



New species of *Eibesfeldtphora* Disney (Diptera: Phoridae) and a new key to the genus

SORAYA URIBE¹, BRIAN V. BROWN², MARCOS A. L. BRAGANÇA³,
JARBAS M. QUEIROZ⁴ & CARLOS A. NOGUEIRA⁵

¹Universidad Nacional de Colombia-Sede Medellín. E-mail: suribecelis@gmail.com

²Natural History Museum of Los Angeles County, Los Angeles, USA. E-mail: bbrown@nhm.org

³Biological Sciences Course, Federal University of Tocantins – UFT, 77500-000, Porto Nacional, TO, Brazil.

E-mail: marcosbr@uft.edu.br

⁴Department of Environmental Sciences, IF, Federal Rural University of Rio de Janeiro – Seropédica, RJ, Brazil.

E-mail: jarquiz@gmail.com

⁵Postgraduate Program in Entomology, National Institute for Amazonian Research – INPA, Manaus, AM, Brazil.

E-mail: ca.nogueira@yahoo.com.br

Abstract

Two new species of parasitoids, *Eibesfeldtphora trifurcata* and *Eibesfeldtphora inornata*, are described. Both species were collected in Brazil. A new key is provided and illustrated for the twenty one known species.

Key words: *Atta*, Formicidae, host-parasitoid, Neotrópico

Introduction

Species of *Eibesfeldtphora* Disney genre (Díptera: Phoridae) are parasitoids of leaf-cutting ants belonging to the genus *Atta* Fabricius. The presence of these parasitoids produces changes in the leaf-cutting ants behavior affecting nest performance (eg.: shifts on foraging rhythms, quickly return to the nest and abandonment of leaf fragments) (Bragança *et al.*, 1998; Orr, 1992; Tonhasca Jr & Bragança, 2000). Ants also adopt defensive postures (Bragança *et al.*, 2002; Tonhasca, 1996) and show hitchhiking behavior (Eibl-Eibesfeldt, 1967; Linksvayer *et al.*, 2002; Vieira-Neto, Mundim, & Vasconcelos, 2006) in order to avoid oviposition by parasitoids. The literature on these phorid-ant interactions is now voluminous, and new species of flies continue to be found. We felt that a new identification key to females was necessary as the previous reference is over a decade old and does not include the newly described species. Additionally, we provide a listing of all papers published on this host-parasitoid system in recent years as a baseline for future research (Table 1.).

Systematics

Eibesfeldtphora Disney, in Disney *et al.*, (2009)

Neodohrniphora Malloch (1914), in part.

Eibesfeldtphora Disney genus was originally part of *Neodohrniphora*, but recognized as a separate genus by Disney *et al.* (2009). Brown (2001) elaborated a key in which describes 15 species of *Eibesfeldtphora* Disney. Four new species belonging to this genus were reported by Disney *et al.* (2009) and Brown *et al.* (2012).

Generalized description of adult females. Frons narrow, brown, median furrow present. 4-4-4 frontal setae present; lower interfrontal setae much lower on frons than lower fronto-orbital setae; supra-antennal setae absent.

TABLE 1. (Continued)

Phorid species	Host species	*References
<i>E. leei</i> (Brown)	<i>Unknown</i>	4.
<i>E. mexicanae</i> (Disney)	<i>A. mexicana</i>	4.
<i>E. pala</i> (Brown)	<i>A. cephalotes</i>	4.
	<i>A. colombica</i>	4.
<i>E. prolixa</i> (Brown)	<i>A. cephalotes</i>	4, 10.
<i>E. tonhascai</i> (Brown)	<i>A. sexdens</i>	3, 8, 14.
	<i>A. laevigata</i>	5, 14.
<i>E. trifurcata</i> Uribe & Brown	<i>A. sexdens</i>	New reference
<i>E. trilobata</i> Disney	<i>A. vollenweideri</i>	13, 15, 16, 18.

*Ref: 1: Orr (1992); 2: Feener and Brown (1993); 3: Tonhasca Jr (1996); 4: Brown (2001); 5: Bragança *et al.* (2002); 6: Bragança *et al.* (2003); 7: Vieira-Neto, *et al.* (2006); 8: Bragança *et al.* (2008); 9: Silva *et al.* (2008); 10: De Almeida, Wirth, & Leal (2008); 11: Gazal, Bailez, & Viana-Bailez (2009); 12: Bragança *et al.* (2009); 13: Disney *et al.* (2009); 14: Pesquero *et al.* (2010); 15: Guillade and Folgarait (2011); 16: Elizalde and Folgarait (2011); 17: Brown *et al.* (2012); 18: Elizalde and Folgarait (2012).

Acknowledgements

M.A.L. Bragança thanks to CNPq and Secretaria Estadual de Desenvolvimento Econômico, Ciência, Tecnologia e Inovação do Tocantins, Brazil, for the financial support. We are grateful to Terezinha Della Lucia for logistical support and Filipe Viegas Arruda for helping to collect the flies. C.A. Nogueira was supported by a CNPq, ARPA and BECA-IEB/Moore Foundation (B/2007/0 2/BMP/02) grants.

Literature cited

- Bragança, M.A.L., Della Lucia, T. & Tonhasca, A. Jr. (2003) First record of phorid parasitoids (Diptera: Phoridae) of the leaf-cutting ant *Atta bisphaerica* Forel (Hymenoptera: Formicidae). *Neotropical Entomology*, 32 (1), 169–171.
<http://dx.doi.org/10.1590/s1519-566x2003000100028>
- Bragança, M.A.L., Souza, L.M.D., Nogueira, C.A. & Della Lucia, T.M.C. (2008) Parasitism by *Neodohniphora* spp. Malloch (Diptera, Phoridae) on workers of *Atta sexdens rubropilosa* Forel (Hymenoptera, Formicidae). *Revista Brasileira de Entomologia*, 52 (2), 300–302.
<http://dx.doi.org/10.1590/s0085-56262008000200011>
- Bragança, M.A.L., Tonhasca, A. Jr. & Della Lucia, T.M.C. (2009) Características biológicas e comportamentais de *Neodohniphora elongata* Brown (Diptera, Phoridae), um parasitóide da saúva *Atta sexdens rubropilosa* Forel (Hymenoptera, Formicidae). *Revista Brasileira de Entomologia*, 53, 600–606.
<http://dx.doi.org/10.1590/s0085-56262009000400009>
- Bragança, M.A.L., Tonhasca, A. Jr. & Moreira, D.D.O. (2002) Parasitism characteristics of two phorid fly species in relation to their host, the leaf-cutting ant *Atta laevigata* (Smith) (Hymenoptera: Formicidae). *Neotropical Entomology*, 31, 241–244.
<http://dx.doi.org/10.1590/s1519-566x2002000200010>
- Brown, B.V. (2001) Taxonomic revision of *Neodohniphora*, subgenus *Eibesfeldtphora* (Diptera: Phoridae). *Insect Systematics Evolution*, 32 (4), 393–409.
<http://dx.doi.org/10.1163/187631201x00272>
- Brown, B.V., Bragança, M.A.L., Gomes, D.S., Queiroz, J.M. & Teixeira, M.C. (2012) Parasitoid phorid flies (Diptera: Phoridae) from the threatened leafcutter ant *Atta robusta* Borgmeier (Hymenoptera: Formicidae). *Zootaxa*, 3385, 33–38.
- De Almeida, W.R., Wirth, R. & Leal, I.R. (2008) Edge-mediated reduction of phorid parasitism on leaf-cutting ants in a Brazilian Atlantic forest. *Entomologia Experimentalis et Applicata*, 129 (3), 251–257.
<http://dx.doi.org/10.1111/j.1570-7458.2008.00774.x>
- Disney, R.H.L., Elizalde, L. & Folgarait, P.J. (2009) New species and new records of scuttle flies (Diptera: Phoridae) that parasitize leaf-cutter and army ants (Hymenoptera: Formicidae). *Sociobiology*, 5 (2), 601–632.
- Eibl-Eibesfeldt, J. (1967) On the guarding of leafcutter ants by minima-workers. *Naturwissenschaften*, 54 (13), 346–346.
<http://dx.doi.org/10.1007/bf00621470>
- Elizalde, L. & Folgarait, P.J. (2011) Biological attributes of Argentinian phorid parasitoids (Insecta: Diptera: Phoridae) of leaf-

- cutting ants, *Acromyrmex* and *Atta*. *Journal of Natural History*, 45 (43–44), 2701–2723.
<http://dx.doi.org/10.1080/00222933.2011.602478>
- Elizalde, L. & Folgarait, P.J. (2012) Behavioral Strategies of Phorid Parasitoids and Responses of Their Hosts, the Leaf-Cutting Ants. *Journal of Insect Science*, 12 (135), 1–26.
<http://dx.doi.org/10.1673/031.012.13501>
- Feener, D.H. Jr. & Brown, B.V. (1993) Oviposition behavior of an ant-parasitizing fly, *Neodohrniphora curvinervis* Diptera: Phoridae, and defense behavior by its leaf-cutting ant host *Atta cephalotes* Hymenoptera: Formicidae. *Journal of Insect Behavior*, 6 (6), 675–688.
<http://dx.doi.org/10.1007/bf01201669>
- Gazal, V., Bailez, O. & Viana-Bailez, A.M. (2009) Mechanism of host recognition in *Neodohrniphora elongata* (Brown) (Diptera: Phoridae). *Animal Behaviour*, 78 (5), 1177–1182.
<http://dx.doi.org/10.1016/j.anbehav.2009.07.036>
- Guillade, A.C. & Folgarait, P.J. (2011) Life-history traits and parasitism rates of four phorid species (Diptera: Phoridae), parasitoids of *Atta vollenweideri* (Hymenoptera: Formicidae) in Argentina. *Journal of economic entomology*, 104 (1), 32–40.
<http://dx.doi.org/10.1603/ec10173>
- Linksvayer, T.A., McCall, A.C., Jensen, R.M., Marshall, C.M., Miner, J.W. & McKone, M.J. (2002) The Function of Hitchhiking Behavior in the Leaf-cutting Ant *Atta cephalotes*. *Biotropica*, 34 (1), 93–100.
[http://dx.doi.org/10.1646/0006-3606\(2002\)034\[0093:tfohbi\]2.0.co;2](http://dx.doi.org/10.1646/0006-3606(2002)034[0093:tfohbi]2.0.co;2)
- Malloch, J.R. (1914) Costa Rican Diptera. Paper 1. A partial report on Borboridae, Phoridae and Agromyzidae. *Transactions of the American Entomological Society*, 41, 8–36.
- Orr, M. (1992) Parasitic flies (Diptera: Phoridae) influence foraging rhythms and caste division of labor in the leaf-cutter ant, *Atta cephalotes* (Hymenoptera: Formicidae). *Behavioral Ecology and Sociobiology*, 30 (6), 395–402.
<http://dx.doi.org/10.1007/bf00176174>
- Pesquero, M.A., Bessa, L.A., Silva, H.C.M., Silva, L.D.C. & Arruda, F.V. (2010) Influência ambiental na taxa de parasitismo (Diptera: Phoridae) de *Atta laevigata* e *Atta sexdens* (Hymenoptera: Formicidae). *Revista de Biologia Neotropical*, 7 (2), 45–48.
- Silva, V.S.G., Bailez, O., Viana-Bailez, A.M., Tonhasca, A. & Castro Della Lucia, T.M. (2008). Survey of *Neodohrniphora* spp. (Diptera: Phoridae) at colonies of *Atta sexdens rubropilosa* (FOREL) and specificity of attack behaviour in relation to their hosts. *Bulletin of Entomological Research*, 98 (2), 203–206.
<http://dx.doi.org/10.1017/s0007485307005548>
- Tonhasca, A. Jr. (1996) Interactions between a parasitic fly, *Neodohrniphora declinata* (Diptera: Phoridae), and its host, the leaf-cutting ant *Atta sexdens rubropilosa* (Hymenoptera: Formicidae). *Ecotropica*, 2 (2), 157–164.
- Vieira-Neto, E.H.M., Mundim, F.M. & Vasconcelos, H.L. (2006) Hitchhiking behaviour in leaf-cutter ants: an experimental evaluation of three hypotheses. *Insectes sociaux*, 53 (3), 326–332.
<http://dx.doi.org/10.1007/s00040-006-0876-7>