REPTILES & AMPHIBIANS

HUSBANDRY

Observations of Captive Rough-backed Litter Snakes, *Xenodermus javanicus* (Reinhardt 1836) (Reptilia: Squamata: Xenodermidae)

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Despite the historically early recognition and description of the Rough-backed Litter Snake, *Xenodermus javanicus* (Reinhardt 1836), little is known about the natural history of this species. Given its disjunct geographic distribution, nocturnal activity, and apparently low population densities other than in Java, few *in-situ* observations have been documented.

Fig. 1. An adult female Rough-backed Litter Snake (*Xenodermus javanicus*) pausing in vegetation during arboreal foraging activity (A); utilizing her tail for stability during arboreal activity (B); resting after consuming a North American Green Treefrog (*Dryophytes cinereus*) (C), and foraging in Javan Ivy (*Hemigraphis alternata*) (D). Photographs by the author.

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Consequently, much of what is known about the species is a product of *ex-situ* husbandry efforts. I herein discuss presumptive habitat use by these fascinating snakes and report observations made over the past 24 months of maintaining *X. javanicus* in captivity.

Many accounts of *X. javanicus* have noted the species' burrowing and fossorial nature: Tweedie (1961, p. 37) "…burrowing in cultivated land…"; Cox (1991, p. 280) "…reported to burrow…"; Greene (1997, p. 183) "…fossorial…" (although he did note that the "scalation, distinctively enlarged heads, and long tails" were not characteristic of burrowing snakes); Mattison (2007, p. 254) "…often burrows…"; Chan-ard et al. (2015, p. 163) "…terrestrial, although reported to burrow." Although DeLang (2017) reported a truly burrowing lifestyle, he described the habitat of the species as cultivated lands (as did Tweedie 1961). I suggest that such agricultural landscapes are likely to have been recolonized by *X. javanicus* and belie the true nature of populations living in remaining primary forests.

Also, as indicated by Greene (1997), this species possesses no characteristics consistent with a truly subterranean existence (e.g., a countersunk lower jaw, indistinct regionalization between head and neck/trunk, stout cylindrical body covered in smooth scales, short tail). In contrast, the elongated and laterally compressed body, distinct head and neck regions, and the long (to 42% of total length) and somewhat prehensile tail are suggestive of an arboreal lifestyle. Although *Xenodermus* lacks the enlarged row of vertebral scales present in many strongly arboreal genera (e.g., *Dipsas*, *Telescopus*, *Boiga*), the three pronounced dorsal keels of tubercles might confer sufficient rigidity to bridge gaps in low vegetation. At least two "grass-swimming" semi-arboreal squamate genera (i.e., *Takydromus* and *Chamaesaura*) have similar dorsal ridges as well as long, semi-rigid tails that act primarily as mobile

Table 1. List of food items offered to adult female Rough-backed Litter Snakes (*Xenodermus javanicus*).

Family	Species	Taken
FISH		
Poeciliidae	Mosquitofish (*Gambusia affinis*)	Y
	Common Molly (*Poecilia sphenops*)	Y
	Mottled Platy (*Xiphophorus maculatus*)	Y
Cyprinidae	Golden Barb (*Barbodes semifasciolatus*)	Y
	Common Goldfish (*Carrasius auratus*)	Y
	Zebra Danio (*Danio rerio*)	Y
	Fathead Minnow (*Pimephalus promelas*)	Y
	Cherry Barb (*Puntias titteya*)	Y
	Tiger Barb (*Puntigrus tetrazona*)	Y
	Het Rasbora (*Trigonostigma heteromorpha*)	Y
Osphronemidae	Dwarf Gourami (*Trichogaster lalius*)	N – seized and released
	Honey Gourami (*Trichogaster chuna*)	N – uninterested
Cichlidae	Jeweled Cichlid (*Hemichromis bimaculatus*)	Y
Characidae	Neon Tetra (*Paracheirodon innesi*)	Y
AMPHIBIANS		
Hylidae	North American Green Treefrog (*Dryophytes cinereus*)	Y
	Spring Peeper (*Pseudacris crucifer*)	Y
Hyperoliidae	African Reed Frogs (*Hyperolius* spp.)	Y
Pipidae	Dwarf Platanna (*Hymenochirus boettgeri*)	N – refused
Ranidae	North American Bullfrog (*Lithobates catesbeianus*) tadpoles	Y
	North American Greenfrog (*L. clamitans*) tadpoles and metamorphs	Y
	Southern Leopard Frog (*L. sphenocephalus*) tadpoles	Y
Plethodontidae	Red-backed Salamander (*Plethodon cinereus*)	Y*

*Salamanders in the genus *Plethodon* exude glutinous secretions when attacked by predators. While the snakes readily consumed these salamanders, both were left slightly distressed and unable to remove such secretions from their jaws for about two hours.

cantilevers while the bodies of these lizards traverse low vegetation and shrubs. In fact, I have regularly observed captive Rough-backed Litter Snakes ascending vegetation in pursuit of arboreal anuran prey (Fig. 1).

In contrast to the accounts of burrowing, a number of recent observations have been "along waterways," "always near water," or "on or under dead leaves on the forest floor, within 10 meters of streams" (Steubing et al. 2014). Tom Charlton (2019, pers. comm.) described a snake "floating on the surface of a jungle pool a few metres from a jungle trail." Goyes Vallejos and Ahmad Sah (2017) recorded a snake found on the ground after consuming a frog, and J. Goyes Vallejos (2019, pers. comm.) mentioned a few additional snakes "found on the leaf-litter moving across our path."

A presumptive association with water is strengthened by the prey offered to and taken by a captive snake (Table 1). In addition to those dietary records, a second, larger female *X. javanicus* obtained in spring 2019 readily took and consumed a pre-killed and thawed, hairless mouse pup on more than one occasion — but only after such novel items were "scented" by allowing them to thaw in a 2-oz. plastic cup that had contained two *L. sphenocephalus* tadpoles. Also worth noting is an interesting behavior while foraging wherein the snakes systematically investigate the substrate using a light "tapping" motion of the snout, particularly when seeking aquatic prey (i.e., tadpoles and fish). More typical tongue-flicking behavior is infrequently employed unless foraging above the ground in vegetation. Nasal scales of *X. javanicus* and other xenodermids are large and often discoid, suggesting that perhaps olfactory epithelia are highly developed in this primitive family and might serve as a chemical sensory system ancestral to the derived function of the vomeronasal organ.

According to recent observations in nature and captivity, I believe that *X. javanicus* exploits a variety of habitats. While these snakes evidently forage in leaf litter and likely rely on subterranean root structure cavities and tunnels created by other animals as refugia, the apparent association with water and aquatic prey plus a willingness to ascend into vegetation in search of quarry are collectively suggestive of terrestrial as well as semi-fossorial, semi-aquatic, and semi-arboreal activity.

While the International Union for Conservation of Nature (IUCN) suggests a range-wide conservation status of "Least Concern" for *X. javanicus* (Wogan et al. 2012), the burgeoning demand for these unusual and interesting snakes could become problematic in the future. While husbandry of this species has improved and captive longevity records are frequently broken, if specific environmental parameters are not addressed, the outlook for imported *X. javanicus* is poor. Consequently, those who wish to attempt captive husbandry of *X. javanicus* should be aware of the challenges and willing to devote the utmost dedication and effort to meeting the needs of these snakes and achieving long-term reproductive success.

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