year, frog friends . . . you haven't seen the last of us!

Photographs show two approximate listening points: Left) the south end of the Lily Pool, where it seems we had a very good time; Right) the north end of North Pond, where the baby beaver can be seen swimming (as a little blur). We had a single listening point at the Lily Pool but three points at North Pond, the most promising of which was by the North Pond Overlook next to North Pond Restaurant. The other two North Pond points were near the center east side of the Pond and at the south end.

1. Manager of Docent Programs, Lincoln Park Conservancy.
2. Manager of Park Stewardship, Lincoln Park Conservancy.
3. Docent, Lincoln Park Conservancy

Herpetological Art in the Indiana State Museum—February 3, 2023

Photos and story by
Roger Carter
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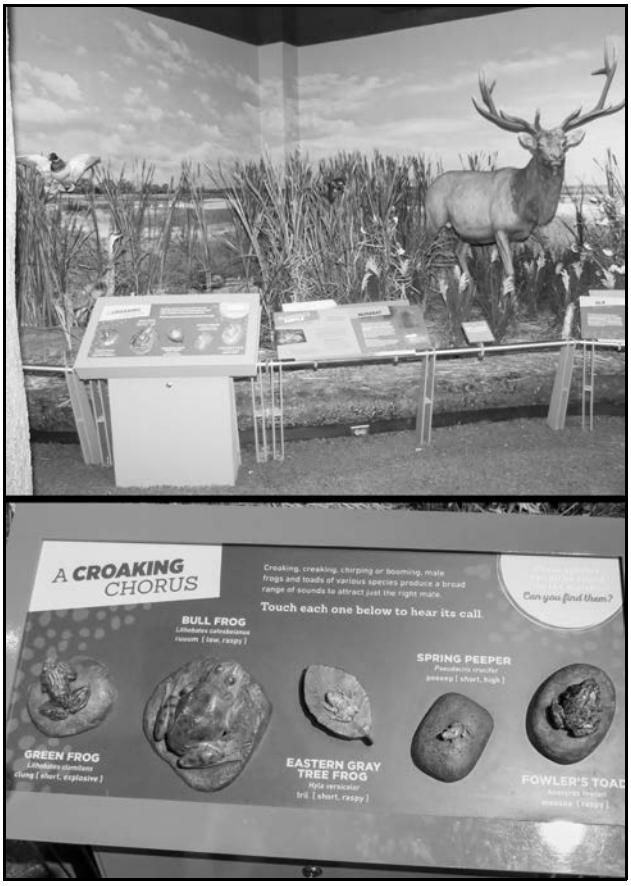
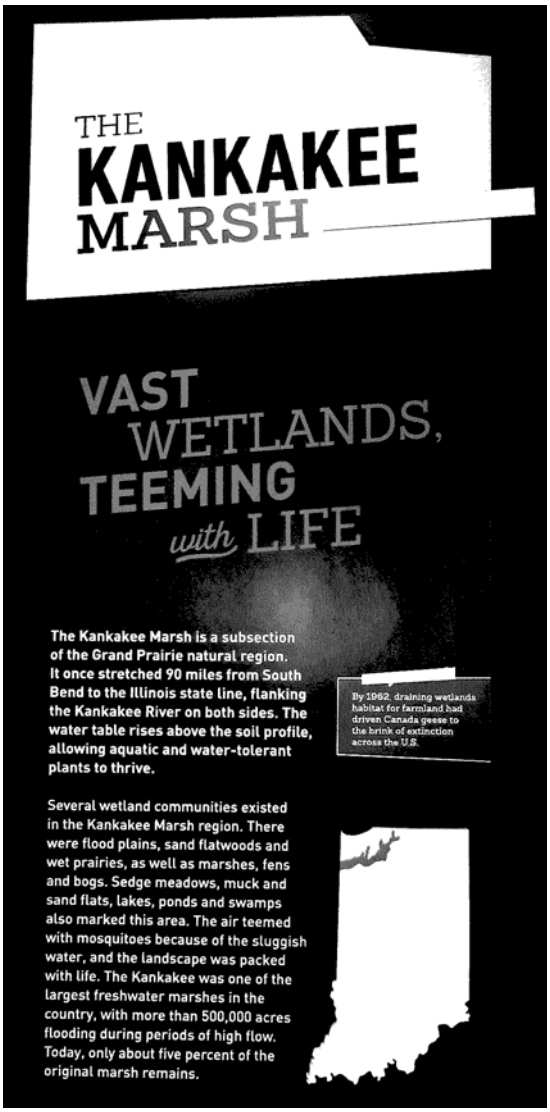
My wife Holly and I recently visited the Indiana State Museum in Indianapolis, Indiana, just to look around. It had been a very long time since we had been there. Some exhibits deal with Indiana from prehistoric times, with a large collection of fossils (mammoths, mastodons [in 2022 Indiana established the mastodon as the Indiana state fossil] and other old mammals, plus corals, fish, brachiopods and trilobites that are a few hundred million years old, and the remains of a 5-million-year-old tortoise, *Hesperotestudo* sp., which was found near Grissom Air Reserve Base near the town of Pipe Creek, Indiana). The museum also covers historic times, including human activities like war, fashion, farming, celebrities, industry and technology and today's natural world of plants and animals.

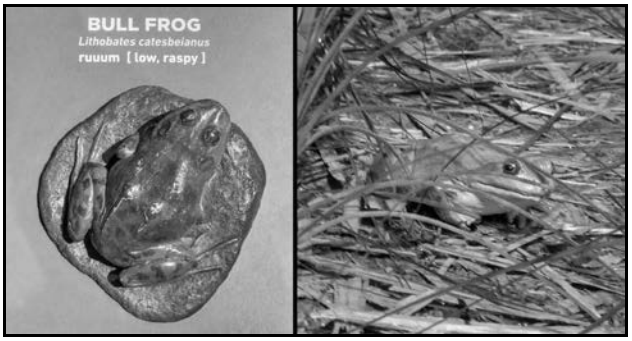
One diorama shows a prehistoric rhinoceros with plants and boulders, and at the base of one of the boulders is a snake. When I examined the close-up photograph of the snake on my computer, from the shape of the head and what little pattern I could see, I think this is supposed to be a ratsnake, *Pantherophis* sp.

Another diorama shows part of the Kankakee marsh, in northwest Indiana, with lots of plants and part of a pond with a deer, several birds, butterflies and other insects plus a green frog, *Lithobates clamitans*, bullfrog, *Lithobates catesbeianus*, gray treefrog, *Hyla versicolor*, spring peeper, *Pseudacris crucifer*, Fowler's toad, *Anaxyrus fowleri* and Blanding's turtle, *Emydoidea blandingii*. There is a sign with replicas identifying the amphibians and a note "Croaking, creaking, chirping or booming, male frogs and toads of various species produce a broad range of sounds to attract just the right mate. Touch each one below to hear its call." Touching the image of the frogs and the toad plays a recording of the calls that these amphibians make. Another note on the sign reads, "These species can all be found in the marsh. Can you find them?" All of the frogs are close to the pond while the toad is found several feet away from the pond. The Blanding's turtle is perched on a log at the water's edge.

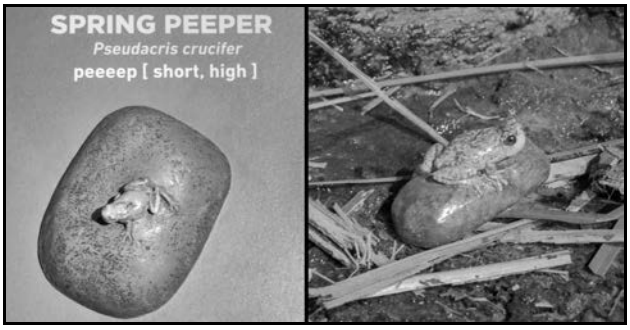



THE
KANKAKEE
MARSH
VAST WETLANDS, TEEMING with LIFE
The Kankakee Marsh is a subsection of the Grand Prairie natural region. It once stretched 90 miles from South Bend to the Illinois state line, flanking the Kankakee River on both sides. The water table rises above the soil profile, allowing aquatic and water-tolerant plants to thrive.
By 1962, draining wetlands habitat for farmland had driven Canada geese to the brink of extinction across the U.S.
Several wetland communities existed in the Kankakee Marsh region. There were flood plains, sand flatwoods and wet prairies, as well as marshes, fens and bogs. Sedge meadows, muck and sand flats, lakes, ponds and swamps also marked this area. The air teemed with mosquitoes because of the sluggish water, and the landscape was packed with life. The Kankakee was one of the largest freshwater marshes in the country, with more than 500,000 acres flooding during periods of high flow. Today, only about five percent of the original marsh remains.


GREEN FROG
Lithobates clamitans
clung [short, explosive]


BULL FROG
Lithobates catesbeianus
ruuum [low, raspy]

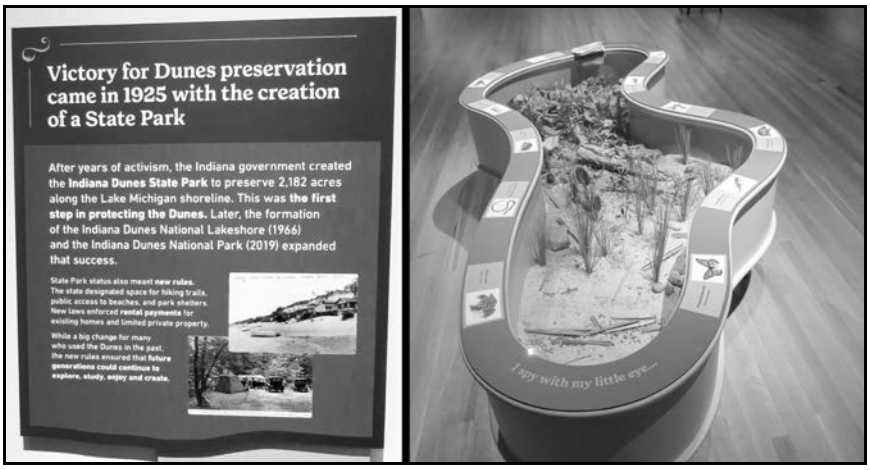

EASTERN GRAY TREE FROG
Hyla versicolor
tril [short, raspy]


SPRING PEEPER
Pseudacris crucifer
peeeep [short, high]


FOWLER'S TOAD
Anaxyrus fowleri


Found primarily in the northern third of Indiana, Blanding's turtles prefer shallow, quiet waters such as marshes, ponds and swamps. They can sometimes be seen sunning themselves on logs, but they are mostly aquatic and even eat underwater. Their diet includes crayfish, insects, snails, fish and plant material.
BUILT-IN PROTECTION
Adult Blanding's turtles don't have many predators, because they can withdraw into their shells. However, their young are vulnerable to raccoons, snakes, foxes and skunks, since they are born with soft shells that harden with age.

An interesting diorama of part of the Indiana Dunes State Park at the southern edge of Lake Michigan shows a sandy area with the plants and animals that are found there. Non-herps include a few small mammals and insects. There are bird tracks in the sand, but no birds are shown. There is a Fowler's toad, *Anaxyrus fowleri*, five-lined skink, *Plestiodon fasciatus*, slender glass lizard, *Ophisaurus attenuatus*, Blanding's turtle, *Emydoidea blandingii* and a hatchling snapping turtle, *Chelydra serpentina*, with the tops of two eggs shown. In my opinion the replica of the glass lizard isn't very good.

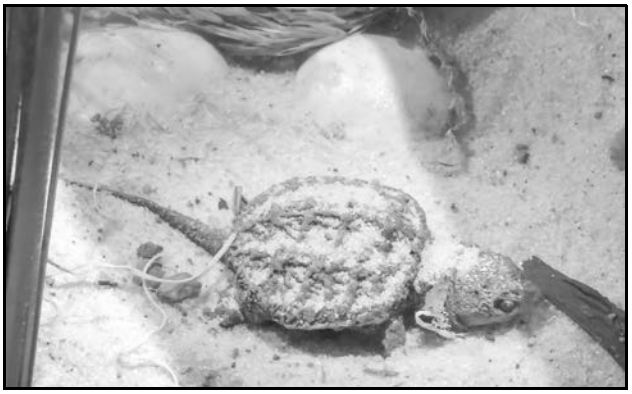



Fowler's toad.


Five-lined skink.


Slender glass lizard.


Blanding's turtle.


Snapping turtle.

At another location near some other dioramas there is a replica of a hollow tree stump approximately four feet tall with a snake at the bottom of the stump. There aren't any signs identifying what the snake is supposed to be but I think it's meant to be a southern black racer, *Coluber constrictor priapus*.

Near the tree stump is a sign with a replica of a wood frog, *Lithobates sylvaticus*, in a plexiglass box with the following descriptions, "These medium-sized frogs are most often located in moist woodlands, where they actively search for prey such as insects, slugs and worms. They can also be found under leaf litter, where they hide from raccoons, raptors, snakes and other predators. CHILLIN' OUT. Wood frogs hibernate through winter, burying themselves in leaves and sometimes actually freezing! These frogs have special proteins in their blood that act as anti-freeze, allowing them to freeze solid without dying and then, with the warm weather, thaw out and begin looking for mates."

Near these last two displays is a display of a timber rattlesnake, *Crotalus horridus*, in an underground cavity. There aren't any signs identifying this snake or what this display is supposed to represent but my guess is that maybe it's meant to show this snake in its hibernaculum during the winter.

These herpetological replicas are the correct size for the living animals of today. The colors of some of them are a little off but maybe these are old enough that the colors have faded. I don't know what material these replicas are made from. The reptiles and amphibians that are shown here in the Indiana State Museum represent only a small fraction of the animals that are actually found here in the many environments of Indiana.

The International Herpetological Symposium

Amelia Pollock
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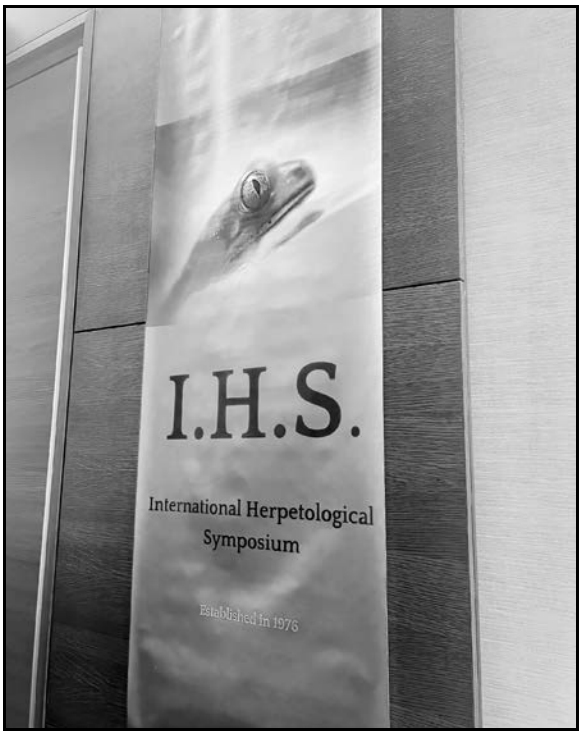
The 45th International Herpetological Symposium (IHS) took place this year, July 25–28, in the Chicago suburb of Schaumburg, Illinois, at the Renaissance Schaumburg Convention Center Hotel. The symposium welcomed more than 30 speakers over the course of three days and included an icebreaker, a behind-the-scenes tour at Brookfield Zoo, a banquet, and both silent and live auctions of herpetological artwork, books and other paraphernalia. The banquet speaker this year was John Murphy, a past president of the Chicago Herpetological Society and editor of this *Bulletin* from 1977 through 1995.



Speakers included former CHS vice-president Rachel Bladow, who works at the American Zoo Association (AZA) Population Management Center at Lincoln Park Zoo. Rachel's lecture covered "Population Management in AZA Zoos and Aquariums." Multiple vendors were present, including representatives from the CHS. We garnered plenty of interest in the way of potential speakers at our future meetings, as well as possible contributors to the *Bulletin*.

The IHS also presented new and experienced herpetologists with multiple awards and grants, including the Junior Herpetologist awards. The event also marked Jennifer Stabile's last year as IHS president, for which she expressed her deep gratitude and joy at having had the experience.

The symposium preceded the weekend's North American Reptile Breeders Conference (NARBC), providing guests additional opportunities to interact with fellow herp enthusiasts and live animals just one floor away.

Each year the IHS is held in a different location and hosted by a zoological, herpetological, or herpetocultural institution. The first Symposium of Captive Propagation and Husbandry of Reptiles and Amphibians was held in June 1976 at my alma mater, Hood College, in Frederick, Maryland. This first symposium evolved into what is today the IHS, which aims to provide an annual conference focused on community building, information, and research in all things herpetological.

The IHS is run by an electoral body that consists of the members of the board of directors, advisory council, publication editors, and chairs of various committees, all selected from various areas of the herpetology and herpetocultural worlds. Zoologists, herpetologists, and private herpetoculturists are involved in the planning and organizing of each symposium and all herp enthusiasts are welcome to attend.

NEW CHS MEMBERS THIS MONTH

Floe Foxon
Van Wallach

UPCOMING MEETINGS

Monthly meetings of the Chicago Herpetological Society begin at 2:00 P.M. on the third Sunday of each month. Please try to join us online or *in person* at the Notebaert Nature Museum, 2430 N. Cannon Drive, Chicago. The next meeting will take place on August 20. The program has not yet been confirmed.

Holly Carter, a private breeder from Zionsville, Indiana, will be present in person to speak at the September 17 meeting. Her topic will be "An Overview of Indigos and Cribos." Holly is a past president of the Chicago Herpetological Society. She currently serves as secretary for the Hoosier Herpetological Society.

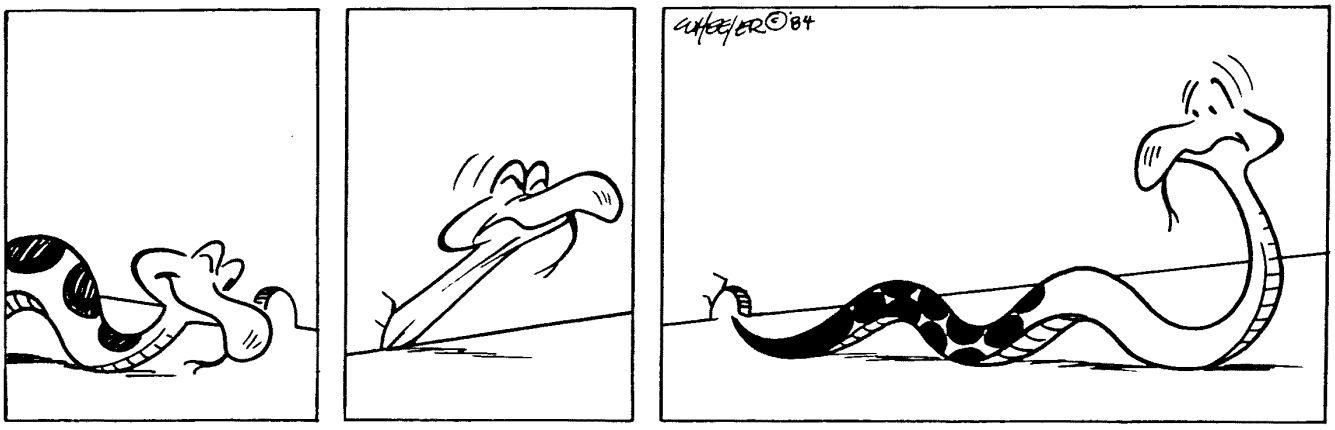
Rachel Bladow, last year's CHS vice-president, will be present in person to speak at the October 15 meeting. Rachel is a biologist at the American Zoo Association (AZA) Population Management Center at Lincoln Park Zoo. She will speak about "Population Management in AZA Zoos and Aquariums."

Please check the CHS website or Facebook page each month for information on the program. Information about attending a Zoom webinar can be found here:
<https://support.zoom.us/hc/en-us/articles/115004954946-Joining-and-participating-in-a-webinar-attendee->

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? The next board meeting will be held online. If you wish to take part, please email: rcrowley@chicagoherp.org.

THE ADVENTURES OF SPOT



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