

Bats in cobwebs of the giant-spider *Nephilingis cruentata* (Fabricius, 1775) (Araneae: Nephilidae) in Brazil

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Resumo

Morcegos em teias da aranha-gigante *Nephilingis cruentata* (Fabricius, 1775) (Araneae: Nephilidae) no Brasil. Em todo o mundo morcegos são vítimas principalmente de vertebrados, mas também são atacados por invertebrados. Relatamos aqui dois casos de morcegos enredados em teias da aranha-gigante *Nephilingis cruentata*, no sudeste do Brasil. No primeiro, ocorrido em dezembro de 2012, uma fêmea de *Eptesicus diminutus* foi encontrada morta, e no segundo, ocorrido em março de 2013, um macho de *Tadarida brasiliensis* foi retirado vivo da teia e liberado. Os animais não apresentavam marcas de predação e ambos os eventos foram registrados após fortes chuvas. Suspeita-se que os morcegos podem ter se emaranhado nas teias quando buscavam abrigo da chuva ou caçavam insetos. Mesmo que esses morcegos não tenham sido predados, esta espécie de aranha não deve ser descartada como um predador oportunista de pequenos morcegos, como observado em outras regiões fora do Brasil.

Palavras-chave: Armadilha natural; Molossidae; Predação; Vespertilionidae

Abstract

Bats throughout the world are preyed upon primarily by vertebrates, but some are also attacked by invertebrates. We report two cases of bats entangled in webs of the giant-spider *Nephilingis cruentata* in southeastern Brazil. The first incidence occurred in December 2012, on which a female *Eptesicus diminutus* was found dead. The second occurred in March 2013, in which a male *Tadarida brasiliensis* was removed from the web alive, and later released. The animals showed no predation marks on the body, and both events were recorded after heavy rains. We suspect that the bats may have become entangled in the webs while seeking shelter from rain, or while foraging for insects. Even though the bats were not preyed upon, this spider cannot be ruled out as an opportunistic predator of small bats, as has been observed outside of Brazil.

Key words: Molossidae; Natural trap; Predation; Vespertilionidae

Small bats throughout the world fall prey mainly to vertebrates, such as mammals, birds, snakes, amphibians, and pet animals (BORDIGNON, 2005; KAŇUCH; BALÁŽ, 2005; LEFEVRE, 2005; ESBERARD et al., 2006; ESBERARD; VRCIBRADIC, 2007; CASTRO et al., 2011; KHLAFALLA; IUDICA, 2012; ANCILLOTTO et al., 2013; GARRIDO-GARCÍA et al., 2013), however they are also attacked by invertebrates such as large arthropods (MOLINARI et al., 2005; NYFFELER; KNÖRNSCHILD, 2013).

Although the number of reports has grown in the last decade, knowledge of invertebrate bat predators is poor (NYFFELER; KNÖRNSCHILD, 2013), which limits our understanding of the impact of predation events on bat populations. In a recent review, 52 cases were reported globally of bats being captured by spiders (NYFFELER; KNÖRNSCHILD, 2013), 88% of which were ascribed to web-building spiders, and the rest (12%) to hunting spiders. These cases include approximately 24 bat species belonging to five families (Vespertilionidae (64%), Emballonuridae (22%), Hipposideridae (8%), Phyllostomidae (3%), and Rhinolophidae (3%), with weight between 2-15 g), and 17 spider species belonging to five families (Theraphosidae, Sparassidae, Pisauridae, Nephilidae and Araneidae). Seventy-three percent of the known cases of bat captures were by orb-weaving spiders, and the dominant group of bat-catching spiders is giant orb-weavers in family Nephilidae (46%). Seventy nine percent of the bats captured by Nephilidae died from exhaustion, starvation, dehydration or hyperthermia, or were killed by the spider, while 41% were either killed and eaten or bitten by the spider. Only a few escaped or were released by researchers. There is one record of a bat found in a web of the giant-spider *Nephilingis cruentata* (Fabricius, 1775) in Swaziland, Africa, in which case the captured bat (unidentified) escaped before being bitten (NYFFELER; KNÖRNSCHILD, 2013).

The two cases reported herein are the first in Brazil. The authors identified bat species using Miranda et al. (2011), and spiders were identified by a specialist (José P.L. Guadanucci).

The first case occurred on December 9, 2012 at 15h30min, on building wall at approximately 8 m

above the ground at the São Paulo State University at Rio Claro campus, São Paulo state, southeastern Brazil (47°32'40"W, 22°23'47"S). The bat was an adult female diminutive serotine bat (*Eptesicus diminutus* Osgood, 1915) (Vespertilionidae) (Figure 1). The specimen was found dead without holes, missing body parts, or other evidence of predation, as well as without rigor mortis and with elasticity in patagium, indicating recent death. It likely died from exhaustion, starvation, dehydration, or hyperthermia. The specimen was deposited in the Zoology Museum of the State University of Campinas, Brazil – ZUEC-MAM 2709. The second case was an adult male Brazilian free-tailed bat (*Tadarida brasiliensis* (I. Geoffroy, 1824), belonging to family Molossidae. The bat was found on March 23, 2013 at 14h00min in the same location. The bat was alive with no signs of predation, and was freed by researchers. Both incidents took place after heavy rains.

Nephilingis cruentata is an arboreal spider that naturally occurs in tropical and subtropical Africa. In southeastern Brazil this giant-spider is an exotic species, commonly found on buildings in São Paulo (SCHUCK-PAIM; ALONSO, 2001; NÄPÄRUS; KUNTNER, 2012). This spider weaves orb-webs up to 1 m in diameter and at a height of 1 to 6 m above the ground, typically on the corners of walls and ceilings (SCHUCK-PAIM, 2000; DINIZ, 2011). They also spin webs strong enough to withstand the kinetic energy of the struggling bats without breaking (NYFFELER; KNÖRNSCHILD, 2013).

These bats probably entangled in the spider webs while taking shelter from heavy rain. Both bats species are open space and forest edge aerial insectivores (DENZINGER; SCHNITZLER, 2013), and were probably seeking refuge. These incidents occurred perhaps because the bats miscalculated how close they were to the web while in flight foraging for insects (NORQUAY et al., 2010; PIGAGE et al., 2011), since bats are likely capable of detecting spider webs by means of echolocation (NYFFELER; KNÖRNSCHILD, 2013). According Nyffeler and Knörnschild (2013) not only the webs, but also the spiders (in particular the huge, adult female *Nephila* spp.) presumably generate strong echoes that the echolocating bats should be able

to detect, advertising the presence of obstacles that should be avoided.

FIGURE 1: Adult female diminutive serotine bat entangled in a web of the giant-spider *Nephilingis cruentata*.



Even though these bats did not fall prey to the spider, there are records of small bats (4-8 g) killed by Nephilids (NYFFELER; KNÖRNSCHILD, 2013). The diminutive serotine bat in this study weighed 4 g, and the brazilian free-tailed bat weighed 11 g; their weights are within the range of bat species found in spider webs (2-15 g, see NYFFELER; KNÖRNSCHILD, 2013). Therefore, they may be considered potential prey, as giant-spiders demonstrate a certain selectivity and opportunism in their choice of prey (JAPYASSÚ; VIERA, 2002). This spider species should not be ruled out as a predator of small bats because it is known to capture and eat several types of vertebrates, including small lizards and birds (DUCA; MODESTO, 2007; PELOSO; SOUSA, 2007; DINIZ, 2011).

These spider webs can be considered an occasional natural trap for small bats, which results in the death of some individuals. Our reports adds two species (and one family) of bats to the list of those likely to be vulnerable to predation by spiders, thus contributing to the general knowledge of predator-prey relationships between spiders and bats.

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