



Systematics, Morphology and Biogeography

## *Axima nordestina* (Hymenoptera, Eurytomidae), a new stalk-eyed wasp from Brazilian savannah



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### ABSTRACT

A new stalk-eyed wasp *Axima nordestina* **sp. n.** is described from the Northeastern Brazilian savannah. *Axima nordestina* is the fourth species of stalk-eyed wasps (*A. noyesi* species group) and the second one known from Brazil. The head morphology of *A. nordestina* appears less derived than in the other known species. An updated key of the *A. noyesi* species group is provided.

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### Introduction

Stalk-eyed wasps are morphologically bizarre chalcidoid parasitoids, which are only known from the Neotropics. So far, three species have been described within the recently revised *Axima noyesi* species group, one from Brazil, and four other non *noyesi* species group (*spinifrons* species group) were also described from Brazil (Arias-Penna et al., 2014). During a research stay at the Coleção Zoológica do Maranhão (CZMA) at Maranhão, Brazil, we recently discovered an additional species, which is described and diagnosed below.

### Material and methods

The material examined was provided by Francisco Limeira-de-Oliveira, curator of the Coleção Zoológica do Maranhão (CZMA), Universidade Estadual do Maranhão, Caxias, Maranhão, Brazil. Morphological terminology follows the Hymenoptera Anatomy Ontology (Hymenoptera Anatomy Consortium, 2014). The nomenclature of integument sculpture follows Harris (1979). The key for species follows Arias-Penna et al. (2014). The new species has been prospectively registered with Zoobank (Polaszek et al., 2005). The following abbreviations are used in the text: cl = clava, F = flagellomere, Mt = metasomal tergite, ped = pedicel.

The specimen was examined with a Leica MZ80 Stereo Microscope. Images were taken with a Leica DFC 495 camera attached to a Leica Z16 APO Stereo Microscope. Figures were produced from stacks of images that vertically transected the specimen using Leica LAS (Leica Application Suite V4.3.0) Microsystems by Leica (Switzerland) Limited. These were combined automatically into a single image using Helicon Focus (version 6.0.18), based on Method C (Pyramid) and focus autoadjustments 1% (horizontally).

### Results

#### Taxonomy

**Key to females of *Axima noyesi* species group** (modified from Arias-Penna et al., 2014)

1. Mesoscutum without median carina (Figs. 4 and 8) . . . 2
- Mesoscutum with median carina at least slightly indicated . . . 3
2. Head strongly transverse in dorsal view, 2.0 times as broad as mesosoma. Mesoscutellar process more posteriorly pointed (shark-fin shaped). Mt5 entirely covered with sparse white setae . . . *A. diabolus* (Yoshimoto & Gibson, 1979)
- Head less transverse in dorsal view, 1.7 times as broad as mesosoma (Fig. 8), Mesoscutellar process dorsally pointed (cone shaped) (Fig. 5). Mt5 with lateral patch of white setae (Fig. 7) . . . *A. nordestina* **sp. nov.**
3. Median mesoscutal carina slightly indicated, laterally flanked by rows of piliferous punctures (rounded depressions). Mt5 and Mt6 with distinct setation . . . *A. noyesi* Subba Rao, 1978

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**Figs. 1–4.** *Axima nordestina* Barbosa, Krogmann & Azevedo **sp. nov.** 1. Habitus, lateral view. 2. Head, lateral view. 3. Head, frontal view. 4. Mesosoma and petiole, dorsal view.

- Median mesoscutal carina more distinctly raised, laterally flanked by rows of piliferous foveae (subrectangular depressions). Mt5 bare, Mt6 with few scattered setae . . . *A. sidi* Arias-Penna, Pape & Krogmann, 2014

*Axima nordestina* Barbosa, Krogmann & Azevedo **sp. n.** (Figs. 1–8)

**Type material.** Holotype female: Brasil, Maranhão, Mirador, Parque Est[adual] Mirador, Povoado Pindaíba (Mel), 06°39'44" S 45°01'37" W, Armadilha Malaise, 01-05.vi.2011, F. Limeira-de-Oliveira, M.M. Abreu & J.S. Pinto Junior (CZMA). The holotype is deposited in Coleção Zoológica do Maranhão (CZMA), Caxias, Maranhão, Brazil.

**Diagnosis.** Eye stalks relatively short, head in dorsal view 1.7 times as broad as mesosoma. Mesoscutellar process dorsally pointed and cone-shaped. Mt5 with lateral patch of white setae.

**Description.** Body color (Figs. 1 and 5). Body generally dark brown with ventral and lateral portions of head (Figs. 2 and 3) and

mesosoma (Figs. 2 and 5) brown. Legs dark brown (Fig. 5). Fore and hind wings hyaline. Body length: 7.15 mm, head plus mesosoma: 3.07 mm.

**Head** (Figs. 2, 3 and 5). Head punctate, densely covered with white setae (Figs. 2 and 3), though less distinct, shorter and thinner, dorsally (Fig. 3). Antenna 10-segmented. Length of antennal segments (in mm): scape: 0.92, pedicel: 0.08, F1 (anellus): 0.04, F2: 0.31, F3: 0.23, F4: 0.23, F5: 0.19, F6: 0.19, F7: 0.15, clava: 0.30. F2–F6 densely covered with long and depressed setae. Longitudinal sensilla arranged in multiple irregular rows (number of rows depending on length of flagellomere). Clava (Figs. 2 and 3) one-segmented, but limits of fused antennomeres still slightly indicated, densely covered with long setae. Frons densely setose and entirely foveate, with basal portion wide, at least more than half width of head in frontal view. Gena short, shorter than eye length in lateral profile; with expansion around posterior margin.



**Figs. 5–8.** *Axima nordestina* Barbosa, Krogmann & Azevedo **sp. nov.**, 5. Head and mesosoma, lateral view. 6. Wings, dorsal view. 7. Metasoma, lateral view. 8. Head and mesosoma, dorsal view.

**Mesosoma** (Figs. 4, 5 and 8). Pronotum (Fig. 8) 0.34 as long as wide; with piliferous punctures, more dense at lateral panel of pronotum. Mesoscutum with complete and broadly foveolate notauli (Figs. 4 and 8); without median mesoscutal carina (Fig. 8), remaining mesoscutum with piliferous punctures. Dorsal surface of axillae with piliferous punctures, posterior portion of axillae smooth with distinct patch of white setae. Axillula smooth, dorsally defined by distinct carinae. Mesoscutellum expanded dorsally into cone-shaped process, antero-medially with keel-like carina (Figs. 5 and 8). Mesepisternum with distinct but shallow mesofemoral depression (Figs. 2 and 5), the depression anteriorly without carina; Mesepisternum anteriorly with distinct white setae. Mesepimeron (Figs. 2 and 5) glabrous, upper mesepimeron marked by deep impression, with well-marked fovea. Ventral mesopleuron with piliferous foveae; mesofurcal pit large, situated anterior to mesocoxal depression; mesodiscriminal line absent.

Metanotum with metascutellar arms carinate; lateral panel of metanotum consisting of row of large fovea; metascutellum carinate, reaching anterior margin but separated from posterior margin of metanotum. Lateral panel of metapleuron with densely foveolate punctures and distinct long white setation. Ventral metepisternum anteriorly smooth, posterior portion irregularly foveolate and greatly expanded between hind coxae. Propodeum with median foveolate sulcus, and most piliferous punctures foveolate and much larger than on pro- and mesonotum.

**Legs** (Fig. 5). Forecoxa with large piliferous punctures. Meso and hind coxae setose and polished.

**Wings** (Fig. 6). Length of submarginal vein: 1.08 mm, marginal vein: 0.69 mm, postmarginal vein: 0.15 mm, stigmal vein: 0.15 mm.

**Metasoma** (Fig. 7). Length of metasomal tergites in dorsal view (in mm): Mt1 (petiole): 1.08, Mt2: 0.23, Mt3: 0.23, Mt4: 0.23, Mt5: 0.46, Mt6: 0.77, Mt7: 0.69, Mt8/9: 0.23. Petiole with indistinct,

shallow reticulation; subrectangular in cross section, with four strong carinae delineating each of the dorso- and ventrolateral margins; dorsal surface with median carina along anterior  $\frac{3}{4}$ ; lateral surface with additional complete length carina. Post-petiole metasoma without microreticulation; tergites bare except Mt4–6 with distinct patches of white setae, Mt7–9 setose (Fig. 7). Length of exposed part of ovipositor in dorsal view: 0.08 mm.

*Male.* Unknown.

*Distribution.* Maranhão, Brazil.

*Etymology.* The specific epithet *nordestina* refers to its Northeastern Brazil origin.

*Host.* Unknown.

## Discussion

*Axima nordestina* is the fourth species in the *noyesi* species group. Arias-Penna et al. (2014) suggested that the stalked eyes, characteristic for the *noyesi* species group, serve as a “head-butting device” for leaving the host through soft plant tissue. They further hypothesized that the pronotal invaginations might further support this function (Arias-Penna et al., 2014, Fig. 7). Interestingly, in *A. nordestina* the stalks are shorter than in the other known stalk-eyed wasp species and the pronotal invaginations are not well developed. These morphological features seem to constitute a less derived character state, which needs confirmation from future cladistic analysis of *Axima*.

As for the three previously described species, *A. nordestina* is only known from the female holotype. Therefore, it still needs to be shown whether the extreme head modification is present in both sexes.

More records are needed to assess the distribution of stalk-eyed wasps, which are currently only known from Central and

Northeastern Brazil, Colombia and Trinidad. The fact that these extremely distinct insects have only been found on four occasions shows that the Neotropical parasitoid fauna is still insufficiently sampled. Increased collecting efforts with a strong focus on microhymenopterans would be needed to better assess the terrestrial biodiversity of South America.

## Conflicts of interest

The authors declare no conflicts of interest.

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