

SHORT COMMUNICATION

Hymenoepimecis neotropica (Brues & Richardson) (Hymenoptera, Ichneumonidae, Pimplinae) parasitoid of *Araneus omnicolor* (Keyserling) (Araneae, Araneidae): first host record and new occurrence to Brazil

Joberto Fernando Sobczak¹, Ana Paula da Silva Loffredo¹, Luiza Figueiredo Camargo¹ & Angélica M. Pentead-Dias¹

¹Departamento de Ecologia e Biologia Evolutiva, Universidade Federal de São Carlos, Rodovia Washington Luis, km 235, 13565-905 São Carlos-SP, Brasil. jobczak@gmail.com, ap_loffredo@yahoo.com.br, luizafigueiredocamargo@hotmail.com, angelica@ufscar.br

ABSTRACT. *Hymenoepimecis neotropica* (Brues & Richardson) (Hymenoptera, Ichneumonidae, Pimplinae) parasitoid of *Araneus omnicolor* (Keyserling) (Araneae, Araneidae): first host record and new occurrence to Brazil. The species of the genus *Hymenoepimecis* occur only in Neotropical region, being recognized for using as their hosts spiders which build orbicular webs. That wasp was described occurring only in the Guyana. This work expands the geographical distribution of the species to Brazil and records the spider *Araneus omnicolor* (Araneae, Araneidae) as its host. Furthermore, it provides information about the natural history of this interaction.

KEYWORDS. Host; parasitism; parasitoid of spider; Pimplinae; *Polysphincta*.

RESUMO. *Hymenoepimecis neotropica* (Brues & Richardson) (Hymenoptera, Ichneumonidae) parasitoide de *Araneus omnicolor* (Keyserling) (Araneae, Araneidae): primeiro registro do hospedeiro e nova ocorrência para o Brasil. Espécies do gênero *Hymenoepimecis* ocorrem somente na região Neotropical, sendo reconhecidas por utilizarem, como hospedeiras, aranhas que constroem teias orbiculares. Essa vespa foi descrita ocorrendo somente na Guiana. Este trabalho amplia a distribuição geográfica da espécie para o Brasil e registra a aranha *Araneus omnicolor* (Araneae, Araneidae) como sua hospedeira. Além disso, fornece informações sobre a história natural desta interação.

PALAVRAS-CHAVE. Hospedeiro; parasitismo; parasitoide de aranha; Pimplinae; *Polysphincta*.

The *Polysphincta* genus-group (*sensu* Wahl & Gauld 1998 or *Polysphinctini sensu* Townes 1969) comprises currently 22 genera with cosmopolitan distribution (Gauld & Dubois 2006; Palacio *et al.* 2007), where all species are koinobiont ectoparasitoids of spiders (Dubois *et al.* 2002; Gauld & Dubois 2006).

The genus *Hymenoepimecis* is a large-sized *Polysphinctinae* and can be characterized mainly by presence of a pocket-like structure on the pronotum (Gauld 1991). With distribution exclusively Neotropical, and currently 14 species described, having been collected from Mexico to the South of Brazil (Gauld 2000; Gauld & Dubois 2006; Loffredo & Pentead-Dias 2009; Sobczak *et al.* 2009). In Brazil, occur six species of the genus *Hymenoepimecis*, five of that with record of host. *Hymenoepimecis bicolor* (Brullé, 1846) attacks females of *Nephila clavipes* (Linnaeus, 1767) (Nephilidae) (Gonzaga *et al.* 2010); *H. sooretama* Sobczak *et al.* 2009 attacks females of *Manoega porracea* (C. L. Koch, 1838) (Araneidae) (Sobczak *et al.* 2009), *H. japi* Sobczak *et al.* 2009 is parasitoid of the spider *Leucauge roseosignata* Mello-Leitão, 1943 (Tetragnathidae) (Sobczak *et al.* 2009), *H. silvanae* Loffredo & Pentead-Dias, 2009, used as host the spider *Araneus venatrix* (Koch,

1838) (Araneae, Araneidae) (Sobczak *et al.* 2012) and *H. jordanensis* Loffredo & Pentead-Dias, 2009, with host unknown. *H. veranii* Loffredo & Pentead-Dias, 2009, is known as parasitoid of *Araneus omnicolor* (Keyserling, 1893) (Araneidae) (Gonzaga & Sobczak 2007) and *Araneus orgaos* Levi 1991 (Araneae, Araneidae) (Sobczak, unpublished data). Gonzaga & Sobczak (2007) described for the first time an interaction between wasps of the genus *Hymenoepimecis* and spiders in Brazil. In the interaction between *A. omnicolor* and *H. veranii*, they observed that spiders parasitized with a third instar larvae are induced to build modified webs, that are probably more resistant than the normal webs constructed by the spiders not parasitized (Gonzaga & Sobczak 2007). In addition, they observed an event of infanticide and also the whole sequence of attack and oviposition by the parasitoid.

In this study, we reported the second case of parasitism in *A. omnicolor* by wasps of the genus *Hymenoepimecis*, and recorded the first occurrence of *H. neotropica* to the Brazil, expanding the geographical distribution of this species, described as only from the Co-operative Republic of Guyana.

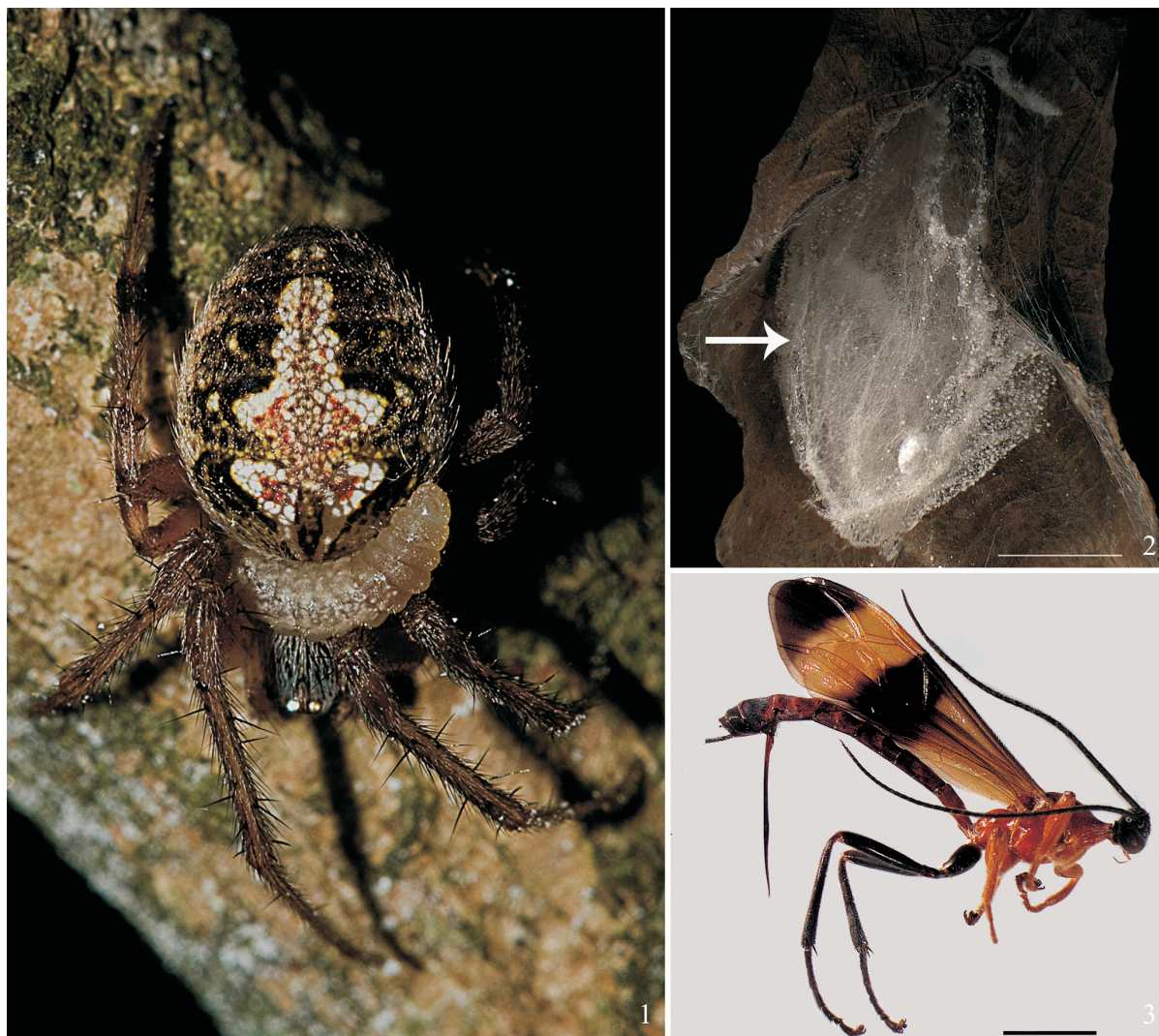
One female of *A. omnicolor* parasitized by the third instar larva of *H. neotropica* was photographed and collected

in March of 2011 in Serra do Japi (23°15' S, 46°57' W), a subtropical humid forest reserve located in Jundiaí, state of São Paulo, Brazil. The spider parasitized was collected and kept in a plastic container (30 x 25 x 25 cm) fed daily with adults of *Drosophila* sp. and kept in the laboratory to obtain the adult wasp. Voucher specimens of *H. neotropica* were deposited in the collection of Universidade Federal de São Carlos, São Carlos (DCBU) (curator A. M. Pentead-Dias) and spiders were deposited in collection of the Instituto Butantan, São Paulo (curator A. D. Brescovit).

In this interaction, the larva of *H. neotropica* was found attached in the front of the abdomen of a sub-adult female of *A. omnicolor* (Fig. 1) and feeds itself with the hemolymph of the spider through small holes, a behavior already observed in other species of the *Polysphincta* genus-group. After consuming the abdomen of the spider, the larva discards the remains of the host through movements of stretch and contraction of the body. Soon after, the larva begins the constructing of the cocoon, taking approximately 24 hours to

complete its construction. This cocoon built by the larva is white, with 16mm length by seven mm width and surrounded by threads of silk (Fig. 2). After 12 days a female of *H. neotropica* emerged from the cocoon (Fig. 3), cutting the side of the cocoon with the help of the mandibles. The time of development of *H. neotropica* within of the cocoon is very similar to the observed in others species of *Hymenoepimecis* where the cycle of life is known.

The species, *H. neotropica* and *H. veranii* occur in sympatry in Serra do Japi, and use *A. omnicolor* as host. However, female of *H. veranii* lays its egg on the mid part to the end portion of the abdomen, while *H. neotropica* lays its egg on the anterior portion of the abdomen of the spider. In another interaction, also involving species of genus-group *Polysphincta*, Matsumoto and Konishi (2007) observed that *Reclinervellus tuberculatus* (Uchida, 1932) and *Reclinervellus masumotoi* Matsumoto & Konishi 2007 use a single host, the spider *Cyclosa octotuberculata* Karsch 1879 (Araneae). They observed that *R. tuberculatus* lays the egg



Figs. 1–3. 1. sub adult female of *Araneus omnicolor* with larva of third instar attached in anterior part of abdomen; 2. cocoon build by the larva and involving the cocoon threads (arrow); 3. wasp female of *Hymenoepimecis neotropica*.

on the anterior part of the abdomen, while *R. masumotoi* deposited the egg on the posterior end of the host. Besides laying eggs on different places of the host, the two species avoid competition by maturing at different times (Matsumoto & Konishi 2007). Probably the oviposition on different places of host body by wasps *H. neotropica* and *H. veranii*, is a mechanism employed to avoid direct competition in these two species during the larval instar. In this work, the larva of third instar of *H. neotropica* was not able to change the behavior of its host, inducing the building of a modified web as observed in *A. omnicolor* when parasitized by *H. veranii*.

Further studies are needed to understand if there is competition between larvae consuming the same host and if there are differences between the growth time in larvae of *H. neotropica* and of *H. veranii* as well as to check if the spiders with larvae of third instar are induced to build modified webs.

ACKNOWLEDGMENTS

We were supported financially by Instituto Nacional de Ciência e Tecnologia dos Hymenoptera Parasitoides da Região Sudeste Brasileira (HYMPAR/Sudeste – CNPq/FAPESP/CAPES), CNPq (research grants to J. F. Sobczak, A. P. S. Loffredo, L. F. Camargo and A. M. Pentead-Dias). Also thank to Prefeitura Municipal de Jundiá the staff Base de Estudos de Ecologia e Educação Ambiental da Serra do Japi.

REFERENCES

- Dubois, J.; C. Rollard.; C. Villemant & I. D. Gauld. 2002. The phylogenetic position of parasitoids of spiders within Pimplinae (Hymenoptera, Ichneumonidae), p. 27–35. *In*: F. Samu & Cs. Szinetár (eds.) **Proceedings of the 20th European Colloquium of Arachnology**, Budapest, Plant Protection Institute and Berzsenyi College Press, 356 p.
- Gauld, I. D. 1991. The Ichneumonidae of Costa Rica, Volume 1: Keys to subfamilies, and keys to the species of the lower pimpliform subfamilies Rhyssinae, Pimplinae, Poemeniinae, Acaenitinae and Cyloceriinae 1. **Memoirs of the American Entomological Institute** 47:1–589.
- Gauld, I. D. 2000. The re-definition of pimpline genus *Hymenoepimecis* (Hymenoptera: Ichneumonidae) with a description of a plesiomorphic new Costa Rican species. **Journal of Hymenoptera Research** 9: 213–219.
- Gauld, I. D. & J. Dubois. 2006. Phylogeny of the *Polysphincta* group of genera (Hymenoptera: Ichneumonidae; Pimplinae): a taxonomic revision of spider ectoparasitoids. **Systematic Entomology** 31: 529–564.
- Gonzaga, M. O. & J. F. Sobczak. 2007. Parasitoid-induced mortality of *Araneus omnicolor* (Araneae, Araneidae) by *Hymenoepimecis* sp. (Hymenoptera, Ichneumonidae) in Southeastern Brazil. **Naturwissenschaften** 94: 223–227.
- Gonzaga, M. O.; J. F. Sobczak.; A. M. Pentead-Dias & W.G. Eberhard. 2010. Modification of *Nephila clavipes* (Araneae Nephilidae) webs induced by the parasitoids *Hymenoepimecis bicolor* and *H. robertsae* (Hymenoptera Ichneumonidae). **Ethology Ecology and Evolution** 22: 151–165.
- Loffredo, A. P. S. & A. M. Pentead-Dias. 2009. New species of *Hymenoepimecis* Viereck (Hymenoptera, Ichneumonidae, Pimplinae) from Brazilian Atlantic forest. **Revista Brasileira de Entomologia** 53: 11–14.
- Matsumoto, R. & K. Konishi. 2007. Life histories of two ichneumonid parasitoids of *Cyclosa octotuberculata* (Araneae): *Reclinervellus tuberculatus* (Uchida) and its new sympatric congener (Hymenoptera: Ichneumonidae: Pimplinae). **Entomological Science** 10: 267–278.
- Palacio, E.; I. E. Sääksjärvi & V. Vahtera. 2007. *Lamnatibia*, a new genus of the *Polysphincta* group of genera from Colombia (Hymenoptera: Ichneumonidae; Pimplinae). **Zootaxa** 1431: 55–63.
- Sobczak, J. F.; A. P. S. Loffredo; A. M. Pentead-Dias & M. O. Gonzaga. 2009. Two new species of *Hymenoepimecis* (Hymenoptera: Ichneumonidae, Pimplinae) with notes on their spider hosts and behaviour manipulation. **Journal of Natural History** 43: 2691–2699.
- Sobczak, J. F.; A. P. S. Loffredo & A. M. Pentead-Dias. 2012. Parasitism on *Araneus venatrix* (Koch, 1838) (Araneae: Araneidae) by *Hymenoepimecis silvanae* Loffredo & Pentead-Dias, 2009 (Ichneumonidae, Pimplinae) with description of male of the wasp. **Brazilian Journal of Biology** 72: 221–223.
- Townes, H. 1969. The genera of Ichneumonidae, part 1: Ephialtinae to Agriotypinae. **Memoirs of the American Entomological Institute** 11: 1–300.
- Wahl, D. B. & I. D. Gauld. 1998. The cladistics and higher classification of the Pimpliformes (Hymenoptera: Ichneumonidae). **Systematic Entomology** 23: 265–298.