REPTILES & AMPHIBIANS

HUSBANDRY

# Reproductive Notes on McGregor's Pitviper, *Trimeresurus mcgregori* Taylor 1919

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The genus *Trimeresurus* comprises more than 45 species of pitviper distributed throughout Southern and Southeast Asia (Uetz et al. 2022). Due to a general paucity of field studies for most species, limited information is available on the reproductive biology of the genus (Tsai and Tu 2000, 2001; Devan-Song et al. 2017). In zoological parks and related institutions where various species of *Trimeresurus* have been managed under human care over the last several decades, successful captive reproduction has occurred in at least eight species (Zoological Information Management System [ZIMS] 2022). Yet, despite these and other captive breeding successes that have taken place within private herpetoculturists' collections, there has been a lack of breeding reports published for most of these species, with detailed information limited to just a handful of species (e.g., Klusmeyer and Fausten 1994; Ryabov et al. 2002; Visser 2015).

McGregor's pitviper, *T. mcgregori* (Fig. 1) is a poorly-studied polymorphic inhabitant of the Philippines that remains rare in captive collections outside of zoological parks in the United States, where it has been maintained since 1987 (ZIMS 2022). Formerly managed by an Association of Zoos and Aquariums (AZA) regional studbook (Dietz 2003), at least 149 captive-bred *T. mcgregori* offspring have been produced in AZA-accredited zoos since 1993 (ZIMS 2022); however, published accounts describing successful reproduction have been lacking. At Audubon Zoo, a male and three females were initially acquired from commercial distributors between 1989 and 1990; eggs were received from this group as early as 1992, with successful reproduction first occurring in 1999. Between 1999 and 2006, a total of 11 clutches of eggs were received from five females, of which four viable clutches produced a total of 23 live offspring. Historical

**Figure 1:** A male McGregor's pitviper, *T. mcgregori* in the herpetological collection at Audubon Zoo, New Orleans, Louisiana. Photograph credit: Robert Mendyk.

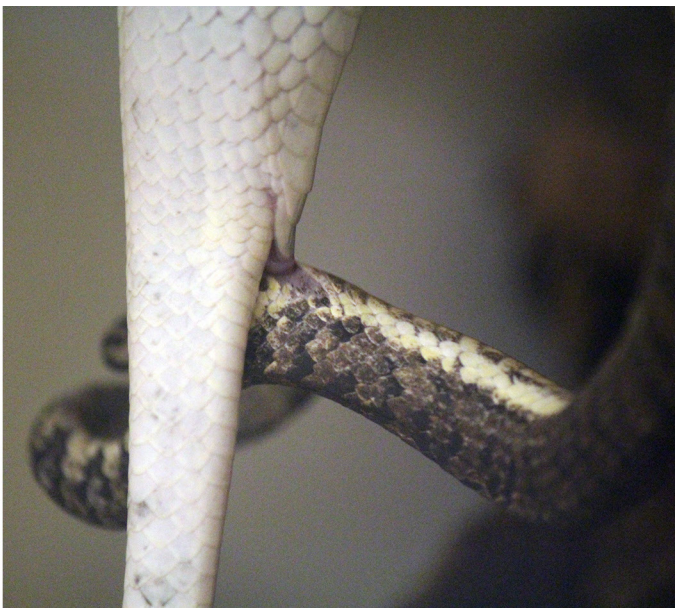

**Figure 2:** A pair of McGregor's pitvipers, *T. mcgregori* in copula at the Audubon Zoo, New Orleans, Louisiana. Photograph credit: Robert Mendyk.

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Reptiles & Amphibians ISSN 2332-4961
https://doi.org/10.17161/randa.v29i1.18271

hand-written breeding notes and digital records archived in ZIMS dating back to 1992 were reviewed, with all pertinent data for successfully and unsuccessfully hatched clutches at Audubon Zoo presented here. Contextual records of specific husbandry practices and incubation techniques were not available. Despite more recent efforts to reproduce the species in 2020, no further eggs have been produced; today, three adult females comprise the zoo's collection.

Copulation (Fig. 2) was observed during the months of November, December, February and May, with gestation, measured from the date of the first observed copulation to oviposition, ranging from 118 to 186 days (average [$\bar{X}$] = 165.8 ± 32.0; n = 4). Oviposition has occurred between March and September, with clutch size including both viable and non-viable clutches ranging from 2 to 11 eggs ($\bar{X}$ = 6.3 ± 3.2; n = 11); successfully hatched clutches numbered 5–11 eggs ($\bar{X}$ = 8.5 ± 3.0; n = 4). Eggs that were measured from viable clutches ranged in mass between 5.0–10.8 g ($\bar{X}$ = 9.1 ± 2.0; n = 18). Relative clutch mass in two females was 26.5 and 27.7% ($\bar{X}$ = 27.1 ± 0.9); post-oviposition body weights for these individuals were 166 and 274 g, respectively.

Hatching occurred during the months of May, July, September and October, with incubation taking 45–54 days ($\bar{X}$ = 50.2 ± 3.0) at an incubation temperature of 26.7 °C. Live hatchlings ranged in body mass from 5.0 to 8.0 g ($\bar{X}$ = 5.6 ± 0.9; n = 19); individual hatchlings from one clutch weighed between 2.2 and 2.9% of their mother's post-oviposition body mass ($\bar{X}$ = 2.3 ± 0.3). Hatchling length measurements were not recorded. As many as four hatchling phenotypes were recorded from a single clutch of eggs (e.g., white/silver, yellow, yellow tiger-striped, white), and although the sexes of several individuals were never identified, there was a general mix of sexes produced in each clutch, with an overall hatchling sex ratio of 5:9:9 (male:female:undetermined).

These data provide valuable insight into the reproductive biology of *T. mcgregori*, for which so little is presently known (Sy et al. 2009). When compared to the closely-related *T. flavomaculatus*, of which *T. mcgregori* was formerly recognized as a subspecies, there were some notable differences between the values reported here and published values for *T. flavomaculatus* presented by Klusmeyer and Fausten (1994). While both species appear to have long gestation periods of more than four months and relatively brief incubation periods, the incubation range reported here for *T. mcgregori* was 15.9–16.9% shorter than the 53–65 day range reported for *T. flavomaculatus*. Although Klusmeyer and Fausten (1994) did report two offspring hatching after just 40 days, these were considered premature and did not survive. The shorter incubation periods for *T. mcgregori* in this case is surprising, especially since Klusmeyer and Fausten (1994) incubated their *T. flavomaculatus* eggs at a warmer temperature (28.0 °C), which should result in shorter incubation periods (Birchard 2004). Clutch sizes for *T. mcgregori* also tended to be smaller than *T. flavomaculatus* (11–19), although there was some overlap at the higher and lower ends of these species' ranges, respectively. Deceased full-term embryos were recorded in both species.

Retrospective studies and analyses of historical data from zoo collections have the potential to yield valuable new insights and fill in gaps of knowledge related to the biology of species that have been rarely studied, are data-deficient like *T. mcgregori* (Sy et al. 2009), or may be difficult to study in the wild (e.g., Goode and Ewert 2006; Mendyk 2012; this study). To prevent valuable information from being lost and never utilized, and to maximize their scientific potentials, zoos are encouraged to review, compile and publish biological data from species currently and historically maintained within their collections (Conde et al. 2019). Such information can help supplement field studies as well as inform and facilitate captive breeding efforts in zoos and related institutions.

**Acknowledgements**

I wish to thank the Audubon Nature Institute for support and the Smithsonian Institution Libraries for assistance with sourcing literature and an anonymous reviewer for valuable feedback on an earlier version of this manuscript.

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