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Thirteen new Costa Rican species belonging to the genus *Triraphis* Ruthe (Braconidae: Rogadinae) with their host records

ALEJANDRO A. VALERIO¹ & SCOTT R. SHAW²

¹Central American Institute for Biological Research and Conservation, P.O. Box 2398–2050 San Pedro de Montes de Oca, San José, Costa Rica. E-mail: avalerio_13@hotmail.com.

urn:lsid:zoobank.org:author:E4B936BE-5F7D-4A22-B9E7-D237BBDE45EB

²Department of Ecosystem Science and Management (3354), University of Wyoming, Laramie, WY 82070, U.S.A.
E-mail: braconid@uwyo.edu.

urn:lsid:zoobank.org:author:D0962240-2766-4813-988F-9E49E68673D9

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Abstract

Thirteen new species belonging to the genus *Triraphis* Ruthe are described and illustrated: *Triraphis baios* sp. nov., *T. balteus* sp. nov., *T. chinusi* sp. nov., *T. cortazari* sp. nov., *T. defectus* sp. nov., *T. guarusa* sp. nov., *T. huidobroii* sp. nov., *T. ikelosops* sp. nov., *T. melasops* sp. nov., *T. paraholos* sp. nov., *T. proxilus* sp. nov., *T. simplices* sp. nov. and *T. willei* sp. nov. The lepidopteran hosts were feeding on 17 genera of plants within 16 families. Two families of Lepidoptera are reported as new hosts for *Triraphis*: *Acraea* sp. (Dacnidae) parasitized by *T. paraholos* sp. nov. and *Norape* sp. (Megalopygidae) by *T. guarusa* sp. nov. Moreover, four *Triraphis* species are treated as new combinations under the genus *Triraphis* sensu van Achterberg: *Triraphis areatus* (Cresson) comb. n., *T. fasciipennis* (Cresson) comb. n., *T. fusciceps* (Cresson) comb. n. and *T. ornatus* (Cresson) comb. n..

Key words: host records, parasitoids, *Rogas*, taxonomy

Triraphis paraholos sp. nov., and the family Megalopygidae with the genus *Norape* sp. parasitized by *T. guarusa* sp. nov.

The new species *Triraphis baios* and *T. sicbaios* are gregarious parasitoids as the previously described *Triraphis gregarius* (Watanabe, 1970). However, the actual number of host records and biological information for the genus *Triraphis*, as *Rogas* sensu lato, is poor (Shaw 1996) and the present number of gregarious species is probably underestimated by the present lack of biological information.

Otherwise, the genus *Triraphis* in Costa Rica is using the lepidopteran families Riodinidae (2 genera), Lycaenidae (2 genera) and Limacodidae (4 genera) as host. Interestingly, some of the host caterpillars are using totally unrelated host plant families for feeding (i.e. *Melanis sanguinea* is feeding on the plant families Bromeliaceae, Fabaceae and Euphorbiaceae). In summary, the total known number of host plant genera used by the lepidopteran larvae as host by *Triraphis* in Costa Rica is 17, in 16 different families (see Table 1).

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References

- Achterberg, C. van (1991) Review of the genera of the Afrotropical and W. Palearctic Rogadinae Foersters (Hymenoptera: Braconidae). *Zoologische Verhandelingen Leiden*, 273, 1–102.
- Achterberg, C. van (1993) Illustrated key to the subfamilies of Braconidae (Hymenoptera: Ichneumonoidea). *Zoologische Verhandelingen Leiden*, 283, 1–49.
- Chen, X. & He, J. (1995) Hymenoptera: Braconidae. In: Chen, X., He, J. & Ma, Y. (Eds.), *Insects and mushrooms of Gutian Shan Nature Reserve of Zhejiang, China*: Zhejiang Scientific and technological Publishing House, Hangzhou, pp. 1–327. [in Chinese with English summary]
- Chen, X. & He, J. (1997) Revision of the subfamily Rogadinae (Hymenoptera: Braconidae) from China. *Zoologische Verhandelingen*, Leiden, 308, 1–187.
- Cresson, E.T. (1869) List of the North American species of the genus *Aleiodes* Wesmael. *Transactions of the American Entomological Society*, 8 (2), 204–237.
<http://dx.doi.org/10.2307/25076223>
- Enderlein, G. (1918) Zur Kenntnis aussereuropäischer Braconiden. *Archiv für Naturgeschichte*, 84A (11), 51–224.
- Fortier, J.C. & Shaw, S.R. (1997) Cladistics of the *Aleiodes* lineage of the subfamily Rogadinae (Hymenoptera: Braconidae). Doctoral dissertation in Entomology. *University of Wyoming, Laramie, Wyoming*, 8, 204–237.
- Hanson, P. & Gauld, I. (1996) *Hymenoptera of Costa Rica*, Oxford University Press, Oxford, 900 pp.
- Huber, J.T. & Sharkey, M.J. (1993) Structure. In: Goulet, H. & Huber, J.T. (Eds.), *Hymenoptera of the World: An Identification Guide of Families*. Agriculture Canada Publication 18894/E Ottawa, pp. 13–59.
- Marsh, P.M. (1979) Family Braconidae. In: Krombein, K.V., Hurd, P.D., Smith, D.R. & Burks, B.D. (Eds.), *Catalog of Hymenoptera in America North of Mexico*. Washington, D.C., Smithsonian Institution Press, pp. 144–313.
- Matthews, R.W. (1974) Biology of Braconidae. *Annual Review of Entomology*, 19, 15–32.
<http://dx.doi.org/10.1146/annurev.en.19.010174.000311>
- Miller, S.E., Becker, V.O. & Velez-Angel, R. (1995) *Podia bolivari* (Lepidoptera: Megalopygidae): a highly sexually dimorphic Neotropical pest. *Proceedings of the Entomological Society of Washington*, 97, 117–122.
- Quicke, D.L.J. (1993) A note on the occurrence of green pigmentation in the Braconidae (Hymenoptera). *Entomologist's Monthly Magazine*, 129, 123–124.
- Quicke, D.L.J. & Achterberg, C. van (1990) Phylogeny of the subfamilies of the family Braconidae (Hymenoptera: Ichneumonoidea). *Zoologische Verhandelingen Leiden*, 258, 1–95.
- Ruthe, J.F. (1855) Beiträge zur Geschichte der Ichneumoniden. *Stettiner Entomologische Zeitung*, 16 (2), 51–58.
- Schuh, R.T. (Ed.) (1989) *The Torre-Bueno Glossary of Entomology (Revised Edition)*. The New York Entomological Society, New York, 849 pp.
- Shaw, M.R. & Huddleston, T. (1991) Classification and biology of braconid wasp. *Handbook of the Identification of British Insects*, 7, 1–126.

- Shaw, S.R. (1996) Braconidae. In: Gauld, I. & Hanson, P. (Eds.), *Hymenoptera of Costa Rica*, Oxford University Press, Oxford, pp. 431–463.
- Shaw, S.R. (1997) Subfamily Rogadinae s.s.. In: Wharton, R.A., Marsh, P.M. & Sharkey, M.J. (Eds.), *Manual of the New World genera of the Family Braconidae (Hymenoptera)*. No. 1. Special publication of the International Society of Hymenopterists, pp. 403–412.
- Shaw, S.R., Marsh, P.M. & Fortier, J.C. (1997) Revision of North American *Aleiodes* Wesmael (part 1): The pulchripes Wesmael species-group in the New World (Hymenoptera: Braconidae: Rogadinae). *Journal of Hymenoptera Research*, 6, 10–35.
- Shenefelt, R.D. (1969) Notes on some Rogadine genera (Hymenoptera: Braconidae). *Proceedings of the Entomological Society of Washington*, 71, 428–444.
- Shenefelt, R.D. (1975) Braconidae. 8. Exothecinae, Rogadinae. In: Ferriere, Ch. & van der Vecht, J. (Eds.), *Hymenopterorum Catalogus (New Edition)*, W. Junk B.V., The Hague, pp. 307–428.
- Szépligeti, G.V. (1904) Hymenoptera Fam. Braconidae. *Genera Insectorum*, 22, 1–252.
- Townes, H. (1969) The genera of Ichneumonidae, Part 1; Ephialtinae to Agriotypinae. *Memoirs of the American Entomological Institute*, 11, 1–300.
- Wahl, D.B. & Sharkey, M.J. (1993) Superfamily Ichneumonoidea. In: Goulet, H. & Huber, J.T. (Eds.), *Hymenoptera of the World: An Identification Guide of Families*. Agriculture Canada Publication 1894/E, Ottawa., pp. 358–469.
- Watanabe, C. (1970) Descriptions of two new species of the genus *Pelecystoma* Wesmael (Hymenoptera, Braconidae). *Mushi*, 43, 117–120.
- Whitfield, J.B. (1989) The limits and composition of the Rogadinae tribes. Unpublished lecture outline distributed at the national meeting of the Entomological Society of America (ESA), Lexington, Kentucky.
- Zaldívar-Riverón, A., Shaw, M.R., Sáez, A.G., Mori, M., Sergey, A., Belokobylskij, S.A., Shaw, S.R. & Quicke, D.L.J. (2008) Evolution of the parasitic wasp subfamily Rogadinae (Braconidae): phylogeny and evolution of lepidopteran host ranges and mummy characteristics. *BMC Evolutionary Biology*, 8, 1–329. [12 pp]