

# May the force be with us: predation of the gecko *Hemidactylus mabouia* by the ant *Pheidole oxyops*

Hugo Andrade<sup>1,2\*</sup>, Tainara L. Silva<sup>1</sup>, Mariáh Tibcherani<sup>3</sup>, Rony P. S. Almeida<sup>1,4</sup>

1 Laboratório de Biologia e Ecologia de Vertebrados, Departamento de Biociências, Universidade Federal de Sergipe, Campus Alberto de Carvalho, 49500-000 Itabaiana, SE, Brazil.

2 Instituto de Biologia, Universidade Estadual de Santa Cruz, 45662-900 Ilhéus, BA, Brazil.

3 Instituto de Biociências, Universidade Federal de Mato Grosso do Sul, 79070-900 Campo Grande, MS, Brazil.

4 Laboratório de Morfologia e Ecologia Funcional de Formigas, Museu Paraense Emílio Goeldi, 66077-830 Belém, PA, Brazil.

\*Corresponding author. Email: [hugoandrade915@gmail.com](mailto:hugoandrade915@gmail.com)

DOI: 10.5281/zenodo.7410939

For ectothermic species, external factors such as prey availability and social interaction might be determinant to explore different food sources (Vitt & Caldwell, 2014). Conversely, intrinsic factors such as activity period also influence the diet and predation potential (Torello-Viera & Marques, 2017). Lizards, snakes and birds are the main vertebrate predators of reptiles in nature (Schalk & Cove, 2018). Among invertebrates, spiders are the main predators of reptiles (Oliveira et al., 2017) and ants are rarely recorded (Sazima, 2015).

Knowing the predator-prey interactions, whether natural or opportunistic, helps in understanding the population processes of species control (Schalk & Cove, 2018; Suraci et al., 2022). For example, describing predatory events on exotic and invasive species are important for understanding population dynamics, which is crucial for their effective control (Silva & Ribeiro-Filho, 2009; Andrade et al., 2015; Cabrera-Guzmán et al., 2015).

The Gecko *Hemidactylus mabouia* (Moreau de Jonnés, 1818) is native to Africa (Carranza & Arnold, 2006) and was

accidentally introduced into the Americas during European colonization (Meshaka, 2000; Howard et al., 2001; Rocha et al., 2011). In Brazil, there are published records of this species since the 17th century (Agarwal et al., 2021) and the species has expanded its distribution in open habitats (Rocha et al., 2011) and anthropized areas (Vanzolini et al., 1980), which offer suitable phytophysiognomic conditions for colonization.

This species is known as prey for many taxa, mostly snakes and lizards (Borrotto-Páez & Reyes Pérez, 2020). However, there are few predation reports of *H. mabouia* by invertebrates, especially Hymenoptera (Sazima, 2015; Borrotto-Páez & Reyes Pérez, 2020). We extend this information with the first predation record of *H. mabouia* by the ant *Pheidole oxyops* Forel, 1908 (Fig. 1).

The event occurred on 25 July 2017 at 09:38 am in Campo Grande, Mato Grosso do Sul, Brazil, during fieldwork in a Cerrado fragment of the Reserva Particular do Patrimônio Natural of Universidade Federal de Mato Grosso do Sul (20°30'31" S, 54°36'55" W). We found the lizard alive on a fallen trunk, 3–5 above the ground, being subdued and preyed upon by fifteen worker ants, while new workers joined the predation. The predation incident was observed for 90 seconds. During this period some ants walked under the lizard while others bit the gecko in vari-

ous locations. The lizard showed no escape reaction and was being carried to the ant colony by workers and soldiers when we collected it.

The *Hemidactylus mabouia* specimen (Fig. 1A; 42 mm snout-vent length) was deposited in Coleção Zoológica de Referência of Universidade Federal de Mato Grosso do Sul (ZUFMS 03354) and *P. oxyops* deposited in Coleção Entomológica do Museu Paraense Emílio Goeldi (two minor workers and one major; MPEG.HHY 03021757; Fig. 1B-C).

Myrmicinae ants are reported affecting the recruitment of lizards (Chalcraft & Andrews, 1999; Darracq et al., 2017), but records of predation are scarce (Sousa & Freire, 2010; Ribeiro et al., 2011). Species of *Pheidole* adapt their foraging pattern according to prey size; large prey demand the recruitment of many workers while small prey are attacked by individual foragers (Detrain & Deneubourg, 1997). In Brazil, *P. oxyops* is distributed in Mato Grosso, Mato Grosso do Sul, Goiás, Minas Gerais, São Paulo, and Paraná states (Janicki et al., 2016). Moreover, *Pheidole oxyops*, of the *P. diligens* group (Wilson, 2003), is essentially carnivorous, has a nest structure which acts as a pitfall trap and has the unique behavior of laying feathers along the edges of the entrances to its nests to increase prey abundance and diversity (Gomes et al., 2019).

Most predation records of *H. mabouia* by arthropods have been reported in the last eight years (Pedroso-Santos et al., 2019; Borroto-Páez & Reyes Pérez, 2020), suggesting an observational bias or that such records are very occasional events. Therefore, the present record demonstrates the importance of investigations on *P. oxyops* as a possible controller of invasive exotic species.

### ACKNOWLEDGEMENTS

We thank Vivian Nacagava for the support in the collection and Henrique C. Costa for his valuable suggestions in the text. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) Finance Code 001 - Ph.D. scholarships provided to RPSA.

### REFERENCES

- Agarwal I., Ceríaco L.M.P., Metallinou M., Jackman T.R., Bauer A.M. 2021. How the African house gecko (*Hemidactylus mabouia*) conquered the world. *Royal Society Open Science* 8:210749. doi: 10.1098/rsos.210749.
- Andrade R.A., Siqueira Y.F., Passos D.C. 2015. Predation of *Hemidactylus mabouia* (Squamata: Gekkonidae) by *Guira guira* (Cuculiformes: Cuculidae) in northeastern Brazil. *Boletim do Museu de Biologia Mello Leitão, Nova Série* 37:201–206.
- Borroto-Páez R., Reyes Pérez D. 2020. Predation by a Cuban Treefrog (*Osteopilus septentrionalis*) and a Domestic Cat (*Felis catus*) on Tropical House Geckos (*Hemidactylus mabouia*) in Central Cuba, with a review of predators and vertebrate prey of Tropical House Geckos. *Reptiles & Amphibians* 27:120–128. doi: 10.17161/randa.v27i2.14022.
- Cabrera-Guzmán E., Crossland M.R., Pearson D., Webb J.K., Shine R. 2015. Predation on invasive cane toads (*Rhinella marina*) by native Australian rodents. *Journal of Pest Science* 88:143–153. doi: 10.1007/s10340-014-0586-2.
- Carranza S., Arnold E.N. 2006. Systematics, biogeography, and evolution of *Hemidactylus* geckos (Reptilia: Gekkonidae) elucidated using mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution* 38:531–545. doi: [10.1016/j.ympev.2005.07.012](https://doi.org/10.1016/j.ympev.2005.07.012).
- Chalcraft D.R., Andrews R.M. 1999. Predation on lizard eggs by ants: species interactions in a variable physical environment. *Oecologia* 119:285–292. doi: [10.1007/s004420050788](https://doi.org/10.1007/s004420050788).
- Darracq A.K., Smith L.L., Oi D.H., Conner L.M., McCleery R.A. 2017. In-

vasive ants influence native lizard populations. *Ecosphere* 8:e01657. doi: [10.1002/ecs2.1657](https://doi.org/10.1002/ecs2.1657).

Detrain C., Deneubourg J.-L. 1997. Scavenging by *Pheidole pallidula*: a key for understanding decision-making systems in ants. *Animal Behaviour* 53:537–547. doi: [10.1006/anbe.1996.0305](https://doi.org/10.1006/anbe.1996.0305).

Forel A. 1908. Ameisen aus Sao Paulo (Brasilien), Paraguay etc. gesammelt von Prof. Herm. v. Ihering, Dr. Lutz, Dr. Fiebrig, etc. *Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien* 58:340–418.

Gomes I.J.M.T., Santiago D.F., Campos R.I., Vasconcelos H.L. 2019. Why do *Pheidole oxyops* (Forel, 1908) ants place feathers around their nests? *Ecological Entomology* 44:451–456. doi: [10.1111/een.12722](https://doi.org/10.1111/een.12722).

Howard K.G., Parmerlee J.S., Powell R. 2001. Natural history of the edificarian geckos *Hemidactylus mabouia*, *Thecadactylus rapicauda*, and *Sphaerodactylus sputator* on Anguilla. *Caribbean Journal of Science* 37:285–288.

Janicki J., Narula N., Ziegler M., Guénard B., Economo E.P. 2016. Visualizing and interacting with large-volume biodiversity data using client–server

web-mapping applications: The design and implementation of antmaps.org. *Ecological Informatics* 32:185–193. doi: [10.1016/j.ecoinf.2016.02.006](https://doi.org/10.1016/j.ecoinf.2016.02.006).

Meshaka W.E. 2000. Colonization dynamics of two exotic geckos (*Hemidactylus garnotii* and *H. mabouia*) in Everglades National Park. *Journal of Herpetology* 34:163–168. doi: [10.2307/1565258](https://doi.org/10.2307/1565258).

Moreau de Jonnés A. 1818. Monographie du mabouja des murailles, ou Gecko Mabouja des Antilles. *Bulletin des Sciences par la Société Philomathique de Paris, Series 3* 5:138–139.

Oliveira C.N., Barbosa G.G., Campos I.H.M.P., Guarnieri M.C., Ribeiro S.C. 2017. Predation on *Coleodactylus meridionalis* (Squamata: Sphaerodactylidae) by *Ctenus rectipes* (Araneae: Ctenidae) in the Atlantic Forest, northeastern, Brazil. *Herpetology Notes* 10:221–223.

Pedroso-Santos F., Sanches P.R., Sousa J.C., Costa-Campos C.E. 2019. Predation on the tropical house gecko *Hemidactylus mabouia* (Squamata: Gekkonidae) by the granular toad *Rhinella major* (Anura: Bufonidae), including an update list of predation events in this species of gecko. *Herpetology Notes* 12:833–839.

Ribeiro L.B., Gogliath M., Freire E.M.X. 2011. *Hemidactylus brasilianus* (Amaral's Brazilian Gecko) and *Cnemidophorus ocellifer* (Spix's Whiptail): Predation. *Herpetological Bulletin* 117:31–32.

Rocha C.F.D., Anjos L.A., Bergallo H.G. 2011. Conquering Brazil: the invasion by the exotic gekkonid lizard *Hemidactylus mabouia* (Squamata) in Brazilian natural environments. *Zoologia (Curitiba)* 28:747–754. doi: [10.1590/S1984-46702011000600007](https://doi.org/10.1590/S1984-46702011000600007).

Sazima I. 2015. House Geckos (*Hemidactylus mabouia*) and an unidentified snake killed and devoured by army ants (*Eciton burchellii*). *Herpetology Notes* 8:527–529.

Schalk C.M., Cove M. V. 2018. Squamates as prey: Predator diversity patterns and predator-prey size relationships. *Food Webs*. doi: [10.1016/j.fooweb.2018.e00103](https://doi.org/10.1016/j.fooweb.2018.e00103).

Silva E.T., Ribeiro-Filho O.P. 2009. Predation on juveniles of the invasive American bullfrog *Lithobates catesbeianus* (Anura, Ranidae) by native frog and snake species in South-eastern Brazil. *Herpetology Notes* 2:215–218.

Sousa P.A.G., Freire E.M.X. 2010. *Coleodactylus natalensis* (NCN): Predation. *Herpetological Review* 41:218–219.

Suraci J.P., Smith J.A., Chamailé-Jammes S., Gaynor K.M., Jones M., Luttbeg B., ... Sih A. 2022. Beyond spatial overlap: harnessing new technologies to resolve the complexities of predator–prey interactions. *Oikos:e09004*. doi: [10.1111/oik.09004](https://doi.org/10.1111/oik.09004).

Torello-Viera N.F., Marques O.A.V. 2017. Daily activity of Neotropical Dip-sadid snakes. *South American Journal of Herpetology* 12:128–135. doi: [10.2994/SAJH-D-16-00023.1](https://doi.org/10.2994/SAJH-D-16-00023.1).

Vanzolini P.E., Ramos-Costa A.M., Vitt L.J. 1980. Répteis da Caatinga. Academia Brasileira de Ciências, Rio de Janeiro.

Vitt L.J., Caldwell J.P. 2014. *Herpetology: An Introductory Biology of Amphibians and Reptiles*. Academic Press, San Diego.

Wilson E.O. 2003. *Pheidole in the New World: a dominant, hyperdiverse ant genus*. Harvard University Press, Cambridge.

*Editor: H. C. Costa*



**Figure 1.** Specimen of **A)** *Hemidactylus mabouia* (42 mm snout-vent length; ZUFMS 03354) preyed on by *Pheidole oxyops* **B)** minor worker and **C)** major worker; MPEG.HHY 03021757) during fieldwork at Cerrado fragment of the Reserva Particular do Patrimônio Natural of Universidade Federal de Mato Grosso do Sul. (photos by Rony P.S. Almeida).