

PREDATION OF THE HUMBLE ANOLE *ANOLIS HUMILIS* BY THE CENTRAL AMERICA WHIPTAIL *HOLCOSUS FESTIVUS*

DEPREDACIÓN DEL ANOLIS COMÚN, *ANOLIS HUMILIS*, POR LA CHISBALA CENTROAMERICANA, *HOLCOSUS FESTIVUS*

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Resumen.– En Costa Rica hay 88 especies de lagartijas, incluidas especies de forrajeo activo como la chisbala centroamericana, *Holcosus festivus*, y cazadoras al acecho como el anolis común, *Anolis humilis*. Observamos un evento de depredación entre estas dos especies en la Estación Biológica La Selva, en las tierras bajas del norte de Costa Rica. Un individuo juvenil de la chisbala capturó y consumió a un juvenil de anolis en el suelo de este bosque lluvioso. Los patrones de actividad principales del anolis común y de la chisbala potencialmente conducen a encuentros frecuentes entre estas dos especies. A pesar de ello, sorprende que esta interacción depredadora no haya sido reportada anteriormente, y actualmente no está claro cuán a menudo o cuán significativos podrían ser los anolis para la dieta de la chisbala.

Palabras clave.– Bosque Húmedo Tropical, Costa Rica, hojarasca, La Selva, lagartijas, reptiles.

Abstract.– In Costa Rica there are 88 lizard species including active foraging species such as the Central America Whiptail, *Holcosus festivus*, and sit-and-wait specialists such as the Humble Anole, *Anolis humilis*. We observed a predation event between these two species at La Selva Biological Station in the northern lowlands of Costa Rica. A juvenile Whiptail captured and consumed a juvenile anole on the forest floor of this rain forest. The primary activity patterns of the Humble Anole and the Central American Whiptail likely leads to frequent encounters between these two species. Despite that, it is surprising that this predatory interaction has not been reported before, and it is currently unclear how often or how significant anoles could be in the Central American Whiptail's diet.

Key words.– Costa Rica, La Selva, leaf litter, lizards, reptiles, Tropical Wet Forest.

Among reptiles, “lizards” (sensu all non-snake Squamata) represent the most species-rich and ecologically diverse group, comprising 60% of the entire class, totaling 7,396 species worldwide (Uetz, 2023). The tropical forests of the New World

host a high variety of lizard species with different sizes, shapes, and colors (Alvarado et al., 2022). In Costa Rica, specifically, 88 lizard species have been reported (Leenders, 2023). They inhabit highly diverse habitat types and play crucial roles in ecosystems,

serving as prey for various predators, including snakes, other lizards, mammals, birds, and invertebrates (Pianka & Vitt, 2006). Predatory interactions among lizards are influenced by the sizes of the individuals involved, with juvenile individuals typically falling prey to adults of other species (Alvarado et al., 2022). However, if the adult size is small, larger species may prey on adults of smaller species (Alvarado et al., 2022).

The Central American Whiptail, *Holcosus festivus* (Lichtenstein & Martens, 1856), is a teiid lizard found from Tabasco, Mexico, to northern Colombia (Savage, 2002). *Holcosus festivus* inhabits tropical or subtropical wet and moist forests (Campbell, 1998). It is widespread along the Caribbean slope of Central America and the Pacific slope in southwestern Costa Rica, Panama, and western Colombia (Leenders, 2019). It inhabits humid lowlands and also premontane wet forests or rainforests at some sites, ranging from near sea level to 1,435 m a.s.l. (Savage, 2002; Sasa et al., 2010).

Adult male Central American Whiptail's reach up to 129 mm in snout-vent length (Savage, 2002). Adults can reach a total length of about 270-430 mm, with males being larger than females (Campbell, 1998). It is a common, diurnal, terrestrial lizard that may be found in mature and secondary forest (Campbell, 1998; Lee, 1996). It tends to occupy deeper forest and more shaded locations sites than other *Holcosus* species (Lee, 1996). However, it can also be found in banana, cacao, and coconut plantations (Savage, 2002). Nevertheless, it is considered mainly a species of edge ecosystems and is most common in tree-fall areas, along roads and trails, or in other areas where the sun reaches the forest floor (Leenders, 2019). It has been found also in semi-urban settings near human settlements (Campbell, 1998; Acuña-Vargas, 2016).

Individuals of the Central America Whiptail are most frequently seen basking in mid-morning, on sunny days along the edge of clearings or in sunny spots within the forest before begin scanning the forest floor for food (Savage, 2002; Leenders, 2019). The head and flicking tongue are constantly probing and sampling the substrate environment, and it utilizes both the snout and forelimbs in intermittent bouts of digging while searching for food (Savage, 2002).

Central American Whiptail predominantly feeds on invertebrates, primarily orthopterans and araneid spiders, but occasionally consumes small frogs (Lee, 1996; Savage, 2002). Large individuals readily consume small leaf litter frogs (and possibly small lizards) that are flushed out during their search for invertebrate prey (Savage, 2002; Leenders, 2019). While it

has been suggested that the Central American Whiptail may also consume lizards, we did not find specific reports confirming this prey type.

The Humble Anole, *Anolis humilis* Peters, 1863 (Anolidae), is a small lizard found in Nicaragua, Costa Rica, and Panama (Uetz et al., 2023). There is some ongoing discussion regarding its absolute identity, leading to uncertainty about its distribution (Phillips et al., 2015; Leenders, 2019; Uetz et al., 2023). It inhabits humid forests of the Caribbean lowlands and premontane slopes, marginally extending into the lower montane zone, ranging from near sea level to an elevation of 2,000 m a.s.l. (Savage, 2002; Sasa et al., 2010).

Anolis humilis is primarily a terrestrial species that occupies the leaf litter, commonly found in shaded areas of mature rainforest, plantations, and other forested habitats (Savage, 2002). Adult males often climb low perches up to 0.6 m above the ground, while females and juvenile individuals typically remain on the ground (Leenders, 2019). This species is frequently observed on or within the leaf litter on the forest floor, especially near tree buttresses (Savage, 2002).

Anolis humilis reaches a standard length of 46 mm in males and 50 mm in females (Leenders, 2019) and a total length of 114 mm and tail moderately long, 60% to 63% of the total length (Savage, 2002). Generally, this lizard surveys its surroundings from an elevated foraging perch and cover short distances to capture invertebrates within their reach (Leenders, 2019). It preys on a diverse range of arthropods, primarily araneid spiders and isopods, but also hemipterans, caterpillars, beetles, dipterans, termites, and centipedes (Savage, 2002).

Predation plays a pivotal role in the fundamental aspects of wildlife fitness, influencing activities such as feeding, breeding, and often mortality, thereby shaping the lives of wild animals (Humphreys & Ruxton, 2018). Predator-prey interactions serve as crucial drivers of natural selection, community ecological structure, and ecosystem functioning (Valdez, 2020). While observing predatory interactions is essential for comprehending trophic networks (Passos et al., 2017; Dias-Silva et al., 2021), witnessing such interactions in their natural habitat proves to be a challenging endeavor (Dias-Silva et al., 2021). This report details the observation of a Humble Anole being consumed by a Central American Whiptail.

Observations were made at La Selva Biological Station, owned by the OTS (Organization for Tropical Studies), and located in the northern plains of the Heredia Province of Costa Rica at the

confluence of the Sarapiquí and Puerto Viejo rivers. La Selva area encompasses the topographic transition from the steep, low foothills of the Cordillera Central to the extensive Sarapiquí coastal plain, extending north to the San Juan River (Hartshorn, 1983). Elevations vary from 35 m a.s.l. on the recent terrace of the Puerto Viejo River to approximately 150 m a.s.l. (Hartshorn, 1983). La Selva encompasses two life zones: Tropical Wet Forest on the west side and Tropical Premontane Wet Forest, warm transition, on the east side, with a mean annual rainfall of 3,991 mm (Hartshorn, 1983).

We identified the two lizards based on the following descriptions. The Central American Whiptail has an overall dark color pattern marked with dorsolateral series of yellow dashes and irregular orange-red vertical lines on the flanks (Savage, 2002). It features a pale yellow or cream middorsal stripe, although it can be obscured in older males (Leenders, 2019). In juvenile individuals, the middorsal stripe extends well onto its strikingly blue tail nearly to the tip (Savage, 2002). The Common

Anole has enlarged middorsal scales and typically possesses a deep axillary pore (Leenders, 2019). Its dorsum is brown to olive-brown, often with dark markings forming a broad middorsal bronze or dark stripe, paired dark dorsolateral blotches, or a middorsal series of hourglass-shaped figures; usually a broad dark band across the prefrontal region; venter light brown; iris brown with gold flecks (Savage, 2002). The dewlap of adult males is mostly deep red with a bright yellow free margin; females do not have a dewlap, but the throat has a patch of red color (Savage, 2002).

On 11 July 2023 at 09:36 h, we observed a juvenile Central American Whiptail preying on a Humble Anole at the Surá trail in La Selva ($10^{\circ}25'45''$ N, $84^{\circ}00'34''$ W; 63 m a.s.l.; Fig. 1). The anole was moving, possibly after a failed predatory attempt, and was encountered by the whiptail as it was searching near a sunny spot on the forest floor. The Whiptail captured the anole by seizing it on the dorsum and consumed it from the head toward the tail (Fig. 2). The entire event, from capture to ingestion by

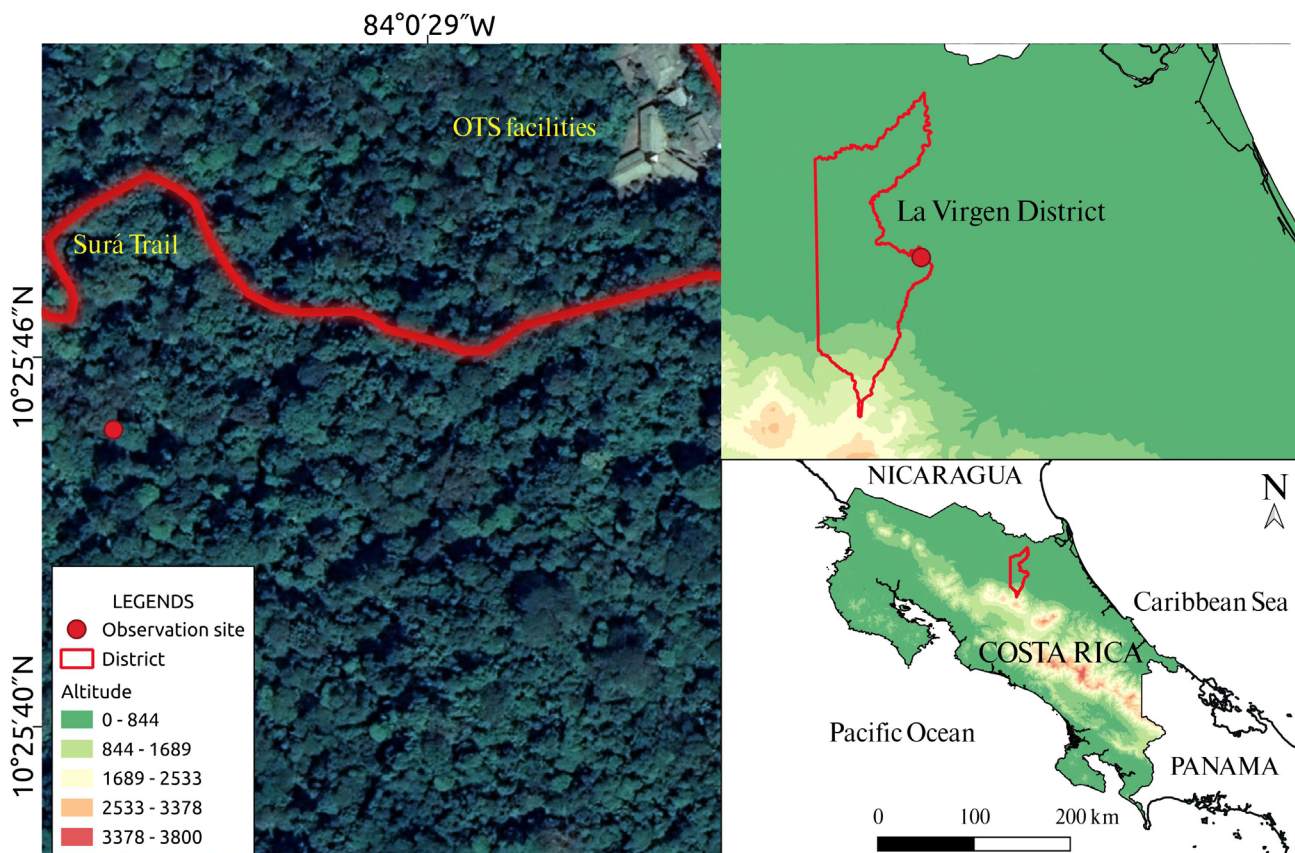


Figura 1. Sitio (punto rojo) donde un *Anolis humilis* fue depredado por una *Holcosus festivus* en La Selva, Sarapiquí, Heredia, Costa Rica. .

Figure 1. Site (red dot) where an *Anolis humilis* was predated by a *Holcosus festivus* at La Selva, Sarapiquí, Heredia, Costa Rica.



Figura 2. Un juvenil de la chisbala centroamericana, *Holcosus festivus*, alimentándose de un anolis común, *Anolis humilis*, en la Estación Biológica La Selva, Sarapiquí, Heredia, Costa Rica.

Figure 2. A juvenile Central America Whiptail, *Holcosus festivus*, feeding on a Humble Anole, *Anolis humilis*, at La Selva Biological Station, Sarapiquí, Heredia, Costa Rica.

the Whiptail, lasted over 15 minutes. Although we observed the entire event from the beginning, the behavior of the two lizards was not influenced by our presence. When we captured some photos, the Whiptail's behavior indicated that the predation event proceeded without interruption at any point in time.

Anolis humilis is a rainforest resident often found in shaded areas near the base of large trees (Savage, 2002). This anole spends considerable time on the ground and is particularly prevalent in areas with deep leaf litter (Savage, 2002). *Holcosus festivus* is another common lizard characterized by its active and nervous behavior, often seen moving rapidly and jerkily across the ground (Savage, 2002). The conclusion drawn from this information is that the primary activity patterns of the Humble Anole and the Central American Whiptail are likely to lead to frequent encounters between these two species. Specifically,

when juvenile anoles are active on the forest floor, it presents opportunities for predation by the whiptail.

Although previous literature has mentioned that the Central American Whiptail might consume lizards (e.g., Savage, 2002), this report provides the first evidence supporting this fact. Despite this, it is surprising that this predatory interaction has not been reported before, given that *H. festivus* is a common and diurnal lizard that is easily observed. Consequently, it remains unclear how often or how significant anoles could be for the Central American Whiptail's diet.

Central American Whiptail preying on another lizard species, a Humble Anole in this case, represents one of the relatively few known instances of this type of predation interaction, which could be an important component of the food webs in

lowland forests. Understanding the structure of food webs can contribute to our comprehension of both ecosystem function and biodiversity loss (Zeng et al., 2014). Many aspects of lizard ecology remain unknown, and our understanding grows through the accumulation of reports such as this one. Therefore, even anecdotal information deserves to be published to enhance our understanding of the trophic relationships of Neotropical lizards (Quirós Rosales et al., 2023).

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