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PENSOFT

Distributional range expansion and first record of the parasitic wasp *Horismenus liturgusae* Hansson & Schoeninger, 2014 (Hymenoptera, Eulophidae) on *Liturgusa maya* Saussure & Zehntner, 1894 (Mantodea, Liturgusidae) from Ecuador

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Abstract

The presence of the parasitic wasp *Horismenus liturgusae* Hansson & Schoeninger, 2014 is recorded for the first time in Ecuador. This new record significantly expands the known distributional range of the species by more than 2000 km west of its type locality in Manaus, Brazil. In addition, the Neotropical bark mantid *Liturgusa maya* Saussure & Zehntner, 1894 is reported as a host, and *Horismenus* specimens were reared from the mantids ootheca.

Keywords

Amazon, Chalcidoidea, Morona Santiago, Neotropics

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Introduction

Parasitic wasps are a fascinating, ecologically important, diverse, and taxonomically challenging group of insects (Heraty et al. 2013; Munro 2011) that are especially diverse and dominant in the Neotropics (Murray and Heraty 2019). The genus *Horismenus* Walker (1843) is a predominantly Neotropical parasitic wasp group (Kenyon et al. 2015) which currently includes more than 400 species (Hansson 2009; Kenyon et al. 2015). The species are parasitoids or hyperparasitoids on a variety of hosts, including mantids (Hansson 2009; Hansson et al. 2014). Records of mantid parasitoids are generally scarce, and this is especially true and evident in the Neotropics where few reports have been published (Ehrman 2002; Rivera 2003; Hansson et al. 2014; Martínez et al. 2017; Falcon and Padrón 2019; Santos Murgas et al. 2019). This might seem contradictory to the high species diversity of mantids and parasitic wasps that can be found in this region (Agudelo et al. 2007; Arias and Delvare 2003). Therefore, new information, including new distribution records such as the one presented here, are important for a better understanding of the group as a whole.

Methods

The specimens reported here were reared from an ootheca of the bark mantid *Liturgusa maya* Saussure & Zehntner, 1894 (Fig. 1B, C) which was attached to the bark of the tree *Cedrela odorata* L. approximately 1 m above ground. It was found during a search for mantids carried out at Parque Regional Botánico del Cantón Sucúa (PRBCS), Morona Santiago province, Ecuador (Fig. 1A). The ootheca was collected and stored in a plastic rearing cage and transported to the city of Cuenca 2500 m a.s.l. Azuay province in the Andes for further study. After seven days 36 mantid nymphs hatched from the ootheca, and then after 10 additional days, 67 adults of a parasitic wasp were found in the rearing cage where the ootheca was kept. Specimens are deposited in the Entomology Collection of the Museo de Zoología de la Universidad del Azuay (MZUA), Cuenca, Ecuador, and are preserved and stored in 70% ethanol. The preserved wasps were analyzed at the Entomology Laboratory at Universidad del Azuay in Cuenca. For morphological measurements, a stereomicroscope Nikon SMZ745T with MSHOT software was used.

Photos of the specimens were taken using a Canon 5D Mark III camera with a Canon MPE 65mm lens and a Mitutoyo 10× and Nikon 20× microscope lens attached to a tube system. The final images were composed from several individual photos combined through a focus stacking technique using Zerene Stacker Software. The final plates were assembled using Photoshop CS6.

Results

Adults of the parasitic wasp *Horismenus liturgusae* Hansson & Schoeninger, 2014 (Eulophidae) were identified. The host was identified as *L. maya* based on nymphs that hatched from the ootheca and from adults that were collected previously from the same area.

Material examined. ECUADOR • Morona Santiago Province, Sucua/ Parque Regional Botánico del

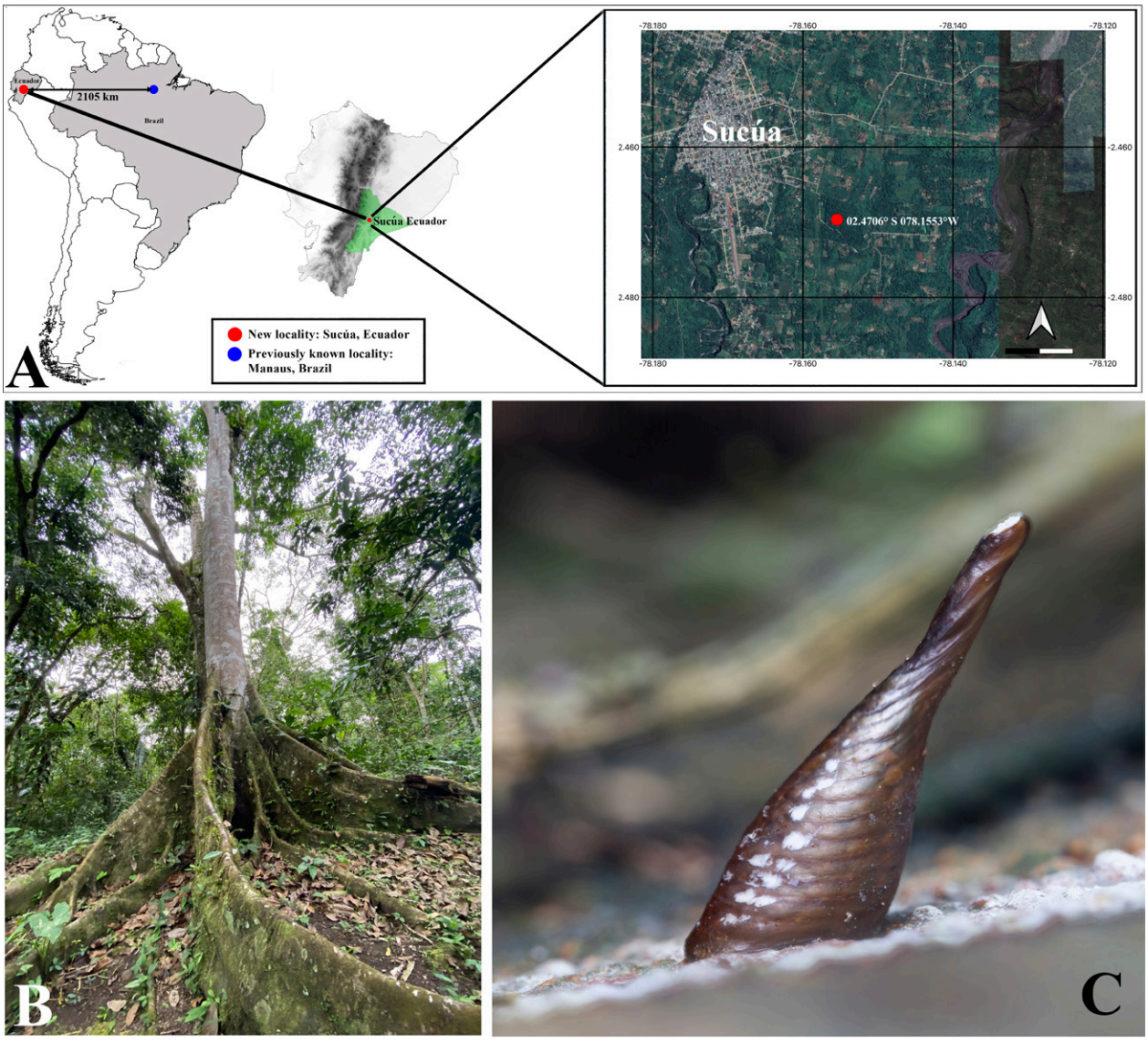

Figure 1. New locality record of *Horismenus liturgusae*. **A.** Previously known occurrence in Manaus and the new record at PRBCS in Sucúa, Morona Santiago Province, Ecuador. **B.** Habitat where the mantid ootheca was found. **C.** Ootheca of *Liturgusa maya* in situ.

Cantón Sucúa, 02.4707°S, 078.1554°W, alt. 880 m a.s.l.; 03.II.2021; P.S. Padrón leg.; 67 specimens, MZUA-EN47158 to MZUA-EN47224.

Identification. Identification of the specimens was corroborated with the original description based on external morphological characteristics found on the head: antennal scrobes joining below frontal suture, eyes very large and frons very narrow; mesosoma: mesoscutum with engraved reticulation, mesoscutum and scutellum metallic dark; and gaster in males conspicuously hairy (Fig. 2) and later confirmed by Dr. Christer Hansson Lund University.

Discussion

Horismenus liturgusae was originally described from Manaus, Brazil, and the description was based on specimens reared from an ootheca of the bark mantid genus *Liturgusa* Saussure, 1869, but the species was not identified. Our female specimens show small differences from the female holotype, such as the eyes appearing to be slightly smaller and the space between them larger (Fig. 2). However, these small variations can be attributed to geographical variation.

The genus *Liturgusa* includes 11 species and is a common and sometimes abundant group of Neotropical forest mantids (Svenson 2014) which are commonly known as bark mantids due to their similarity with bark and their adapted behaviour to dwell on tree trunks where they actively hunt for prey. *Liturgusa maya* has a broad distribution in the Neotropics and is very versatile in the use of habitats, from forests in a good state of conservation to heavily degraded places (Svenson 2014).

So far only three records of parasitoid wasps have been reported for the genus *Liturgusa*, and therefore new information about parasitic wasps is especially important. Ehrman (2002) mentioned an unidentified hymenoptera as parasitoid of *Liturgusa*; Hansson, et al. (2014), reported and newly described *H. liturgusae* from Brazil as a parasitoid of an unidentified species of the genus *Liturgusa*. Finally, Santos Murgas et al. (2019), reported a species of *Anastatus* sp. (Eupelmidae) as the parasitoid of *Liturgusa* cf. *maya* from Panama. Our report is the fourth record of parasitism for the genus *Liturgusa*. This record constitutes the first from Ecuador and represents a significant increase of the distribution range *H. liturgusae*, and it is also the first record for a named species of *Liturgusa* as the host. The locality where the ootheca and the wasps were collected, PRBCS, is located at least 2100 km west of the type locality of *H. liturgusae* in Manaus, Brazil (Fig. 1). The forest of PRBCS constitutes a protected remnant of 26 ha of secondary forest in the process of restoration and is classified as "evergreen foothill forest of the southern Eastern Cordillera of the Andes" (Ministerio del Ambiente del Ecuador 2013). The eulophid fauna is still very poorly known in Ecuador (Hansson 2010), where many new records and new species would be discovered if diversity inventories were performed. So far only 15 species of the genus *Horismenus* have been recorded from Ecuador *H. albiscapus* Hansson, 2009; *H. chydaeus* Hansson, 2009; *H. corbus* Hansson, 2009; *H. dulcis* Hansson, 2009; *H. elineatus* Schauff, 1989; *H. erasmus* Hansson, 2009; *H eumantis* Hansson, 2009; *H. eurys* Hansson, 2009; *H. leius* Hansson, 2009; *H. napus* Hansson, 2009; *H. nigrocyaneus* (Ashmead, 1894); *H. nyctiscapus* Hansson, 2009; *H. platynotus* Hansson, 2009; *H. rhanis* Hansson, 2009 and *H. striatus* Hansson, 2009 (Ashmead, 1894) (unpublished data, Natural History Museum, London, March 2021).

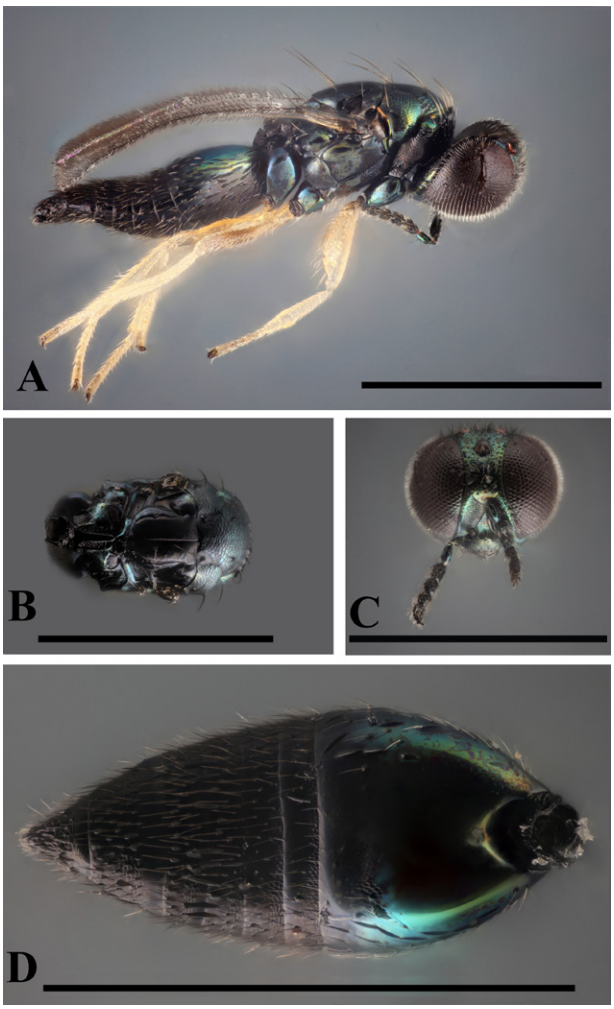

Figure 2. *Horismenus liturgusae* female. **A.** Habitus lateral view. **B.** Mesosoma dorsal view. **C.** Head frontal view. **D.** Gaster dorsal view. Scale bars = 1mm.

Finally, this new information adds to the knowledge of host-parasitoid interactions and potential impact on the survival, population dynamics, and regulation of hosts, which are still very unclear but an interesting and promising area for future research.

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Authors' Contributions

All authors contributed to writing and revision the final manuscript. Conceptualization: PP. Data curation: PP. Funding acquisition: PP. Investigation: PP, PA, LO, MC. Methodology: PP. Writing – original draft: PP, PA, LO, MC. Writing – review & editing: PA, LO, MC.

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