

Predation of the invasive gecko *Hemidactylus angulatus* Hallowell, 1854 (Squamata: Gekkonidae) by the wandering spider *Ancylometes bogotensis* Keyserling, 1877 (Araneae: Ctenidae) in Tolima, Colombia*

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Abstract

We report the predation on the gecko *Hemidactylus angulatus* by the spider *Ancylometes bogotensis*, in the Tropical Dry Forest life zone located at Northern Tolima (Colombia). This short note is a contribution to the knowledge about the natural history of the referenced species because of the potential of *A. bogotensis* as a biological control agent of geckos that decreases its invasive potential. This is important due to the possibility to make populations of the gecko decline and to restrict the entry of these saurians to natural forested areas.

Key words: Arachnid, Biological Controllers, Invasive species, Gecko, Tropical forest.


Predación del gecko invasor *Hemidactylus angulatus* Hallowell, 1854 (Squamata: Gekkonidae) por la araña errante *Ancylometes bogotensis* Keyserling, 1877 (Araneae: Ctenidae) en el Tolima, Colombia


Resumen


Registramos la depredación del gecko *Hemidactylus angulatus* por la araña *Ancylometes bogotensis*, en la zona de vida de Bosque Seco Tropical en el norte del departamento del Tolima (Colombia). El reporte aquí descrito constituye un aporte al conocimiento de la historia natural de las especies referenciadas y evidencia el potencial de *A. bogotensis* como agente de control biológico de especies invasoras de geckos, debido a que podría contribuir a disminuir las poblaciones y el ingreso de estos saurios a zonas boscosas naturales.

Palabras clave: Arácnido, Controladores biológicos, Especie invasora, Gecko, Trópico seco.

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Previous reports on arachnid predation of herps are common in the Neotropical region and there are records from the Greater Antilles and from Central and South America (De Armas, 2001; Losos, 2009; Silva-Vieira *et al.*, 2012). The herp predation in the Ctenidae family has been well documented with evidence of predation on *Espadarana prosoblepon* by *Cupiennius* sp. (Hayes, 1983), *Eleutherodactylus coqui* by *Oligoctenus ottleyi*, *Eleutherodactylus zugii* by *Ctenus vernalis* (De Armas, 2001), *Anomaloglossus stepheni* by *Ctenus amphora*, *Adenomera andreae*, *Dendropsophus minutus* and *Boana geographica* by *Ancylometes rufus*, *Hamptophryne boliviana* by *Ancylometes* sp. (Menin *et al.*, 2005), *Adenomera marmorata* by *Ctenus medius* (Barbo *et al.*, 2009), *Leptopelis brevirostris* by an unidentified species ctenid spider (Barej *et al.*, 2009), *Dendropsophus elegans* by *Phoneutria nigriventer* (Santana *et al.*, 2009), *Physalaemus cuvieri* by *Ancylometes* sp. (Maffei *et al.*, 2010), *Crossodactylus schmidti* by *Phoneutria nigriventer* (Caldart *et al.*, 2011), *Scincella cherriei* by *Anahita* sp. (Aguilar-López *et al.*, 2014), *Anolis sagrei* by *Cupiennius* sp. (Fonseca & Rodríguez, 2014), and *Engystomops pustulosus* by a ctenid spider (Gallego-Carmona *et al.*, 2017). These predator-prey interactions reveal an important ecological relationship between ctenid spiders and herps. Notwithstanding, the varied *Ancylometes* (Ctenidae) genus diet ranges from insects to small vertebrates (Bhukal *et al.*, 2015).

Ancylometes bogotensis Keyserling, 1877 is a ctenid spider with a strong presence throughout Central America and in the north and west areas of South America (Höfer & Brescovit, 2000). In Colombia, this species has been reported in fifteen departments: Bolívar, Boyacá, Caldas, Caquetá, Cauca, Chocó, Córdoba, Cundinamarca, Magdalena, Meta, Risaralda, Santander, Sucre, Tolima and Valle del Cauca (Höfer & Brescovit, 2000; Hazzi *et al.*, 2013). This species can reach the adult stage in a period between 205 and 230 days of age, during which they undergo 13 and 14 changes in males and females, respectively. During the adult stage, twice a year they lay between 300 and 400 eggs with a hatch time of 22.7 days (Merrett, 1988).

The hunting microhabitats for the Bogotá Giant Fishing Spider are the freshwater bodies in the forest (Lapinski & Tschapka, 2013). They are almost always found on the floor, near creeks and small rivers, where they mainly prey frogs (Dehling, 2007; Acevedo *et al.*, 2018; Auguste *et al.*, 2018) and toads (White, 2015; Salcedo *et al.*, 2018). Besides, *A. bogotensis* has been reported as a predator of some species of crab (Bhukal *et al.*, 2015) and fish (Deacon *et al.*, 2015). It is important to mention that, apart from the event here described, there are no other reports of predation of geckos and lizards by *A. bogotensis*.

Conversely, the *Hemidactylus* genus has taxonomically and nomenclaturally complex challenging species and, in some species, their external features vary among individuals of the same species. Hence, some taxa of this genus show wide geographic variation and can be easily confused (Carranza & Arnold, 2006). Accordingly, molecular data

are increasingly being used to resolve the taxonomy of cryptic species complexes (Lajmi *et al.*, 2016). Accordingly, *Hemidactylus angulatus* (Hallowell, 1854) will be considered in this paper as *Hemidactylus brookii* (Gray, 1845). Other authors have also proposed this taxonomic synonym (Bauer & Günther, 1991; Weiss & Hedges, 2007; Rösler & Glaw, 2010; Caicedo-Portilla & Dulcey-Cala, 2011). *Hemidactylus angulatus* is an invasive gecko from Guinea and Borneo that inhabits approximately 29.2% of the Colombian territory and recent estimates have indicated that, in the next 33 years, this species will occupy 72.6% of such territory, affecting native species and the natural ensemble and its ecological functions (Urbina-Cardona & Castro, 2011).

We recorded an adult *H. angulatus* individual on a black plastic sheet covering a compost pile (internal pile temperature 38°C) that was being preyed upon by an adult *A. bogotensis* in the Tropical Dry Forest area of Centro Universitario Regional del Norte (CURDN) of the Tolima University (5.0027°N, 74.9095°W, Datum WGS84, elevation 290 m above sea level), in the municipality of Armero-Guayabal-Tolima (Colombia). The spider was recorded grasping the gecko with its two pedipalps and chelicerae on the sides at the base of the head (Fig. 1A). Over a period of five minutes of observation, the gecko tried to extricate itself by moving its body and subsequently shed its tail (Caudal autotomy) while the spider remained attached to its head. Finally, the spider moved a few meters with its prey to the surrounding vegetation, a task for which it was unnecessary to change position, make a new attack or release the gecko at any time (Fig. 1B). It should be noted that the compost was on the ground near a high density of trees, where it is normal to find individuals of *A. bogotensis*, and to find individuals of *H. angulatus* in the CURDN buildings.

The gecko was identified according to the criteria of Buer *et al.* (2006), who describe strongly keeled dorsal tubercles, separated from one another by approximately the width of one tubercle and tubercles that are usually prominent on the dorsum of the head. The ctenid spider was identified by following the description of the *Ancylometes* genus (Höffer & Brescovit, 2000), which depicts the form of the epigyne as resembling a bike saddle with its nose pointing backwards. The distribution of the genus in Colombia (Hazzi *et al.*, 2013) and a description of the external characteristics of *A. bogotensis* (Merrett, 1988), which correspond to a triangular median plate with a narrow prominent protuberance, were subsequently considered for identification at the species level. The genitalia were then dissected following the classic technique (Levi, 1965), in which the straight copulatory ducts with a ventral contact with the spermatheca were observed. This process was performed in the Arachnological Collection of the Natural Sciences Institute (ICN) of the National University of Colombia.

This report broadens our knowledge about the prey of the *Ancylometes* genus and could indicate that, in areas where populations of *H. angulatus* and *A. bogotensis* live together, these depredation events occur. The spider *A. bogotensis* could be a biological

control agent of *H. angulatus*, limiting its access to forest areas and tropical dry forest successions.

The species *A. bogotensis* has been described as an important generalist and opportunistic predator (White, 2015). Therefore, to rule out incidental or opportunistic feeding events and to demonstrate that this gecko or other reptiles are frequently found in this spider species diet, more detailed studies would be necessary.



Figure 1. (A) *Acylosetes bogotensis* attacking *Hemidactylus angulatus* on a covered compost pile, (B) *Acylosetes bogotensis* moving the *Hemidactylus angulatus* at Centro Universitario Regional del Norte (CURDN), Tolima department, Colombia. Photo: Mario J. Gómez-Martínez.

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References

- Acevedo, A.A., Armesto, O. and Martínez-Cuesta, M. (2018). *Aromobates cannatellai* (Cannatella frog). Predation. *Herpetological review*, 49(4), 728-729.
- Auguste, R.J., Maraj, S. and Deo, R. (2018). Possible predation on the frog *Leptodactylus validus* (Anura: Leptodactylidae) by the spider *Ancylometes bogotensis* (Ctenidae) in Trinidad, WI. *Living World, Journal of the Trinidad and Tobago field naturalists' club*, 106-107.
- Aguilar-López, J.L., Pineda, E. and Luría-Manzano, R. (2014). Depredación de tres especies de herpetozoos por arañas en la región tropical de Veracruz, México. *Revista Mexicana de biodiversidad*, 85(3), 965-968. doi: <https://doi.org/10.7550/rmb.43649>
- Barbo, F.E., Rodrigues M.G., Couto, F.M. and Sawaya, R.J. (2009). Predation on *Leptodactylus marmoratus* (Anura: Leptodactylidae) by the spider *Ctenus medius* (Araneae: Ctenidae) in the Atlantic forest, southeast Brazil. *Herpetology notes*, 2, 99-100.
- Barej, M.F., Würstner, J. A. and Böhme, W. (2009). Predation on the treefrog *Leptopelis brevirostris* (Anura: Arthropelidae) by a wandering spider (Araneae: Ctenidae) in Cameroon. *Herpetology notes*, 2, 137-139.
- Bauer, A. and Günther, R. (1991). An annotated type catalogue of the geckos (Reptilia: Gekkonidae) in the zoological museum, Berlin. *Zoosystematics and evolution*, 67(2), 279-310. doi: <https://doi.org/10.1002/mmnz.19910670204>
- Bauer, A., Tchibozo, S., Pauwels, O.S.G. and Lenglet, G. (2006). A review of the gekkotan lizards of Bénin, with the description of a new species of Hemidactylus (Squamata: Gekkonidae). *Zootaxa*, 1242, 1-20. doi: <http://doi.org/10.5281/zenodo.273464>
- Bhukal, R., Rutherford, M.G. and Mohammed, R.S. (2015). Predation on a freshwater crab, *Dilocarcinus dentatus* (Trichodactylidae), by several tropical wolf spiders, *Ancylometes bogotensis* (Ctenidae), in Trinidad, WI. *Living World, Journal of the Trinidad and Tobago field naturalists' club*, 59-60.
- Caicedo-Portilla, R. and Dulcey-Cala, C.J. (2011). Distribución del gecko introducido *Hemidactylus frenatus* (Dumeril y Bribon 1836) (Squamata: Gekkonidae) en Colombia. *Biota colombiana*, 12(2), 45-56.
- Caldart, V.M., Iop, S., Rocha, M.C. and Cechin, S.Z. (2011). Diurnal and nocturnal predators of *Crossodactylus schmidti* Gallardo, 1961 (Anura, Hylodidae) in southern Brazil. *North-Western journal of zoology*, 7(2), 342-345.
- Carranza, S. and Arnold, E.N. (2006). Systematics, biogeography, and evolution of *Hemidactylus* geckos (Reptilia: Gekkonidae) elucidated using mitochondrial DNA sequences. *Molecular phylogenetics and evolution*, 38(2), 531-545. doi: <https://doi.org/10.1016/j.ympev.2005.07.012>
- Deacon, A.E., Farrell, A.D. and Fraser, D.F. (2015). Observation of a semi-aquatic spider attack: An overlooked fish predator in a well-studied ecosystem? *living world, journal of the Trinidad and Tobago field naturalists' club*, 57-59.
- De Armas, L.F. (2001). Frogs and lizards as prey of some Greater Antillean arachnids. *Revista ibérica de aracnología*, 3, 87-8.
- Dehling, D.M. (2007). *Smilisca sordida* (drab tree frog). Predation. *Herpetological review*, 38, 444.
- Fonseca Hernández, E. and Rodríguez-Cabrera, T.M. (2014). Predation on a Cuban Brown Anole, *Anolis sagrei* (Dactyloidae), by a spider, *Cupiennius cubae* (Ctenidae), in the cienfuegos botanical garden, South-central Cuba. *IRCF Reptiles & Amphibians*, 21, 98, 99.
- Gallego-Carmona, C.A., Forero-Rodríguez, J.S., Castro-Arango, J.A. and Castellanos-Vargas, C. (2017). *Engystomops pustulosus* (Tungara Frog) Predation. *Herpetological review*, 48(2), 408.
- Hayes, M.P. (1983). Predation on the adults and prehatching stages of glass frogs (Centrolenidae). *Biotropica*, 15, 74-76. Doi: <https://doi.org/10.2307/2388005>
- Hazzi, N.A., Valderrama-Ardila, C., Brescovit, A.D., Polotow, D. and Simo, M. (2013). New records and geographical distribution of ctenid spiders (Araneae: Ctenidae) in Colombia. *Zootaxa*, 3709, 243-254. doi: <https://doi.org/10.11646/zootaxa.3709.3.3>
- Höfer, H. and Brescovit, A.D. (2000). A revision of the Neotropical spider genus *Ancylometes* Bertkau (Araneae: Pisauridae). *Insect systematics and evolution*, 31, 323-360.
- Lajmi, A., Giri V.B. and Karanth, K.P. (2016). Molecular data in conjunction with morphology help resolve the *Hemidactylus brookii* complex (Squamata: Gekkonidae). *Organisms diversity and evolution*, 16, 659-677.
- Lapinski, W. and Tschapka, M. (2013). Habitat use in an assemblage of Central American wandering spiders. *The journal of arachnology*, 41(2), 151-159.
- Levi, H.W. (1965). Techniques for the study of spider genitalia. *Psyche*, 72: 152-158.
- Losos, J.B. (2009). *Lizards in an evolutionary tree: ecology and adaptive radiation of anoles*. California, USA, University of California press.
- Maffei, F., Ubaid, F.K. and Jim, J. (2010). Predation of herps by spiders (Araneae) in the Brazilian Cerrado. *Herpetology notes*, 3, 167-170.
- Menin, M., Rodrigues, D.J. and De Azevedo, C.S. (2005). Predation on amphibians by spiders (Arachnida, Araneae) in the Neotropical region. *Phyllomedusa: Journal of herpetology*, 4, 39-47. doi: <https://doi.org/10.11606/issn.2316-9079.v4i1p39-47>
- Merritt, P. (1988). Notes on the biology of the neotropical pisaurid, *Ancylometes bogotensis* (Keyserling) (Araneae: Pisauridae). *Bulletin of the British arachnological society*, 7(7), 197-201.
- Rösler, H. and Glaw, F. (2010). Morphologische variation und taxonomie von *Hemidactylus brookii* Gray, 1845 und *Hemidactylus angulatus* Hallowell, 1854 sowie phänotypisch ähnlicher Taxa. *Spixiana*, 33, 139-160.
- Salcedo-Rivera, G.A., Fuentes-Mario, J.A. and Tovar-Márquez, J. (2018). Predation of the frog *Elachistocleis panamensis* by the spider *Ancylometes bogotensis*: first record. *Biota Colombiana*, 19(2), 128-132. doi: <http://dx.doi.org/10.21068/c2018.v19n02a11>

- Santana, D.J., Da Silva, E.T. and De Oliveira, E.F. (2009). Predação de *Dendropsophus elegans* (Anura, Hylidae) por *Phoneutria nigriventer* (Araneae, Ctenidae) em Viçosa, Minas Gerais, Brasil. *Boletim do museu de biologia Mello Leitão*, 26, 59-65.
- Silva-Vieira, W.L., Ribeiro-G, M.B. and Pantoja, R. (2012). Predation on *Tropidurus hispidus* (Squamata: Tropiduridae) by *Lasiadora klugi* (Aranea: Theraphosidae) in the semiarid caatinga region of northeastern Brazil. *Biota Neotropica*, 12(4), 1-3. doi: <https://doi.org/10.1590/S1676-06032012000400028>
- Urbina-Cardona, J.N. and Castro, F. (2011). Distribución del nicho ecológico actual y futuro de anfibios y reptiles invasores: competencias en las Corporaciones Autónomas Regionales y de desarrollo sostenible en Colombia. In Vargas-Ríos, O., Reyes, S.P., (Eds.), *La restauración ecológica en la práctica*. Memorias del I congreso colombiano de restauración ecológica and II simposio colombiano de experiencias en restauración ecológica (pp. 180-188). Bogotá, Colombia, Universidad Nacional de Colombia – GREUNAL.
- White, G., (2015). Observation of a spider, *Ancylometes bogotensis* (Ctenidae), preying on the frog *Rhinella beebei* (Bufonidae) in Trinidad. *Living world, journal of the Trinidad and Tobago field naturalists' club*, 61-62.
- Weiss, A.J. and Hedges, S.B. (2007). Molecular phylogeny and biogeography of the Antillean geckos *Phyllodactylus wirshingi*, *Tarentola americana*, and *Hemidactylus haitianus* (Reptilia, Squamata). *Molecular phylogenetics and evolution*, 45, 409-416. doi: <https://doi.org/10.1016/j.ympev.2007.01.006>