Zootaxa 627: 1–8 (2004)
www.mapress.com/zootaxa/

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

627

Borneomyia, a new genus and two new species of Milichiidae (Diptera, Schizophora)

IRINA BRAKE

Department of Entomology, Smithsonian Institution, MRC-0169 NHB, PO Box 37012, Washington, DC 20013, USA. ibrake@sel.barc.usda.gov

Abstract

Borneomyia n. gen. and its two new species, *B. tigra* n. sp. and *B. acanthophora* n. sp. (Diptera, Milichiidae), are described from Borneo and nearby regions. The new genus belongs to the Phyllomyzinae and is characterized by a femoral organ on the male midfemur, by several ventral rows of 3-5 setulae on the basitarsomere of the hindleg, and by the brown spot, each, on the otherwise yellow antennal grooves.

Key words: Diptera, Milichiidae, *Borneomyia*, new genus, new species

Introduction

The Milichiidae are a small acalyptrate family of approximately 250 species in 19 genera and are worldwide in distribution. The family is divided into three subfamilies: Milichiinae, Madizinae, and Phyllomyzinae (Brake 2000). *Borneomyia* n. gen. ("Genus nov. 1" in Brake 2000) belongs to the subfamily Phyllomyzinae and is most closely related to the genera *Phyllomyza* Fallén, *Microsimus* Aldrich, and *Costalima* Sabrosky based on the synapomorphy of the males' notched surstylus. However, specimens were often identified as the genus *Stomosis* because of similar chaetotaxy and color pattern to *S. vittata* Malloch.

Specimens have been primarily collected in Malaise traps, from Borneo and nearby regions, first stored in ethanol, and later mounted. In this paper I describe this new genus, which includes two new species, *Borneomyia tigra* n. sp. and *B. acanthophora* n. sp.

Materials and methods

The terminology essentially follows McAlpine (1981) with a few exceptions. For the ver-

Accepted by D. Bickel: 16 Aug. 2004; published: 3 Sept.. 2004

tical setae, I use the terms "medial" and "lateral" (White *et al.* 2000) instead of the traditional "inner" and "outer," respectively. For the orbital and frontal setae I use the terms "posterior" and "anterior" instead of "upper" and "lower", and for the first flagellomere I use the term basoflagellomere. The terminology of the male genitalia follows Cumming *et al.* (1995). For the most part information given in the description of the genus is not repeated in the species descriptions. In the type material section, three dots ("...") in the locality citation denote redundant information, which is the same as in the previous locality citation.

Specimens are deposited in the following institutions:

BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, USA
BMNH	The Natural History Museum, London, United Kingdom
MZB	Museum Zoologicum Bogoriense, Bogor, Indonesia
NMWC	National Museum and Galleries of Wales, Cardiff, United Kingdom
ROM	Royal Ontario Museum, Toronto, Ontario, Canada
TAU	Tel Aviv University, Tel Aviv, Israel
USNM	National Museum of Natural History, Washington, D.C., USA.

Borneomyia Brake, n. gen.

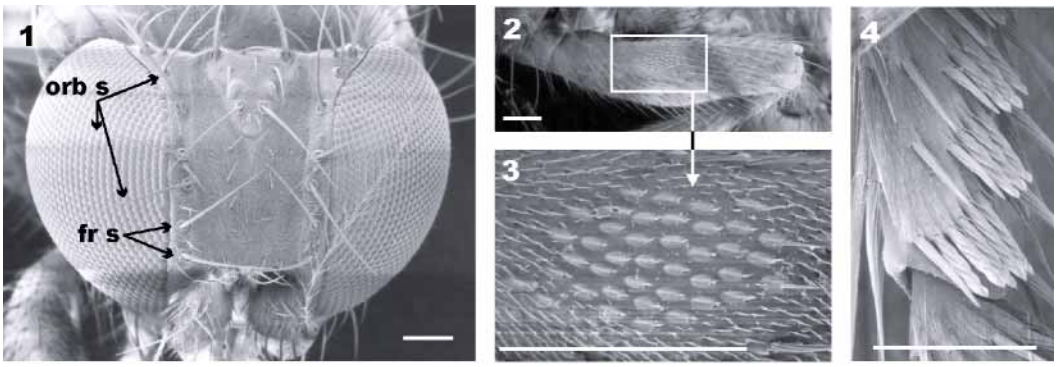
Genus nov 1, in Brake 2000.

Type species: *Borneomyia tigra* Brake, n. sp., by present designation.

Description: Body wholly subshiny, only mesonotum slightly more shiny. Body usually yellow with brown stripes. Antennal grooves yellow with roughly circular spot ventral to each antenna.

Head (fig. 1): Frontal triangle extending to level of middle orbital seta. Three orbital setae, posterior seta lateroreclinate, anterior 2 setae lateroclinate; two medioclinate frontal setae. One reclinate setula between posterior and middle orbital setae, one medioclinate setula each between middle and anterior orbital setae and between anterior orbital seta and posterior frontal seta, 2 or 3 medioclinate setulae between frontal setae, and one medioclinate setula ventral to anterior frontal seta; about 5–6 small interfrontal setulae, anterior setula slightly longer; additional setula between anterior interfrontal setula and anterior frontal seta. Lateroproclinate ocellar and medial and lateral vertical setae present, plus some setulae. Postocellar setae cruciate. Lunula not or only narrowly visible, apparently without setulae, merging into face. Antenna short; basoflagellomere round, about as long as pedicel; arista long (about as long as head height), long pubescent. Vibrissal angle not produced, but base of vibrissa protuberant. Vibrissa well developed, followed posteriorly by slightly smaller seta also on slight protuberance. Gena covered by several setulae. Pal-

pus flat, elongate spatulate, with several setulae. Labellum with 4 pseudotracheae, 2 medial pseudotracheae converging towards labellum apex.



FIGURES 1–4. *Borneomyia tigra* Brake n. sp., male (from Brake 2000). 1: Head, frontal view; 2–3: Midfemur with femoral organ, anterodorsal view; 4: Basitarsomere of hindleg, anteroventral view. Abbreviations: fr s–frontal setae, orb s–orbital setae. Scale bar: 0.1 mm.

Thorax: Mesonotum about as long as broad. Chaetotaxy: 1 large postpronotal plus 1 additional seta about 0.4x length of postpronotal, 2 notopleural, 1 presutural, 1 supra-alar, 1 postalar, 1 intra-alar, and 3 postsutural dorsocentral setae, anterior dorsocentral only slightly longer than acrostichal setulae, middle dorsocentral about 0.6x length of posterior dorsocentral, acrostichal setulae in irregular rows, 1 short prescutellar acrostichal seta, 1 apical and 1 basal scutellar setae, basal seta longer than apical seta, apical setae cruciate, 1 proepimeral seta, 1 proepisternal seta, anepisternum bare, 1 katepisternal seta and row of setulae anterior to katepisternal seta from dorsal to ventral margin of katepisternum, no anepimeral seta.

Legs: Forefemur bearing posterodorsal, slightly irregular row of about 6 setae, these becoming progressively longer distally. Foretibia with 2 slightly stronger preapical setulae. Basitarsomere of foreleg with anteroventral row of setulae and a few stronger setulae ventrobasally. Midfemur in males with femoral organ anterodorsally and shortly proximal to middle (figs. 2 and 3). Femoral organ consisting of field of irregularly-placed tiny setulae of probably sensory function (Brake 2000). Midtibia with several stronger setulae and 1 seta preapically. Hindfemur enlarged, about 1.5–1.8x as broad as fore- and midfemur. Hindtibia as foretibia, with ventroapical comb of setulae. Basitarsomere of hindleg with several ventral rows of 3–5 setulae, with setulae flattened apically (fig. 4), and with few stronger setulae ventrobasally.

Wing (fig. 8): R4+5 and M1 parallel. Cell cup closed. Wing surface covered by numerous brown microtrichia which are about as long as costal spines.

Abdomen: Tergites with relatively sparse setulae, with setulae progressively longer posteriorly, and row of setae along posterior margins of tergites 4 and 5. Sternite 5 with

row of setae, setae posterolaterally longest. Male terminalia as in fig. 7. Epandrium spherical; surstylus deeply notched at middle. Hypandrium U-shaped, not fused with phallapodemic sclerite. Pregonites bare, not fused with hypandrium, but appear to be fused with phallapodemic sclerite. Distiphallus short and glabrous, without sclerotizations.

Females differ from males in absence of femoral organ. Sternites 2-8 complete, not reduced. Ventral receptacle globular; spermathecal ducts elongate and rolled up together distally into one longish spool-like coil; sclerotized spermathecal capsules absent, distal end of spermathecal ducts surrounded by epithelial gland cells.

Etymology: The genus name is derived from the island Borneo and the Greek *myia* = fly, referring to the place where most of the specimens have been collected. The gender of the name is feminine.

Discussion: The new genus differs from other milichiid genera in the presence of a femoral organ on the male midfemur, in the basitarsomere of the hindleg having several ventral rows of 3–5 setulae, and in the brown spot, each, on the otherwise yellow antennal grooves.

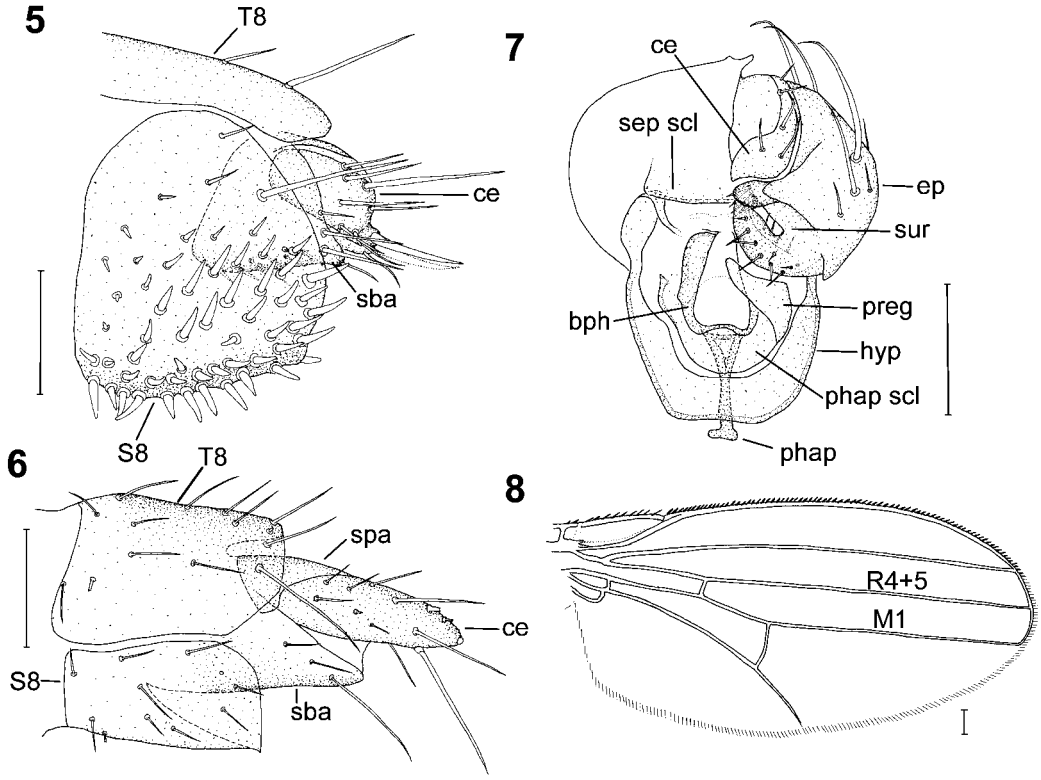
***Borneomyia tigra* Brake, n. sp.**
(Fig. 1–4, 6–8)

Genus nov 1, sp. 1, in Brake 2000 (Fig. 1C, 3A, 6B, 11F-H).

Male. Coloration: Yellow with brown vittae as stated below. Extent of brown coloration varies between darker and paler specimens, resulting in different width of vittae. Setae black except where otherwise stated.

Head: Yellow except for brown arista, dorsolateral base of pedicel, and frontal triangle. Brown vitta from apex of frontal triangle to level of second anteriormost interfrontal setula. Roughly circular brown spot on face ventral to each antenna and brown lower margin of face. Brown vitta on ventral and posterior half of gena but dorsal to most ventral row of genal setulae. Proboscis and palpus yellow, eye yellow. Eye 1.2–1.7x as high as long. Frons 1.2–1.4x as long as broad. Pedicel usually with only one, sometimes with two strong setae, longer than basoflagellomere. Gena about 0.1–0.2x as high as eye. Palpus flat, elongate spatulate, with 1 longer seta at ventral edge and several smaller setulae.

Thorax: Yellow except for narrow brown vittae as follows: medially on mesonotum and extending onto scutellum and there broadening; along dorsocentral track; along intra-alar track between transverse suture and posterior end of mesonotum, united with dorsocentral vitta posteriorly; vitta beginning dorsally from postpronotum, extending to presutural seta and to base of wing (ventral to supra-alar seta); on dorsal part of anepisternum beginning just dorsal to anterior spiracle and extending to base of wing; between proepimeron and katepisternal seta. Vittae are about as wide as distance between prescutellar setae. Scutellum with basal scutellar seta very long, 1.5–1.8x as long as apical seta.



FIGURES 5–8. 5: *Borneomyia acanthophora* Brake n. sp., tip of ovipositor, lateral view; 6–8: *B. tigra* Brake n. sp.; 6: Tip of ovipositor, lateral view; 7: Male terminalia, ventral view; 8: Wing. Abbreviations: bph–basiphallus, ce–cercus, ep–epandrium, hyp–hypandrium, M–media, phap–phallapodeme, phap scl–phallapodemic sclerite, preg–pregonite, R–radius, S–sternite, sba–subanal plate, sep scl–subepandrial sclerite, spa–supra-anal plate, sur–surstylus, T–tergite. Scale bar: 0.1 mm.

Legs: Yellow except for sub-basal dorsal vitta on forecoxa and dorsal base of mid- and hindcoxa; forefemur with brownish tinge along posterior aspect, short vitta in middle of, and apical spot on anterior aspect; midfemur with brown femoral organ and brown spot anteriorly at middle and tip (some specimens additionally with brown anterior base); hindfemur with brown base (except posteriorly) and apex (except ventrally in some specimens); tibiae with brown basal, middle, and subapical ring (except basal ring on hindtibia missing); tarsi with subapical ring on basitarsomere, apical 0.75 of second tarsomere and completely brown distal three tarsomeres (tarsomeres of midleg slightly paler). Ventroapical comb on hindtibia with yellow setulae and ventral rows on basitarsomere of hindleg with yellow setulae.

Wing: Brownish with brown veins; halter yellow. Distal section of M1 about 3–4x as long as penultimate section.

Abdomen: Yellow except for brown posterior margins of tergites and posterior half of sternite 5. Terminalia: Epandrium with 3 long and few shorter setae (fig. 7). Surstylus deeply notched, with several setulae medially and laterally on anterior lobe and row of setulae medially on posterior lobe. Hypandrium quite broad in lateral view, connected to phallapodemic sclerite via membrane. Distiphallus short.

Female. Medial pseudotracheae on labellum much stronger than lateral pseudotracheae, both ending at one short spine at apex of labellum (Fig. 6B in Brake 2000). Pseudotracheal teeth on lateral two pseudotracheae as hemicircles, teeth on medial pseudotracheae long and thin, ending in one or sometimes two tips. Tergites 1–7 brown except for medial base of T1 and T2, and anterolateral corners of T2–T5. In some specimens anterior part of T1–T7 yellow and posterior part brown. Tergite 8 yellow. Female tergites with more setulae than male tergites. Sternites 1 to 4 and S8 yellow, posterior margin of S4 brown in some specimens. S5–S7 yellow anteriorly and brown posteriorly. Tip of ovipositor as in figure 6, cercus long. Wing slightly darker anteriorly than in male.

Type material. Holotype male: BRUNEI. Laden Forest Reserve, primary mixed dipterocarp forest, PF 3/3, 11.i.1993, M.J. Sahat, NMW.Z. 1992-012. The holotype is glued on a cardboard triangle, is in good condition, and is deposited in the National Museum and Galleries of Wales, Cardiff (NMWC). Paratypes (4♂, 86♀): 1 ♂ and 1 ♀, same collection data as holotype (BMNH). BRUNEI. Laden Forest Reserve, logged mixed dipterocarp forest, LF 1/3, 14.xii.1992, M.J. Sahat, NMW.Z. 1992-012 (1 ♂, 1 ♀, NMWC); … LF 1/4, 14.xii.1992 (1 ♀, NMWC); … LF 1/7, 14.xii.1992 (2 ♀, BMNH); … LF 2/2, 28.xii.1992 (4 ♀, NMWC); … LF 2/3, 28.xii.1992 (11 ♀, NMWC, TAU); … LF 2/6, 28.xii.1992 (1 ♂, 7 ♀, USNM, NMWC); … LF 3/3, 11.i.1993 (1 ♀, NMWC); … LF 3/6, 11.i.1993 (2 ♀, NMWC); … LF 4/5, 25.i.1993 (1 ♀, NMWC); … LF 4/10, 25.i.1993 (2 ♀, NMWC); … 25.ii.1993 (1 ♂, 6 ♀, NMWC); … primary mixed dipterocarp forest, PF 1/6, 14.xii.1992 (3 ♀, NMWC); … PF 3/3, 11.i.1993 (1 ♀, NMWC); … PF 4/6, 25.i.1993 (2 ♀, NMWC).

MALAYSIA. Sabah: Danum Valley, 5.01'N, 117.47'E, 260 m, lowland, mixed dipterocarp forest, Grid No. W10 51, malaise trap sample No. 11, 6–12.ix.1987, A.H. Kirk-Spriggs, NMW Sabah (Borneo) Expedition NMW.Z. 1987.094 (1 ♀, NMWC); … malaise trap sample No. M19, 24.ix.–12.x.1987 (4 ♀, in ethanol, NMWC); … malaise trap sample No. M23, 12.–18.x.1987 (3 ♀, in ethanol, NMWC); … 150 m, Grid No. W0 N3, malaise trap sample No. M15, 16.-24.ix.1987 (1 ♀, in ethanol, NMWC); … malaise trap sample No. M22, 1.–12.x.1987 (1 ♀, in ethanol, NMWC); … malaise trap sample No. M24, 12.-18.x.1987 (1 ♀, in ethanol, NMWC); … Bukit Monkobo, 51.48'N, 116.58'E, 900 m, malaise trap sample base-camp, stunted hill forest, malaise trap sample No. 1, 7–13.viii.1987 (3 ♀, NMWC); … Bukit Monkobo stream, malaise trap sample No. 4, 11–17.viii.1987 (3 ♀, NMWC); … malaise trap sample No. 7, 17–23.viii.1987 (2 ♀, NMWC); … Bukit Monkobo, 1930 m, upper montane forest summit, malaise trap sample No. 3, 11–19.viii.1987 (4 ♀, NMWC); Sabah: mainline West, 56 km West of Silam, 1200 m, seven

year old selectively logged forest, malaise trap sample No. 12, 7.-25.ix.1987, A.H. Kirk-Spriggs. NMW Sabah (Borneo) Expedition NMW.Z. 1987.094 (3 ♀, NMWC); … 100 m, malaise trap sample No. 20, 25.ix.–14.x.1987 (3 ♀, in ethanol, NMWC); … lowland, mixed dipterocarp forest, Grid No. Stream, malaise trap sample No. 17, 23.ix.-28.ix.1987 (1 ♀, in ethanol, NMWC); … malaise trap sample No. 21, 28.ix.–14.x.1987, (3 ♀, in ethanol, NMWC). Sabah: Mt. Kinabalu, Kamborangah, 70,750 feet, 29.v.1929, ex F.M.S. Museum, B.M. 1955-354 (1 ♀, USNM). INDONESIA. Maluku: Bacan Is., Makian, 1.5 km E of Labuha, forest trail, secondary area, malaise trap sample, 23.–26.ix.1985, NMW Indonesia Expedition 1985 (Project Wallace) NMW.Z 1985.078, A.H. Kirk-Spriggs (1 ♀, NMWC); E. Kalimantan, Kac. Pujungan, Kayan-Mentarang Nat. Reserve, lowland diptero. forest WWF station, Lalut Birai vicinity of Base Camp Log emergence traps, 2° 52'N, 115° 49'E, 378 m, vi–viii.1993, DC Darling Rosichon U., IIS 930596 (1 ♀, ROM); Sumatra, Aceh, Gunung Leuser Nat. Pk., Ketambe Res. Sta., primary rainforest, young forest (T3)/mature forest (T4), gap/canopy, 350-400 m, 3° 41'N 97° 39'E, malaise trap head, 1–31.xii.1989, DC Darling, IIS 890014 (3 ♀, MZB, ROM); ... primary forest, mature forest, Terrace 4, light gap, 400 m, malaise trap w/ pans, 22–30.ix.1989, IIS 890003 (1 ♀, ROM); ..., closed canopy, 1–30.xi.1989, IIS 890012 (1 ♀, MZB).

Etymology: I named this species *tigra*, because the brown vittae reminded me of a tiger. The epithet is to be treated as a noun in apposition.

Comments: One male from Malaysia, Sabah (1 km S. Kundasang, 1530 m, 22.viii.1983, G.F. Hevel & W.E. Steiner, USNM) was not included in the type series, because it is lighter than the other specimens, with the brown vittae being thinner and a yellow scutellum.

***Borneomyia acanthophora* Brake, n. sp.**
(Fig. 5)

Genus nov 1, sp. 2, in Brake 2000.

This species differs from *Borneomyia tigra* n. sp. in the following characters: Pedicel with 3 strong setae that are longer than the basoflagellomere. Basal scutellar seta 1.1–1.2x as long as apical seta. Male epandrium with a few more setae and setulae; posterior lobe of surstylus with an additional setula on lateral aspect. Female ovipositor: Sternite 8 bent on medial line, covered with short spine-like setulae on ventral half (fig. 5); cercus with a long spine-like seta at tip.

Type material. Holotype female: INDONESIA. North Sulawesi: Dumoga-Bone N.P., 0.34' N, 123.54' E, 232 m, malaise trap sample forest 'Rintice 3', 3.–16.ix.1985, A.H. Kirk-Spriggs, NMW Indonesia Expedition 1985 (Project Wallace) NMW.Z 1985.078. The holotype is mounted on a cardboard triangle, is in good condition, and is deposited in the National Museum and Galleries of Wales, Cardiff (NMWC). Paratypes: 1 ♀, same collec-

tion data as holotype (BMNH). MALAYSIA. Sabah: mainline West, 56 km West of Silam, 1200 m, seven year old selectively logged forest, malaise trap sample No. 12, 7.–25.ix.1987, A.H. Kirk-Spriggs. NMW Sabah (Borneo) Expedition NMW.Z. 1987.094 (1 ♀, USNM). PAPUA NEW GUINEA. Popondetta, 25 m, light trap, vi.1966, Shanahan-Lippert (1 ♂, 1 ♀, BPBM).

Etymology: The species name is derived from the Greek *acantha* = spine and *phoreo* = carry, denoting the conspicuous seta on the cerci. The epithet is to be treated as an adjective.

Comments: The male paratype from Papua New Guinea is in bad condition (head missing), and the species identity could only be ascertained by the length of the scutellar setae.

Acknowledgments

I thank Drs. F.C. Thompson, W.N. Mathis, and J. Swann for reviewing a draft of this paper and I am grateful to GBIF, the Global Biodiversity Information Facility for providing the funds for my Smithsonian fellowship. To Drs. J.C. Deeming, W.N. Mathis, and J. Swann I express my thanks for lending specimens. I am grateful to Dr. L. Cederholm, editor of the *Entomologica Scandinavica Supplements*, for providing permission to use figures 1-4 from Brake (2000).

Literature

Brake, I. (2000) Phylogenetic systematics of the Milichiidae (Diptera, Schizophora). *Entomologica Scandinavica Supplement*, 57, 1–120.

Cumming, J.M., Sinclair, B.J. & Wood, D.M. (1995) Homology and phylogenetic implications of male genitalia in Diptera – Eremoneura. *Entomologica Scandinavica*, 26, 120–151.

McAlpine, J.F. (1981) Chapter 2. Morphology and terminology: adults. *In*: McAlpine, J.F., Peterson, B.V., Shewell, G.E., Teskey, H.J., Vockeroth, J.R. & Wood, D.M. (Coord.). *Manual of Nearctic Diptera*, Vol. 1. Research Branch, Agriculture Canada, Monograph 27. Ottawa, 9–63.

White, I.M., Headrick, D.H., Norrbom A.L. & Carroll, L.E. (2000) 33 Glossary. *In*: Aluja, M. & Norrbom, A.L. (Eds). *Fruit flies (Tephritidae): Phylogeny and Evolution of Behaviour.* CRC Press, Boca Raton, 881–924.

