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A fourth account of centipede (Chilopoda) predation on bats

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Abstract. With an incident in Palo Duro Canyon, Texas, USA, *Scolopendra heros* Girard (Chilopoda: Scolopendromorpha: Scolopendridae) becomes the third centipede species known to prey on bats; *S. gigantea* Linnaeus and *S. viridicornis* Newport have been so documented in Venezuela and Brazil, respectively. The Texas predation was interrupted by the predator/prey pair's falling around 15–20 m from the canyon wall and, perhaps also, by human presence where they landed. The centipede uncoiled and retreated to shelter under a nearby rock and, after initial immobilization, so did the bat.

Key Words. Brazil, carnivore, Palo Duro Canyon, *Scolopendra*, Texas, Venezuela.

Resumen. Con un incidente en Palo Duro Canyon, Texas, Estados Unidos, *Scolopendra heros* Girard (Chilopoda: Scolopendromorpha: Scolopendridae) se convierte en el tercer ciempiés que se sabe depreda murciélagos; *S. gigantea* Linnaeus y *S. viridicornis* Newport han sido documentados mostrando este comportamiento en Venezuela y Brasil, respectivamente. El incidente de Texas fue interrumpido por el despeñamiento del par depredador/presa unos 15–20 m desde la pared del cañón y, al parecer, por la presencia humana en el sitio de caída. El ciempiés se desenrolló y retiró para refugiarse bajo una roca cercana. Tras permanecer inmóvil inicialmente, el murciélago hizo lo mismo.

Palabras Clave. Brasil, carnívoro, Cañón de Palo Duro, *Scolopendra*, Texas, Venezuela.

Introduction

Predation of vertebrates by invertebrates is rarely observed. Large species of arachnids, insects and centipedes occasionally feed on frogs and toads, lizards, snakes, birds and chicks, and bats (Okeden 1903; Lawrence 1953; Cloudsley-Thompson 1955; Butler 1970; Easterla 1975; Goldberg 1975; Lewis 1981; McCormick and Polis 1982; Carpenter and Gillingham 1984; Toledo 2005; Forti et al. 2007; Timm and Losilla 2007; Lewis et al. 2010; Noronha et al. 2015; Seshadri et al. 2017). Centipedes are opportunistic and voracious predators (Dugon and Arthur 2012a, b) and are known to prey on mice, voles and other small rodents, particularly juveniles (Cloudsley-Thompson 1955, 1958; Shugg 1961; Porter 1973; Clark 1979; Lewis 1981). To date, only three accounts of centipede predation on bats, all by species of *Scolopendra* Linnaeus (Scolopendromorpha: Scolopendridae/-inae), have been documented. The first was by *S. gigantea* Linnaeus in a Venezuelan cave (Molinari et al. 2005), and the others were by *S. viridicornis* Newport in Brazilian buildings (Srbek-Araujo et al. 2012; Noronha et al. 2015) (Fig. 1).

Discussion

On 14 October 2016, TTL and BNS were hiking in Palo Duro Canyon, in the panhandle of Texas, USA (101°33'26"W, 34°51'27"N), and fortuitously observed predation by *S. heros* Girard on the bat, *Eptesicus fuscus* (Palisot de Beauvois) (Chiroptera: Vespertilionidae) (Fig. 2–3). This sighting constitutes the first in both North America and outside of tropical South America although a "large centipede," identified as *S. morsitans* Linnaeus but probably *S. subspinipes* Leach, has been implicated in the extinction of the endemic bat, *Pipistrellus murrayi* Andrews, from Christmas Island in the Indian Ocean (Beeton et al. 2010; Waldock and Lewis 2014). *Scolopendra heros* thus becomes the third centipede known to prey on bats and the fourth suspected of doing so.

The incident occurred in a slot canyon estimated to average 5 m in width with nearly vertical walls 20 m high. At 1130 h, the hikers heard a loud sound and promptly discovered an individual of *E. fuscus* on the canyon floor. As the bat moved its wings in an otherwise silent struggle, they noted a large *S. heros* wrapped around its head and upper torso. The hikers began photographing the pair one minute later, but the centipede began to uncoil (Fig. 4), perhaps because of their presence. Three minutes later it had released the bat and crawled under a rock less than one meter away while the injured bat remained where the pair had landed (Fig. 5). The centipede showed no evidence of injury, but the bat had two puncture wounds on its upper torso, near the right wing and below the back of the neck, and blood splatter was evident on adjacent rocks. The injured bat made only slow, minor movements for nearly 30 minutes, after which it crawled under another nearby rock.

The centipede must have attacked the bat while it was roosting high on the canyon walls. Although not directly observed, roosting was indicated by guano on the rocks and canyon floor; predator and prey fell 15–20 m, thereby producing the noise that alerted the hikers. Both Molinari et al. (2005) and Srbek-Araujo et al. (2012) observed centipedes feeding on deceased and fallen bats that were reasoned to have been attacked on roosts above. The fresh blood and two visible wounds in the Texas incident were consistent with known predatory behavior of centipedes, which inflict an initial puncture with their forcipules on the necks of vertebrate prey to inject venom near the brain for quick immobilization (Cloudsley-Thompson 1958; Shugg 1961; Stankiewicz et al. 1999). Centipede venom's toxicity on bats is unknown (Molinari et al. 2005; Noronha et al. 2015), but that from some species is fatal to mice in 20–32 seconds (Bücherl 1946). The Texas attack was not immediately fatal, perhaps because the fall dislodged the centipede's forcipules to some degree. Although the bat initially appeared to suffer immobilizing injuries, it was able to crawl to at least momentary safety a half-hour later.

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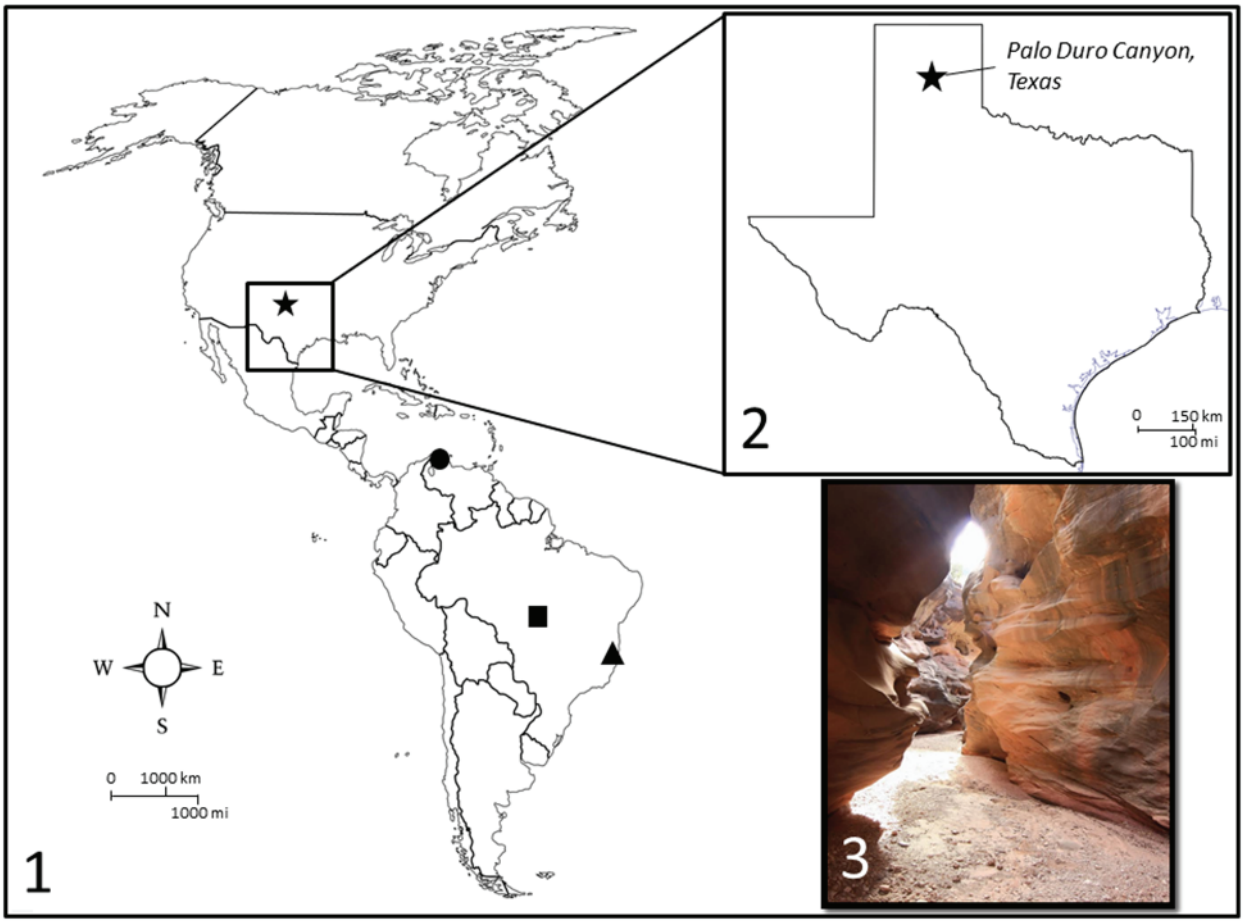

Figures 1–3. Locations of *Scolopendra* predations on bats. **1)** Western Hemisphere. Star, Palo Duro Canyon. Texas, USA. Dot, cave in Venezuela. Square/Triangle, Brazilian sites. **2)** Location of Palo Duro Canyon in Texas. **3**) Photo of the slot canyon where the Texas incident occurred.

Figures 4–5. Photographs of centipede predation in Texas. **4)** Uncoiling of *Scolopendra heros* from *E. fuscus*. **5**) Injured bat after *S. heros* had retreated.