

SHORT COMMUNICATION

Predation of *Lepidophyma flavimaculatum* (Squamata: Xantusiidae) by *Basiliscus plumifrons* (Squamata: Corytophanidae)

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Lizards are the most diversified group of living reptiles with 7176 species worldwide (Uetz 2022). They play key roles in ecosystems where they are prey to a wide variety of predators, including snakes, other lizards, mammals, birds, and invertebrates (Pianka and Vitt 2006). The tropical forests of the new world contain a high variety of species of different sizes, shapes, and colors. In Costa Rica in particular, at least 80 species of lizards have been reported (Leenders 2019). They occupy highly diverse habitat types where they participate in food webs that involve many other species of vertebrates and invertebrates. Predatory interactions among lizards depend on the sizes of the individuals involved, and juveniles generally are preyed upon by adults of

other species. If the adult size is small, large species will prey on adults of smaller species (Alvarado *et al.* 2022). Some predatory relationships may be frequent but scarcely observed such as a Green Basilisk, *Basiliscus plumifrons* Cope, 1875, that ate a young Green Iguana, *Iguana iguana* (Linnaeus, 1758) (Alvarado *et al.* 2022). Basilisks in general have been reported as participants in trophic relationships involving other lizard species (Hirth 1963, Gutsche 2005, Bock *et al.* 2018, Leenders 2019).

Adult male Green Basilisks measure 122–250 mm in snout–vent length, while adult females range between 146 and 174 mm (Savage 2002). Male Green Basilisk can exceed 900 mm in total length; the tail represents 72 to 75% of the total length (Savage 2002, Leenders 2019). Individuals are emerald green with striking yellow eyes (Leenders 2019). Males have a crest on the head, a conspicuous dorsal crest that is 50 mm in height, and another somewhat lower tail

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fin, the latter two supported by elongated neural spines and covered with small scales (Savage 2002). Crests of females and juvenile males are smaller and less prominent, and they are absent in young individuals (Leenders 2019).

The Green Basilisk is endemic to Middle America, occurring from southern Honduras to western Panama along the Caribbean versant and in the Golfo Dulce region of the Pacific southwest of Costa Rica and adjacent areas in Panama (Savage 2002, Leenders 2019). This species inhabits humid lowlands from sea level to 780 m (McCranie 2018, Leenders 2019). It is associated with riverine vegetation near streams and lagoons and along river banks (Savage 2002, Leenders 2019). They are active during the day and adults are mostly arboreal (McCranie 2018). Although the Green Basilisk is usually found high in trees where it climbs without difficulty, it also perches on logs, rocks, and bushes (Leenders 2019).

Small juvenile Green Basilisks are primarily insectivorous. Adults feed mainly on insects and other arthropods such as crabs and shrimp, but large individuals include flowers, seeds, leaves, and fruits in their diet (Hirth 1963, Savage 2002). Only the adults consume plant matter (McCranie 2018), but small vertebrates, mainly small lizards, but also a bat (Hirth 1963, Leenders 2019), a frog (Cover Jr. 1986), and small fish (Kober 2012), have been reported in their diet.

The Yellow-spotted Night Lizard (*Lepidophyma flavimaculatum* Duméril, 1851) is a small, slender, secretive lizard measuring 90 to 110 mm in snout–vent length, and 210 to 290 mm in total length (Campbell 1998). Its head is covered with large glossy plates, while the body, tail, and limbs are covered with small granular scales interspersed on the dorsum and tail with enlarged and pointed tubercles (Lee 2000, Leenders 2019). The Night lizard has a dark brown dorsum with yellowish spots, although considerable variation occurs (Campbell 1998).

The Night Lizard is found in tropical rainforest and tropical deciduous forest from 2 to 1100 m in elevation on the Atlantic slope of Middle America, from Oaxaca and southern Veracruz, Mexico to the canal zone of Panama (Campbell 1998,

Savage 2002, Sasa *et al.* 2010). It is widely distributed in Costa Rica but is rarely seen although it could be common (Leenders 2019). It is primarily a terrestrial inhabitant of the forest but is sometimes found on tree trunks or under tree bark, under rocks and logs or loose bark of fallen trees, in caves or crevices between rocks, and even in abandoned leaf-cutter ant nests and archeological ruins (Savage 2002, Arenas-Moreno *et al.* 2018, Leenders 2019). It is viviparous, and in Costa Rica, it apparently consists of a mixture of parthenogenetic and sexually reproducing populations (Savage 2002, Goldberg 2009).

The Night Lizard has been described as crepuscular or nocturnal (O’Shea 2021). It is active in the early morning and late afternoon, as well as on overcast days (Savage 2002, Leenders 2019). Individuals bask at the entrance of their burrows (Leenders 2019) and come out at night to climb vegetation or rocks in search of food (Álvarez del Toro 1982). It has been seen basking in the morning (Campbell 1998), and in captivity, it spends daylight hours in shelters or containers with water and moves into the cage during night hours (Cooper 2000).

The Night Lizard feeds on invertebrates, mainly insects such as crickets, significant numbers of ants and termites, and also centipedes, spiders, and scorpions, among others (Savage 2002, Leenders 2019, O’Shea 2021). Captive individuals were offered crickets and a variety of plant foods but only consumed crickets (Cooper 2000). It is an active predator that is able to discriminate prey chemically (Cooper 2000).

Several snakes have been cited as predators of the Night lizard, including *Drymarchon melanurus* (Duméril, Bibron and Duméril, 1854), *Mastigodryas melanolomus* (Cope, 1868), and possibly *Amastridium veliferum* Cope, 1861 (Campbell 1998). No lizard species have been reported to prey on the Night Lizard, perhaps because it is primarily nocturnal. Herein we document the first case of predation of the Night Lizard by another lizard, a female Green Basilisk, in a lowland rainforest in northern Costa Rica.

On 07 October 2022 between 07:10 and 07:30 h we observed an adult female Green

Basilisk consuming a Night Lizard at Selva Verde Lodge in northern Costa Rica ($10^{\circ}27'03''$ N, $84^{\circ}04'12''$ W; 78 m a.s.l.; Figure 1). Selva Verde is located in the Tropical Wet Forest (TWF), a bioclimatic zone with a mean annual rainfall of about 4000 mm (Alvarado *et al.* 2022). The vegetation of the TWF results from the absence of an effective dry season and the prevalence of dripping condensation that occurs nearly every night (Hartshorn 1983). The TWF is a tall, multi-stratal, evergreen forest, although some canopy species are briefly deciduous. Canopy trees reach 45–55 m in height, with round to umbrella-shaped crowns and unbranched trunks up to 30 m reaching 100–200 cm dbh (Hartshorn 1983). The understory often abounds in stilt-rooted palms, and the shrub layer is 1.5–2.5 m tall, with abundant dwarf palms;

unbranched treelets and large broad-leaved herbs are occasionally present (Hartshorn 1983). The TWF is the most species-rich life zone in Costa Rica (Hartshorn 1983).

Mornings at Selva Verde Lodge during this time of the year are variable; some are sunny and very humid, but sometimes rainfall occurs early in the morning. On the day of the observation it was raining shortly before the observation of the predatory event, and some lizards were active. The basilisk captured the Night Lizard by the middle of the body (Figure 2). The Night Lizard struggled for a few minutes, but the female Green Basilisk consumed it completely within 10 minutes and then moved to dense vegetation where further observation was not possible. The yellow spots and tubercles of the Night lizard allowed us to make a definitive identification.

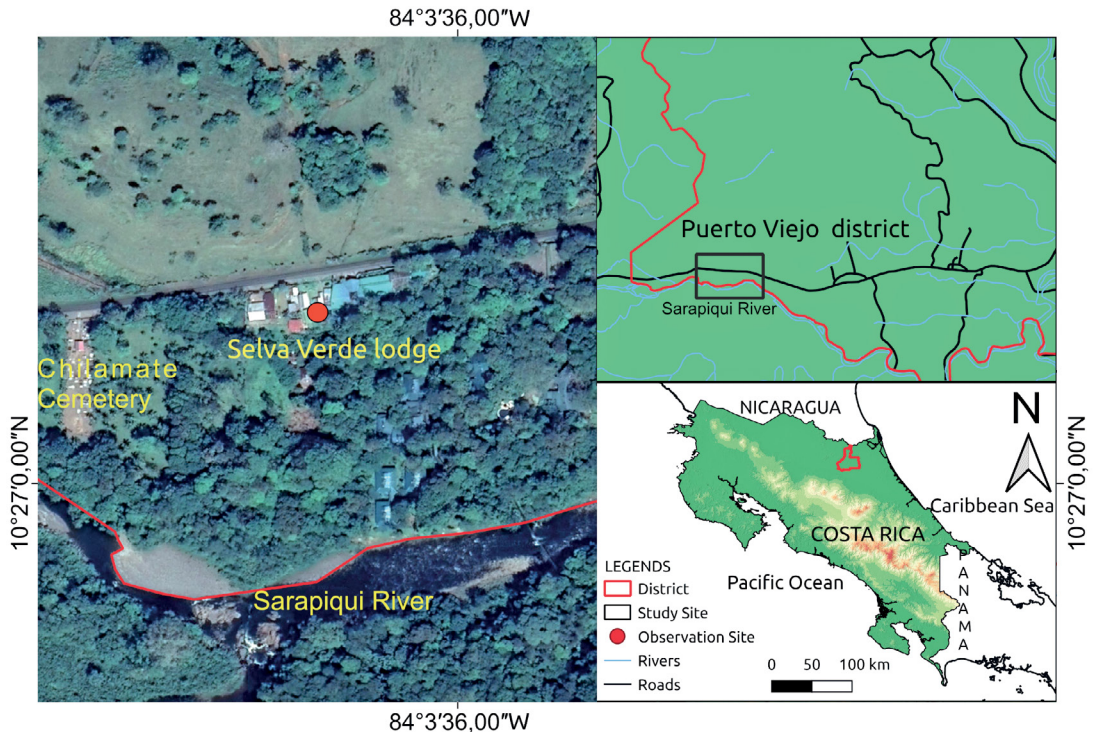


Figure 1. Site (red dot) where an adult female Green Basilisk (*Basiliscus plumifrons*) captured and ingested a Yellow-spotted Night Lizard (*Lepidophyma flavimaculatum*) at Selva Verde Lodge, Sarapiquí, Heredia, Costa Rica. Map by G. Chaves.




Figure 2. An adult female Green Basilisk (*Basiliscus plumifrons*) feeding on a Yellow-spotted Night Lizard (*Lepidophyma flavimaculatum*) at Selva Verde Lodge, Sarapiquí, Heredia, Costa Rica. Photo by Mauricio Quirós Rosales.

Several lizards feed on arthropods as juveniles and then switch to other feeding habits such as herbivory, although they may include small vertebrates at least occasionally (Astorga-Acuña and Mora 2023). Some are diurnal sit-and-wait predators such as leopard lizards (*Gambelia* Baird, 1859) that feed primarily on arthropods but occasionally take smaller lizards (O'shea 2021). Some have obvious cranial adaptations to subdue other lizards, such as Burton's Snake-lizard (*Lialis burtonis* Gray, 1834) from Papua New Guinea (O'shea 2021). The large lizards of the Central American region, mainly *Iguana* and *Ctenosaura* are primarily herbivorous (Mora 2010). Most of them, at least opportunistically, take vertebrate prey (Astorga-Acuña and Mora 2023). The Utila Spiny-tailed Iguana (*Ctenosaura bakeri* Stejneger, 1901) preys on lizards such as *Hemidactylus frenatus* Duméril and Bibron, 1836 (Hallmen and Hallmen 2011) and juvenile Green Iguanas in captivity (Dirksen and Gutsche 2006). The Roatán Spiny-tailed Iguana (*Ctenosaura oedirhina* De Queiroz, 1987) has captured juvenile Green Iguanas (Hendry and Gandola

2011). Mesoamerican basilisks, as a group, are known to prey on lizards and other reptiles. *Basiliscus vittatus* Wiegmann, 1828 has been reported to prey on *Ctenosaura bakeri* (Gutsche 2005), and *Basiliscus basiliscus* (Linnaeus, 1758) has been reported to capture an adult of the colubrid snake *Thamnophis proximus* (Say, 1823) (Solórzano 2022).

Most of those predatory events occurred among diurnal species or were observed while in captivity, making observations relatively easy. Most Night lizards are observed when their hiding places in or under surface debris are disturbed, making it difficult to assess their daytime activity (Leenders 2019). It is difficult to observe predation events if individuals are active during the night. The predation event we report here not only elucidates a predator-prey interaction previously unknown between these species but also demonstrates early morning activity by the Night Lizard. Basilisk predation on the Night Lizard, as well as potential predation by other lizards, depends on these aspects because nocturnal activity of basilisks is unknown. Several species exploit both the diurnal and nocturnal niche (López and Mora 2021), including the Night Lizard, a presumably nocturnal species (Arenas-Moreno *et al.* 2018). A pattern of cathemeral activity by the Night Lizard is possible because it inhabits thermally stable areas (Arenas-Moreno *et al.* 2018). The risk of dehydration in these microhabitats is low due to their high moisture levels. Both factors are key for this lizard as levels of evaporative water loss increase with temperature (Arenas-Moreno *et al.* 2018).

Understanding food web structure can contribute to our understanding of both ecosystem function and biodiversity loss (Zeng *et al.* 2014). This event is just one example of the amount of information on lizard ecology that is unknown. Even anecdotal information deserves to be published to gain a better understanding of the trophic relationships of Neotropical lizards.

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