

# Hopes (Orthoptera: Tettigoniidae).

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Insects of the Order Orthoptera include species with chewing mouthparts, incomplete metamorphosis, and enlarged posterior femurs adapted for jumping. The order contains two suborders, Ensifera and Caelifera. The first groups are the crickets, the hopes, and the paquinhas, with long antennae, tympana located on the tibia of the first pair of legs, stridulating apparatus on the forewings, and a spadiform ovipositor. The other suborder includes the grasshoppers. Tettigoniidae, popularly known as hopes or leaf bugs, belong to the order Orthoptera, suborder Ensifera, superfamily Tettigoniioidea. They have representatives in all biogeographic regions, except in polar regions, being more abundant and diverse in tropical and subtropical regions.

Males are 28 to 36 mm long, females 32 to 42 mm. Wings included, its size reaches 6 cm for a wingspan of ten. The morphology of the two sexes is very comparable. The insect is usually entirely green, but some specimens are completely yellow or have yellow legs, except for a rust-colored band on the upper part of the body and an identical border along the upper fringe of the elytra.

Antennae usually together with more than 30 tympanic articles located on the anterior tibiae; tarsus with four tarsomeres; forewings tegmina graminacea presence of stridulatory apparatus in the tegmina of males and ovipositor with three pairs of articulated valves along its length forming an ensiform structure the female is equipped with a helical axis, an egg-laying organ, can measure 23 to 32 millimeters, reaches the end of the elytra and is slightly curved downwards. With the anterior pair of wings, shaped like parchment, resembling leaves. The ovipositor can be seen from the fifth stage onwards, the wings appear for both sexes from the sixth stage of rudimentary formation. The male stridulation organ located at the base of the elytra is usually brown.

It is a very attractive group, mainly due to its remarkable ability to camouflage itself with the environment, which can be living leaves, dead leaves, tree bark, branches, mosses, lichens, and stones, and can even be mimetic of other insects. Hopes make sounds by rubbing a wing to attract the opposite sex. The sound is produced by the friction of two structures located in the basal region of the tegmina: the stridulatory row and the palette. The sound is produced during the closure of the tegmina when the palette brushes against the row of teeth. Hope's adult life only lasts one summer. When winter comes, she dies because of the cold. But in late autumn, before dying, the female lays eggs in the soil, and these manage to survive the cold of winter (diapause). In spring, nymphs emerge from the eggs. After the eggs hatch, the larvae go through 4-9 successive instars, depending on the species, before finally reaching the adult stage.

Most of the hopes have an arboreal habit, however, some live among the undergrowth, on the ground or associated with

floating aquatic herbaceous plants. In general, species are generalists, feeding on what is available. There are phytophagous species and other predators. With few exceptions, Hopes are most active at night and are often attracted to light, especially Phaneropterinae. They feed on fruits and flowers, but there are predatory families capable of devouring grasshoppers or even other species. There is an unusual record of a scorpion (Scorpiones: Chactidae) preyed on by a scorpion (Orthoptera: Tettigoniidae) in the western Brazilian Amazon. Natural predators are birds, birds, primates, lizards, and amphibians.

Among insects, the Orthoptera order is the sixth largest, with more than 27 thousand described species. In Brazil, 1,700 species are registered, and their representatives are known as grasshoppers, crickets, hopes, and paquinhas. Most species in this family are green in color, which justifies the popular name of hopes; however, the diversity of habitus and colors is much wider. The family is the largest within the Ensifera, with approximately 6,000 known species in the world. In Brazil, there are records of five subfamilies of the order Orthoptera: Burmeister, Conocephalinae, Listrocelidinae, Meconematinae, Phaneropterinae, Pseudophyllinae, and Redtenbacherinae. The larvae are also green, as are the adults (imago stage), which have a thin brown longitudinal line on the back. Among the genera are the *Ommatopterae* Pictet, 1888, *Pterochroza* Serville, 1831 and *Tanusia* Stål, 1874. Among the species are *Pterochroza ocellata* (Linnaeus, 1758), *Scaphura nigra* (Thunberg, 1824), *Tettigonia cantans* (Fuessly, 1775) and *Tettigonia caudata* (Charpentier, 1845) (Figure 1-3) [1-20].



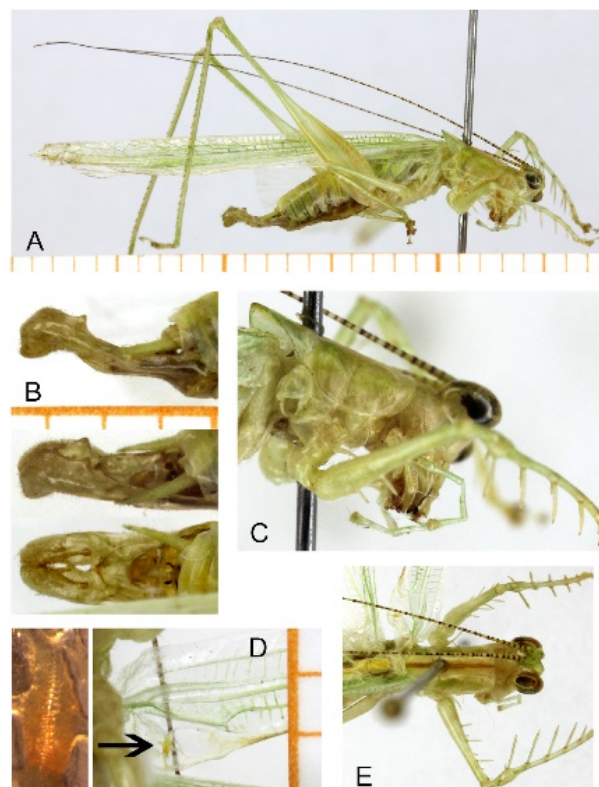
**Figure 1.** The peacock's striking characteristic is the act of raising its wings like a fan, like what male peacocks do. The wings of these hopes often have spots that resemble eyes also known as ocelli, so their practice of bristling their wings can serve as a defense technique to scare away or frighten potential predators, making the home appear larger than it is.

Source: <https://pt.wikipedia.org/wiki/Esperan%C3%A7a-pav%C3%A3o>.



**Figure 2.** Camouflaged nymph of Nymphs of *Microcentrum californicum* Hebard, 1932 (Orthoptera: Ensifera: Tettigoniidae) perched on a mint leaf *Mentha spicata* L. (Lamiaceae).

Source: <https://pt.wikipedia.org/wiki/Tettigoniidae>



**Figure 3.** Male: A. lateral view abdomen slightly shrunk; B. subgenital plate in lateral, dorsolateral, and dorsal view; C. anterior portion of the body, note auditory spiracle with the latero-ventrally directed opening; D. stridulatory file and base of left tegmen in ventral view (the little yellow spot is the file); E. anterior portion of the body in dorsal view note long thigh

spines.

Source:Sources: DOI:10.11646/zootaxa.4107.3.12Corpus and ID: 207556675.

## References

- [1] Gullan PJ, Cranston PS. *Insects: Fundamentals of Entomology*. 5th. ed. Roca. 2017.
- [2] Farias PRS. *Manual of General Entomology*. 1st ed. Belém: Edufra. 2013.
- [3] Rafael JA, et al. *Insects from Brazil: diversity and taxonomy*. 1st ed. Ribeirão Preto: Holos. 2012.
- [4] Menezes EC, Bravo F. Mantodea (Insecta) from the Semiarid. In: Bravo F, eds. *Semiarid Arthropods: Biodiversity and Conservation*. 1st ed. Feira de Santan: Print Mídia; 2014; p. 111-116.
- [5] Barranco P. Orthoptera from the Alberto Manuel Brenes Biological Reserve (San Ramón, Costa Rica). *Anostostomatidae and Tettigoniidae (Orthoptera: Ensifera)*. *Bulletin of the Aragonese Entomological Society*. 2010; 46: 509–517.
- [6] Chamorro-Rengifo J, Braun H. The Tettigoniidae (Orthoptera) described by Salvador de Toledo Piza Jr. and deposited in the collection of the University of São Paulo, Escola Superior de Agricultura "Luiz de Queiroz", Brazil. *Zootaxa*. 2010; 2635: 41-66.
- [7] Chamorro-Rengifo J, Lopes-Andrade C. The phallus in Tettigoniidae (Insecta: Orthoptera: Ensifera): revision of morphology and terminology, and discussion on its taxonomic importance and evolution, *Zootaxa*. 2014; 3815 (2): 151–199.
- [8] Mendes DMM, Oliveira JC, Chamorro-Rengifo J, Rafael JA. Two new genera of predatory katydids (Orthoptera: Tettigoniidae: Meconematinae) from the Amazon rainforest. *Zootaxa*. 2018; 4438(2): 261-282.
- [9] Mendes DMM, Oliveira JC. The Little Harlequin Katydid – a new species of Paraphiliac Redtenbacher, 1891 (Orthoptera: Tettigoniidae: Conocephalinae; Conocephalini) from the Amazonian rainforest. *Zootaxa*. 2019; 4623(1): 151–162.
- [10] Cadena-Castañeda OJ. The Microcentrini tribes, stat. nov. and Amblycoryphini, stat. nov. (Orthoptera: Tettigoniidae: Phaneropterinae): fourth contribution to the suprageneric organization of neotropical Phaneropterinae. *Bulletin of the Aragonese Entomological Society*. 2014; 55: 19–3.
- [11] Red list of invertebrates project [Internet]. Lisbon: Association for Research and Development of Sciences; @2020 [cited 2024 Mar 02]. Available from <https://lvinvertebrados.pt/especies-protegidas/apteromatis-aptera/>.
- [12] Desutter-Grandcolas L. Phylogeny and the evolution of acoustic communication in extant Ensifera (Insecta, Orthoptera). *Zoologica Scripta*. 2003; 32(6): 525–561.
- [13] Mendes DMM, Oliveira JC, Alves-Oliveira JR, Rafael JA. New species and new behavioral data of *Phlugiola* Karny,

1907 (Orthoptera: Tettigoniidae: Meconematinae) from the Brazilian Amazonian Rainforest. *Zootaxa*. 2017; 4243(3): 503–520.

[14] Mendes DMM, Oliveira JC. First record of *Copiphora longicauda* Serville, 1831 (Orthoptera: Tettigoniidae: Conocephalinae: Cophiphorini) in Brazil and new behavioral data. *Entomological Communications*. 2019; 1: 1–2.

[15] Gwynne D. *Katydid and Bush-Crickets – Reproductive behavior and evolution of the Tettigoniidae*. 1st ed. London: Cornell University Press. 2001.

[16] Mendes DMM, Chamorro–Rengifo J, Rafael JA. Five new genera of angle–wing katydids (Orthoptera: Tettigoniidae: Phaneropterinae: Microcentrini) from the Amazon Rainforest. *Zootaxa*. 2020; 4828(1): 2–84.

<https://doi.org/10.11646/zootax>.

[17] Diego MMM. *Taxonomy of Microcentrini Brunner von Wattenwyl, 1878 (Orthoptera: Tettigoniidae: Phaneropterinae)*. [P.h.D. dissertation]. Manaus: National Amazon Research Institute; 2021.

[18] Antunes AF. Diversity of hoppers (Insecta, Orthoptera, Tettigoniidae) from Itatiaia National Park [Internet]. Rio de Janeiro: Federal University of Rio De Janeiro; @2020 [cited Mar 04]. Available from

[https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/trabalhoConclusao/viewtrabalhoConclusao.jsf?popup=true&id\\_trabalho=8466591](https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/trabalhoConclusao/viewtrabalhoConclusao.jsf?popup=true&id_trabalho=8466591).

[19] Godé L, Zefa E, Costa MKM, Chamorro-Rengifo J. Grasshoppers, Crickets and Hoppers (Orthoptera) from the Pedra Talhada Biological Reserve. In: Studer A, Nusbaumer L, Spichiger R, eds. *Biodiversity of the Pedra Talhada Biological Reserve (Alagoas, Pernambuco - Brazil)*. Boissiera. 2015; 68: 251-265.

[20] Almeida MRN, Nascimento JAF, Machado EO, Lyra AFA. Once a prey, now a predator: an unusual record of a scorpion (Scorpiones: Chactidae) predated by a katydid (Orthoptera: Tettigoniidae) in the western Brazilian Amazon. *Amazonian Act*. 2022; 52: 229-231.