Zootaxa 2592: 1–133 (2010)
www.mapress.com/zootaxa/

Monograph

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

ZOOTAXA

2592

Phylogeny and classification of Rhagionidae, with implications for Tabanomorpha (Diptera: Brachycera)

PETER H. KERR

California Department of Food and Agriculture, Plant Pest Diagnostics Branch, 3294 Meadowview Rd., Sacramento, CA, 95832–1448 USA. E-mail: mycomya@gmail.com

Magnolia Press
Auckland, New Zealand

Accepted by S. Winterton: 21 Jul. 2010; published: 31 Aug. 2010

PETER H. KERR
Phylogeny and classification of Rhagionidae, with implications for Tabanomorpha (Diptera: Brachycera)
(*Zootaxa* 2592)

133 pp.; 30 cm.

31 August 2010

ISBN 978-1-86977-585-8 (paperback)

ISBN 978-1-86977-586-5 (Online edition)

FIRST PUBLISHED IN 2010 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

http://www.mapress.com/zootaxa/

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

Table of contents

Abstract 4
Introduction 5
Recent classification of Tabanomorph taxa, excluding Tabanidae 7
Phylogenetic analysis of Rhagionidae and related taxa 10
Material and methods 10
Results 16
Morphological characters and character state coding 16
Analysis of morphological data 57
Analysis of molecular data 59
Analysis of combined data 61
Discussion 65
Additional comments on larval morphology 66
Systematics 68
Key to adult genera of Rhagionoidea 68
Austroleptidae Nagatomi 70
    Austroleptis Hardy 70
Bolbomyiidae Stuckenberg *status revised* 71
    Bolbomyia Loew 71
Rhagionidae Latreille 73
Arthrocerinae Williston 73
    Arthroceras Williston 73
Chrysopilinae Bezzi 75
    Chrysopilus Macquart 75
    Schizella Bezzi 78
    Stylospania Frey 80
Rhagioninae Latreille 81
    Arthroteles Bezzi 81
    Atherimorpha White 82
    Desmomyia Brunetti 84
    Rhagio Fabricius 85
    Sierramyia, new genus 88
Spaniinae Frey 90
    Litoleptis Chillcott 90
    Omphalophora Becker 91
    Ptiolina Zetterstedt 95
    Spania Meigen 97
    Spaniopsis White 98
    Symphoromyia Frauenfeld 100
Incertae sedis 103
    Alloleptis Nagatomi & Saigusa 103
Acknowledgements 104
References 104
Appendix. List of included species 117

Abstract

This paper updates current knowledge of Rhagionidae and related taxa within the infraorder Tabanomorpha. An estimate of phylogeny for the group is presented, based on 127 morphological characters for 60 ingroup species and molecular characters consisting of 3200+ bp sequences of 28S rDNA for 38 ingroup species. The morphology and molecular datasets are analyzed separately and in a combined analysis, using parsimony, maximum likelihood, and Bayesian methods. Morphological and molecular data, when analyzed separately and in combination, yield similar hypotheses of the evolution within Tabanomorpha. Arthrocerinae (Rhagionidae), Chrysopilinae (Rhagionidae), Rhagioninae (Rhagionidae), Spaniinae (Rhagionidae), Tabanoidea (Pelecorhynchidae, Oreoleptidae, Athericidae, and Tabanidae), and Vermileonidae are recovered consistently. The relationships among the major tabanomorph clades, including *Austroleptis* Hardy and *Bolbomyia* Loew, remain weakly supported, however. Rhagionidae are recognized as a monophyletic group of four subfamilies and at least 15 extant genera. The subfamily Spaniinae is defined by a special modification of tergite 9 of the female genitalia, which is shared by members of *Omphalophora* Becker, *Ptiolina* Zetterstedt, *Spania* Meigen, *Spaniopsis* White, and *Symphoromyia* Frauenfeld. *Litoleptis* Chillcott is also placed in this group, however this could not be confirmed because females of this genus were not available. The concept of *Omphalophora* is clarified and the genus is resurrected from synonymy with *Ptiolina*. On this basis, several species are newly transferred to *Omphalophora;* they include *O. cinereofasciata* (Schummel 1837) **n. comb.**, *O. fasciata* (Loew 1869b) **n. comb.**, *O. majuscula* (Loew 1869b) **n. comb.**, and *O. nigripilosa* (Hardy & McGuire 1947) **n. comb**. Chrysopilinae is defined by having scale-like setae on the thorax and femur, as in *Chrysopilus* Macquart, *Schizella* Bezzi, and *Stylospania* Frey. *Solomomyia* Nagatomi is recognized as a new junior synonym of *Chrysopilus*. Seven new names within the genus *Chrysopilus* are created for binomials that are preoccupied. These include *C. amulus* Kerr **nom. nov.** for *C. latifrons* Williston 1901 (preoccupied by *C. latifrons* Bezzi 1898), *C. batak* Kerr **nom. nov.** for *C. tomentosus* Meijere 1924 (preoccupied by *C. tomentosus* Bigot 1887), *C. mawambus* Kerr **nom. nov.** for *C. obscuripes* Brunetti 1927 (preoccupied by *C. obscuripes* Speiser 1923), *C. meunieri* Kerr **nom. nov.** for *C. nagatomii* Evenhuis 1994 (preoccupied by *C. nagatomii* Yang & Yang 1991), *C. occidentalis* Kerr **nom. nov.** for *C. lucifer* Adams 1904 (preoccupied by *C. lucifer* Walker 1852), and *C. amorimi* Kerr **nom. nov.** for *C. fascipennis* Bromley in Curran 1931 (preoccupied by *C. fascipennis* (Brunetti 1920)). *Chrysopilus sinensis* (Yang *et al.* 1997) **n. comb.** is transferred from *Spatulina* Szilády, where this species was originally placed. Arthrocerinae contains a single genus, *Arthroceras* Williston. Phylogenetic analyses consistently show strong support for a clade consisting of Arthrocerinae, Chrysopilinae, and Spaniinae; most females of these subfamilies have spermathecal duct accessory glands. Spermathecal duct accessory glands are reported here for the first time and are unique in Tabanomorpha. Rhagioninae is the earliest branching subfamily of Rhagionidae. The saw sclerite in the larval mandible may be synapomorphic for this subfamily. Members of Rhagioninae include *Atherimorpha* White, *Desmomyia* Brunetti, *Rhagio* Fabricius, and *Sierramyia* Kerr **gen. nov.** *Atherimorpha setosus* (Philippi 1865) is recognized as a **new synonym** of *Atherimorpha praefica* (Philippi 1865) and *Neorhagio* Lindner 1924 is recognized as a **new synonym** of *Atherimorpha*. *Sierramyia* **gen. nov.** is erected for two species from Mexico that were originally placed in *Neorhagio* (type species: *Neorhagio caligatus* Santos 2006). *Rhagina* Malloch is recognized as a **new synonym** of *Rhagio*. As a result, *Rhagio yangi* Kerr **nom. nov.** is created for *R. sinensis* Yang & Yang 1993a (preoccupied by *R. sinensis* Yang & Nagatomi 1992, **n. comb.**). Two enigmatic genera, *Bolbomyia* Loew and *Austroleptis* Hardy are retained within their own families, Bolbomyiidae **status revised** and Austroleptidae, respectively. *Alloleptis tersus* Nagatomi & Saigusa is *incertae sedis* within Rhagionoidea. Comments on larval morphology of Tabanomorpha are given in light of this work. A key is given to all families of Tabanomorpha and genera of Rhagionidae. The genera of Austroleptidae, Bolbomyiidae, and Rhagionidae are diagnosed, re-described, and re-classified based on characters and relationships established by the phylogenetic analyses, with a list of included species for each genus. A history of the recent classification of Rhagionidae and related taxa is also provided.

Key words: Tabanoidea, Rhagionoidea, Austroleptidae, Bolbomyiidae, Arthrocerinae, Rhagioninae, Chrysopilinae, Spaniinae, *Sierramyia*, *Omphalophora*, systematics, new genus, phylogeny, taxonomy, combined analysis