

Ovipositing Off the Host Plant by Two Tropical Nymphalid Butterflies

Authors: Victor Lucci Freitas, André, and Kaminski, Lucas Augusto

Source: The Journal of the Lepidopterists' Society, 68(2) : 143-144

Published By: The Lepidopterists' Society

URL: <https://doi.org/10.18473/lepi.v68i2.a8>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

OVIPOSITING OFF THE HOST PLANT BY TWO TROPICAL NYMPHALID BUTTERFLIES

Additional key words: Enemy-free space, Heliconiinae, Ithomiini, Passifloraceae, Solanaceae

The choice for oviposition sites by an insect can be a compromise between opposing needs; females must select a suitable site while considering several different factors, such as plant nutritional content, concentration of chemical substances, presence of competitors, predators, and optimal physical conditions, always considering places that confer superior fitness to their offspring (Jaenike 1978, Thompson 1988, Thompson & Pellmyr 1991). Among all the above factors, predation and parasitism have been considered as particularly strong forces influencing female oviposition behavior (Sendoya et al. 2009, Carrasco & Kaitala 2009, De-Silva et al. 2011). To minimize the risks of predation and parasitism, females need to find a safe place to lay their eggs, where the contact with natural enemies is minimized, known as “enemy-free space” (Price et al. 1980). In temperate climates, selecting oviposition sites away from the host plant is a common strategy, not only related to enemy avoidance, but also to prevent oviposition on plants vulnerable to senescence (Wiklund 1984, Gompert et al. 2006). The behavior of ovipositing away from the host plant, however, is considered rare in tropical environments (Singer 1984, De Silva et al. 2011). In a recent paper, however, De Silva et al. (2011) showed that the neotropical ithomiine *Oleria onega* Hewitson usually oviposits away from its host plants, showing evidence that this behavior is at least partially related to high predation risks on the host plant. In the present paper, the behavior of ovipositing away from the host plant is reported for the tropical nymphalid butterflies *Ithomia drymo* Hübner (Danainae: Ithomiini) and *Eueides aliphera* Godart (Heliconiinae: Heliconiini). Field work was carried out at the “Reserva Municipal Biológica da Serra do Japi”, an area of semi-deciduous mesophytic forest in the municipalities of Jundiá and Cabreúva, in the state of São Paulo in Southeastern Brazil (a complete and detailed description of the area can be found in Morellato 1992); observations were made near the Research Station (centered on 23°13'S 46°55'W). On April, 15, 2011, a single *I. drymo* female was observed showing typical behavior of searching for host plants, fluttering with an irregular flight and touching the leaves of several shrubs on the forest edge. After testing the leaves of an *Aureliana* sp. (Solanaceae), one of their known host plants in Serra do Japi, the female flew 20 cm away from

the host plant and laid an egg on a dead leaf of a nearby non-host plant species (Fig. 1A). The female repeated this behavior seven times, resulting in seven eggs laid on dead leaves and twigs in the vicinity of the potential host plant (Fig. 1A). Additional searching revealed at least three additional eggs on neighboring dead vegetation, as well as five eggs on mature leaves of the host-plant. A similar behavior was observed in *E. aliphera*. On April, 14, 2011, a single female was observed ovipositing on a *Passiflora amethystina* vine (Passifloraceae), a plant previously recorded as host for this butterfly (Dell'Erba et al. 2005). Besides ovipositing on its host plant, the female was also observed laying eggs on a non-host Solanaceae (without foraging ants), and also on dead leaves, both nearby to the vine (Fig. 1B). Additional searching revealed other eggs on dead leaves and twigs in the vicinity of the host plant. Although the reasons for ovipositing away from the host plant have not been investigated in the present study, the hypothesis of escape from natural enemies seems the most plausible; ants are commonly present tending homopterans on solanaceous plants and visiting extrafloral nectaries of passion vines in the study area. In the case of *I. drymo*, although it has been reared several times from at least six different solanaceous host plant species at several different localities (Drummond & Brown 1987, Brown & Freitas 1994, Beccaloni et al. 2008, and more than 10 unpublished rearing records by the author), the behavior of ovipositing away from the host plant has never been recorded before in this species. Conversely, the behavior of ovipositing on dead tendrils and off the host plant has been reported for some heliconiines such as *Agraulis Boisduval & Le Conte*, *Dryadula Michener*, *Dryas Hübner*, and *Philaethria Billberg*, and has been suggested as an escape strategy to avoid natural enemies (see discussion in Benson et al. 1975). The present results suggest that this behavior could be more common than previously reported in the tropics. For example, this behavior was also observed in the nymphalid *Blepolenis batea* (Hübner) (Satyrinae: Brassolini) in 1990 (AVLF pers. obs., cited by Brown 1992: 150). However, this was a single event, and an oviposition mistake cannot be discarded. The lack of field observations of actual oviposition events could explain why the behavior of ovipositing away from the host plant has remained rarely reported for tropical butterflies.



FIG. 1. **A.** *Ithomia drymo* ovipositing on a dead twig of a non-host plant (arrow); in the right box, a detailed view of the egg (arrow); **B.** *Eueides aliphera* ovipositing on a dead non-host plant leaf held by the tendrils of its host plant (arrow); in the right box, a detailed view of two eggs (arrows).

ACKNOWLEDGEMENTS

Keith Willmott and one anonymous referee made useful comments on the final version of the manuscript. AVLF thanks the Brazilian Research Council – CNPq (fellowship 302585/2011-7). LAK thanks (FAPESP 10/51340-8). This publication is part of the RedeLep “Rede Nacional de Pesquisa e Conservação de Lepidópteros” SISBIOTA-Brasil/CNPq (563332/2010-7), and BIOTA-FAPESP Program (2011/50225-3).

LITERATURE CITED

- BECCALONI, G. W., S. K. HALL, A. L. VILORIA AND G. S. ROBINSON. 2008. Catalogue of the hostplants of the Neotropical butterflies / Catálogo de las plantas huésped de las mariposas Neotropicales. *In* m3m - Monografías Tercer Milenio, Vol. 8. S.E.A., RIBESCATED, The Natural History Museum, Instituto Venezolano de Investigaciones Científicas, Zaragoza.
- BENSON, W. W., K. S. BROWN JR. AND L. E. GILBERT. 1975. Coevolution of plants and herbivores: passion flower butterflies. *Evolution* 29: 659–680.
- BROWN JR. K. S. 1992. Borboletas da Serra do Japi: diversidade, habitats, recursos alimentares e variação temporal, p.142–187. *In* Morellato L. P. C. (ed.). *História natural da Serra do Japi: ecologia e preservação de uma área florestal no sudeste do Brasil*. Campinas, Editora da Unicamp.
- BROWN, K.S. AND A. V. L. FREITAS. 1994. Juvenile stages of Ithomiinae: overview and systematics (Lepidoptera: Nymphalidae). *Tropical Lepid.* 5: 9–20.
- CARRASCO, D. AND A. KAITALA. 2009. Egg-laying tactic in *Phyllomorpha laciniata* in the presence of parasitoids. *Entomol. Experim. Appl.* 131: 300–307.
- DE-SILVA, D. L., A. S. VÁSQUEZ AND J. MALLETT. 2011. Selection for enemy-free space: eggs placed away from the host plant increase survival of a neotropical ithomiine butterfly. *Ecol. Entomol.* 36: 667–672.
- GOMPERT, Z., J. A. FORDYCE, M. L. FORISTER, A. M. SHAPIRO AND C. C. NICE. 2006. Homoploid hybrid speciation in an extreme habitat. *Science* 314: 1923–1925.
- DELL'ERBA, R., L. A. KAMINSKI AND G. R. P. MOREIRA. 2005. O estágio de ovo dos Heliconiini (Lepidoptera, Nymphalidae) do Rio Grande do Sul, Brasil. *Iheringia, Ser. Zoologia* 95: 29–46.
- DRUMMOND, B.A. & K. S. BROWN JR. 1987. Ithomiinae (Lepidoptera: Nymphalidae): summary of known larval food plants. *Ann. Mis. Bot. Gar.* 74: 341–358.
- JAENIKE, J. 1978. On optimal oviposition behavior in phytophagous insects. *Theor. Pop. Biol.* 14: 350–356.
- MORELLATO, L. P. C. 1992. *História natural da Serra do Japi: ecologia e preservação de uma área florestal no Sudeste do Brasil*. Campinas, Editora da Unicamp, 321p.
- SENDOYA, S. F., A. V. L. FREITAS AND P. S. OLIVEIRA. 2009. Egg-laying butterflies distinguish predaceous ants by sight. *Am. Nat.* 174: 134–140.
- SINGER, M. C. 1984. Butterfly–hostplant relationships: host quality, adult choice and larval success, pp. 81–88. *In* Vane-Wright, R. and P. R. Ackery (eds.). *The Biology of Butterflies*. The Royal Entomol. Soc., Academic Press, London, U.K.
- THOMPSON, J. N. 1988. Evolutionary ecology of the relationship between oviposition preference and performance of offspring in phytophagous insects. *Entomol. Experim. Appl.* 47: 3–14.
- THOMPSON, J. N. AND O. PELLMYR. 1991. Evolution of oviposition behavior and host preference in Lepidoptera. *Ann. Rev. Entomol.* 36: 65–89.
- WIKLUND, C. 1984. Egg-laying patterns in butterflies in relation to their phenology and the visual apparency and abundance of their host plants. *Oecologia* 63: 23–29.

Submitted for publication 8 October 2013; revised and accepted 21 November 2013.

ANDRÉ VICTOR LUCCI FREITAS & LUCAS AUGUSTO KAMINSKI *Departamento de Biologia Animal and Museu de Zoologia, Instituto de Biologia, Universidade Estadual de Campinas, C.P. 6109, CEP 13083-970, Campinas, São Paulo, Brasil; email: baku@unicamp.br*