



<http://dx.doi.org/10.11646/zootaxa.3947.3.5>

<http://zoobank.org/urn:lsid:zoobank.org:pub:92050E4D-F757-4111-B5C0-8B39708447AF>

A new species of *Erythrodiplax* breeding in bromeliads in Costa Rica (Odonata: Libellulidae)

WILLIAM A. HABER, DAVID L. WAGNER & CARLOS DE LA ROSA³

¹*Apdo. 50-5655, Monteverde, Costa Rica, Central America. E-mail: bill.haber01@gmail.com*

²*Dept. of Ecology and Evolutionary Biology, University of Connecticut, Storrs, CT 06269. E-mail: David.wagner@uconn.edu*

³*Director, La Selva Biological Station, Organization for Tropical Studies, Puerto Viejo, Costa Rica, Central America. E-mail: carlos.delarosa@ots.cr*

Abstract

We describe a new species, *Erythrodiplax laselva* (Libellulidae), that breeds in bromeliads and *Cochliostema* (Commelinaceae) in the eastern lowlands of Costa Rica. The closest known relative is thought to be *E. castanea*, widespread in Central and South America, and not *E. bromeliicola*, which is known to breed in bromeliads in Cuba and Jamaica. The male, female, genitalia, and larva are described and illustrated.

Key words: *Aechmea*, Bromeliaceae, *Cochliostema*, Costa Rica, dragonfly, *Erythrodiplax bromeliicola*, *Erythrodiplax castanea*, larval description, La Selva Biological Station, *Werauhia*

Resumen

Describimos una especie nueva, *Erythrodiplax laselva* (Libellulidae), que se reproduce en bromelias en la bajura Atlántica de Costa Rica. Su pariente más cercano parece *E. castanea*, de amplia distribución en Centro y Sudamérica, y no *E. bromeliicola*, que reproduce en bromelias en Cuba y Jamaica.

Palabras clave: *Aechmea*, Bromeliaceae, *Cochliostema* Costa Rica, descripción de larva, *Erythrodiplax bromeliicola*, *Erythrodiplax castanea*, Estación Biológica La Selva, libélulas, *Werauhia*

Introduction

Garrison *et al.* (2006) reviewed *Erythrodiplax*, recognizing 56 species, mostly Neotropical in distribution, with 8 species known from Mexico and 7 species reaching the U.S. Förster (2001) listed 12 species for Costa Rica; however, Paulson (2003) restricted *E. connata* (Burmeister, 1839) to a species in Chile and Argentina, reducing the number to 11. In April 1996 DLW collected a teneral male *Erythrodiplax* at La Selva Biological Station in Heredia Province, Costa Rica, tentatively identified by Dennis Paulson as *E. cf. amazonica* Sjöstedt, 1918 (Wagner *et al.* 2000). In 2012 Carlos de la Rosa collected a female of the same species eclosing from a larva clinging to a bromeliad leaf at the same site. Further observations by CDLR, Ronald Vargas, and WAH indicated that larvae emerged from two species of bromeliads, *Aechmea mariaae-reginae* H. Wendl. and *Werauhia gladioliflora* (H. Wendl.) J. R. Grant, as well as from *Cochliostema odoratissimum* Lem., a water-storing Commelinaceae. The only other dragonfly (Anisoptera) known to breed in bromeliads is *E. bromeliicola* Westfall in Needham *et al.*, 2000 of Cuba and Jamaica (Needham *et al.* 2000, Trapero-Quintana & R. Novelo-Gutiérrez 2012, Paulson 2014). The Costa Rican *Erythrodiplax* is described here as a new species distinct from *E. bromeliicola* and more closely related to *E. castanea* (Burmeister, 1839).

Acknowledgements

We thank Dennis Paulson for a helpful review of the manuscript. Rosser Garrison, Natalia von Ellenrieder, and Dennis Paulson provided identifications and literature. We also thank Rosser Garrison for the use of his illustrations of *E. bromeliicola*. We thank Ronald Vargas for sharing observations and for specimens and field assistance. Bill Mauffray, curator of Odonata at FSCA, was generous in facilitating a visit by WAH to the FSCA collection. The barcoding analysis was carried out through the Instituto Nacional de Biodiversidad (INBIO) in Costa Rica and the Barcode of Life Data Systems (BOLD) Laboratory, University of Guelph. Support for the ALAS Project was provided by National Science Foundation grants DEB-9706976, DEB-0072702 and DEB-0072702. A grant from Bosque Eterno, S.A., to WAH helped with field work and equipment.

References

- BOLD (2014) Barcode of Life Data Systems (BOLD) Laboratory, University of Guelph. BOLD Systems Management & Analysis. Available from: <http://www.boldsystems.org> (accessed 14 November 2014)
- Borror, D.J. (1942) A revision of the Libelluline genus *Erythrodiplax* (Odonata). Ohio State University Graduate Studies. *Contributions in Zoology and Entomology*, 4 (Biological Series), i–xv + 1–286.
- Burmeister, H.C.C. (1839) Neuroptera. In: Burmeister, H.C.C. (Ed.), *Handbuch der Entomologie*. Vol. 2. T.C.F. Enslin, Berlin, pp. 757–1050.
- Calvert, P.P. (1895) The Odonata of Baja California, Mexico. *Proceedings of the California Academy of Sciences*, Series 2, 4, 463–558.
- Corbet, P.S. (1983) Odonata in phytotelmata. In: Frank, J.H. & Lounibos, L.P. (Eds.), *Phytotelmata: Terrestrial Plants as Hosts for Aquatic Insect Communities*. Plexus Publishing, Medford, pp. 29–54.
- Dijkstra, K.-D.B., Bechly, G., Bybee, S.M., Dow, R.A., Dumont, H.J., Fleck, G., Garrison, R.W., Hämäläinen, M., Kalkman, V.J., Karube, H., May, M.L., Orr, A.G., Paulson, D.R., Rehn, A.C., Theischinger, G., Trueman, J.W.H., van Tol, J., von Ellenrieder, N. & Ware, J. (2013a) The classification and diversity of dragonflies and damselflies (Odonata). *Zootaxa*, 3703 (1), 36–045.
<http://dx.doi.org/10.11646/zootaxa.3703.1.9>
- Dijkstra, K.D.B., Kalkman, V.J., Dow, R.A., Stokvis, F.R. & van Tol, J. (2013b) Redefining the damselfly families: the first comprehensive molecular phylogeny of Zygoptera (Odonata). *Systematic Entomology*, 39, 68–96.
<http://dx.doi.org/10.1111/syen.12035>
- Drury, D. (1770) *Illustrations of Natural History. Wherein are exhibited upwards of two hundred and forty figures of exotic insects, according to their different genera*. London, 130 pp.
- Dunson, W.W. (1980) Adaptations of nymphs of a marine dragonfly, *Erythrodiplax berenice*, to wide variations in salinity. *Physiological Zoology*, 53, 445–452.
- Fincke, O.M. & Hedström, I. (2008) Differential forest use by predatory tree hole damselflies (Pseudostigmatidae): implications for forest conversion. *Studies on Neotropical Fauna and Environment*, 43, 35–45.
<http://dx.doi.org/10.1080/01650520701504597>
- Fincke, O.M., Yanoviak, S.P. & Hanschu, R.D. (1997) Predation by odonates depresses mosquito abundance in water-filled tree holes in Panama. *Oecologia*, 112, 244–253.
<http://dx.doi.org/10.1007/s004420050307>
- Förster, F. (1905) Neotropische Libellen. II. *Entomologische Zeitschrift*, 22, 75–76.
- Förster, S. (2001) *The Dragonflies of Central America Exclusive of Mexico and the West Indies*. 2nd Edition. Gunnar Rehfeldt, Braunschweig, 141 pp.
- Garrison, R.W., von Ellenrieder, N. & Louton, J.A. (2006) *Dragonfly Genera of the New World*. The Johns Hopkins University Press, Baltimore, 368 pp.
- Garrison, R.W., von Ellenrieder, N. & Louton, J.A. (2010) *Damselfly Genera of the New World*. The Johns Hopkins University Press, Baltimore, 490 pp.
- Geijskes, D.C. (1943) Notes on Odonata of Surinam. III. The genus *Coryphaeschna*, with descriptions of a new species and the nymph of *C. virens*. *Entomological News*, 54, 61–72.
- Haber, W.A. & Wagner, D.L. (2014) Dragonflies and Damselflies of Ecuador (Odonata). Available from: http://efg.cs.umb.edu/~whaber/Odonata_of_Ecuador/index.html (accessed 19 December 2014)
- Hagen, H.A. (1861) A synopsis of the Neuroptera of North America. *Smithsonian Miscellaneous Collections*, Washington, xx + 347 pp.
- Heckman, C.W. (2006) *Encyclopedia of South American Aquatic Insects: Odonata - Anisoptera*, Springer, Dordrecht, 725 pp.
- Karsch, F. (1891) *Kritik des Systems der Aeschniden*. *Entomologische Nachrichten*, 17, 273–290.
- Kirby, W.F. (1897) List of the Odonata collected by Mr. E. E. Austen on the Amazons etc. during the recent expedition of Messrs. Siemens Bros. Cable S. S. 'Faraday', with descriptions of several new species of Odonata. *Annals and Magazine of*

- Natural History*, 6, 598–617.
<http://dx.doi.org/10.1080/00222939708680582>
- Linnaeus, C. (1758) *Systema Naturae per regna tria naturae, secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis. Holmiae, Lorentii Salvii*. (Edition 10), 1 (Animalia), iv + 824 pp.
<http://dx.doi.org/10.5962/bhl.title.542>
- Lozano, F., Muzón, J. & del Palacio, A. (2011) Description of final stadium larva of *Erythrodiplax connata* and *E. basifusca* and redescription of that of *E. minuscula* (Odonata: Libellulidae). *International Journal of Odonatology*, 14, 127–135.
<http://dx.doi.org/10.1080/13887890.2011.595354>
- Needham, J.C., Westfall, M.J. & May, M.L. (2000) *Dragonflies of North America*. Revised edition. Scientific Publishers, Gainesville, 939 pp.
- Paulson, D.R. (1999) Dragonflies (Odonata: Anisoptera) of southern Florida. Slater Museum of Natural History Occasional Paper No. 57.
- Paulson, D.R. (2003) Comments on the *Erythrodiplax connata* (Burmeister, 1839) group, with the elevation of *E. fusca* (Rambur, 1842), *E. minuscula* (Rambur, 1842), and *E. basifusca* (Calvert, 1895) to full species (Anisoptera: Libellulidae). *Bulletin of American Odonatology*, 6, 101–110.
- Paulson, D.R. (2011) *Dragonflies and Damselflies of the East*, Princeton University Press, Princeton, 538 pp.
- Paulson, D.R. (2014) West Indian Odonata. Slater Museum of Natural History, University of Puget Sound. North American Odonata. Available from: <http://www.pugetsound.edu/academics/academic-resources/slater-museum/biodiversity-resources/dragonflies/west-indian-odonata/> (accessed 20 January 2015)
- Rambur, P. (1842) *Histoire Naturelle des Insectes: Neuropteres. Libraire Encyclopedique de Roret*, Paris, xvii + 534 pp.
- Ratnasingham, S. & Hebert, P.D.N. (2007) BOLD: The Barcode of Life Data System. *Molecular Ecology Notes*, 7, 355–364.
<http://dx.doi.org/10.1111/j.1471-8286.2007.01678.x>
- Ris, F. (1927) *Odonaten von Sumatra, gesammelt von Edward Jacobson. Zoologische Mededelingen*, Leiden, 10, 1–49.
- Sagra, R. (1857) *Histoire physique, politique et naturelle de l'île de Cuba*, A. Bertrand, Paris, 336 pp.
<http://dx.doi.org/10.5962/bhl.title.51128>
- Sjöstedt, Y. (1918) *Wissenschaftliche Ergebnisse der schwedischen entomologischen Reise des Herrn Dr. A. Ronican in Amazonas 1914–1915. Arkiv för zoologi*, 11, 1–54.
- Trapero-Quintana, A. & Novelo-Gutiérrez, R. (2012) Description of the final stadium larva of *Erythrodiplax bromeliicola* Westfall, 2000 (Odonata: Libellulidae) with notes on variation in adults from Cuba. *Zootaxa*, 3545, 59–66.
- Wagner, D.L., Paulson, D.R., Naskrecki, P., Esquivel, C. & Ramirez, A. (2000) Dragonflies and damselflies of La Selva, an illustrated checklist of the Odonata of La Selva Biological Station, Costa Rica. Available from: <http://ghostmoth.eeb.uconn.edu/laselvadragons/> (accessed 24 December 2014)
- Yanoviak, S.P. (2001) Predation, resource availability, and community structure in Neotropical water-filled tree holes. *Oecologia*, 126, 125–133.
<http://dx.doi.org/10.1007/s004420000493>