MECOPTERA (scorpionflies, hangingflies, earwigflies, and allies) at the Florida State Collection of Arthropods

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(http://www.fsca-dpi.org/MecopteraPage.htm)

by

James C. Dunford, Louis A. Somma, and David Serrano
Research Associates:
Florida State Collection of Arthropods, Division of Plant Industry, Entomology Section, Florida Department of Agriculture and Consumer Services, PO Box 147100, 1911 SW 34th St, Gainesville, FL 32614-7100

This is a small, “primitive” order of holometabolous insects. The order name is derived from the Greek words mecos (=length) and pteron (=wing). At present there are approximately fewer than 700 known, extant species arranged in 38 genera and 9 families worldwide. Five families are widely distributed throughout much of the world while the other four are restricted to South America and the Australian region. Two families, Panorpidae and Bittacidae, comprise most of the species. Fossil Mecoptera are well represented in sedimentary rocks of the Lower Permian geological period (approximately 270 million years ago). There are nearly 400 known fossil species in approximately 87 genera and as many as 34 families (although researchers disagree on the exact number of extinct families), exhibiting a greater diversity than extant mecopteran taxa. Because traditional “Mecoptera” lack defining, unifying characters, they may not represent a monophyletic grouping. Recent DNA and older morphological data suggests Mecoptera are closely related to fleas (Siphonaptera). Molecular support for a monophyletic grouping known as the Antliophora (Diptera and (Mecoptera + Siphonaptera)) is strong.

Mecopterans have diverse life histories and morphologies. Many species inhabit mesic, forested environments and feed on decaying vegetation or dead or dying, soft bodied arthropods as larvae and/or adults; some groups are reported to feed on nectar, pollen, carrion, mosses, and larval midges. Eggs are generally ovoid and smooth to finely reticulate. Larvae are generally eruciform or caterpillar-like and have a well developed head capsule with chewing mouthparts. Most groups have thoracic legs and fleshy prolegs on the first eight abdominal segments, while others may be grub-like and lack abdominal prolegs. Pupae are exarate and decticous and many species pupate in the soil. Adult Mecoptera are largely defined by wing venation, wing maculation, and tarsal structure. The head bears prominent eyes (or lacking in some), three large ocelli (or lacking in some), and is extended into a rostrum or beak in most groups, and depending on the food resource, may have short or elongate mandibles; antennae are long and primarily filiform, or nearly moniliform in a few groups. Many Mecoptera have two pairs of membranous wings nearly equal in length, typically with darker spots or bands. In some groups, the wings are reduced or absent. A few natural enemies of Mecoptera have been reported in the literature, such as web-building spiders, damselflies, reduviid bugs, and asilid flies. Since most mecopterans inhabit moist forests, any disturbance reducing
moisture levels (i.e., deforestation, Global Warming) could adversely affect or extirpate the Mecoptera present. In general, Mecoptera are weak fliers, and dispersal can be severely limited if suitable habitat is reduced. This order is of little economic significance but represents a systematically and biologically important, ancient insect lineage.

**Extant Mecopteran Families and Their Continental Distributions**

Nannochoristidae-southeastern Australia, Tasmania, New Zealand, and southern South America  
Bittacidae (hangingflies)-North America, South America, Europe, Africa, Asia, and Australia  
Boreidae (snow scorpionflies, “snow fleas”)-mostly boreal and montane regions of North America, Europe, and Asia  
Meropoeidae (earwigflies)-eastern North America and southwest Western Australia  
Eomeropidae-southern South America  
Apteropanorpidae (wingless scorpionflies)-Tasmania, Australia  
Choristidae-southeastern Australia  
Panorpodidae (short-faced scorpionflies)-Appalachian region and Pacific Northwest of North America, eastern Asia  
Panorpidae (scorpionflies)-North America, Europe, Asia

The Mecoptera collection at the Florida State Collection of Arthropods (FSCA), which includes specimens maintained for the McGuire Center for Lepidoptera and Biodiversity (MGCL), presently contains 20 drawers of mostly pinned adults, representing more than 4800 specimens. There are three holotypes and four allotypes located in the collection (see List of Mecoptera Species). Recent donations (2004 through 2012) and gifted specimens representing the families Bittacidae, Boreidae, Meropoeidae, Panorpodidae and Panorpidae, have expanded the collection by more than 1000 specimens. Important recent donors and collectors include David T. Almquist, Wesley J. Bicha, John B. Heppner, Joshua R. Jones, Peter W. Kovarik, Craig M. Brabant, Edward I. Coher, David P. Cowan, Olga Garcia, William L. Grogan, Jr., Bruce A. Harrison, Joseph E. Eger, John Leavengood, William Mauffrey, R. B. Miller, Howard Romack, Scott R. Shaw, Paul E. Skelley, Zell Smith, Lionel A. Stange, Gary J. Steck, Bruce D. Sutton, James R. Wiley, Allan Wills, Nadeer N. Youssef, and the late entomologists Charles Porter, Alistair S. Ramsdale, and Howard V. Weems, Jr. Additionally, important meropoeids were gifted to FSCA from the Virginia Museum of Natural History and the National Museum of Natural History (Smithsonian Institution).

FSCA research associates are currently conducting research on hypothetically primitive mecopteran taxa, such as *Merope tuber* Newman. New *M. tuber* distributional records, biogeographical information, and life history data is actively being obtained. The collection currently holds more than 310 adult *M. tuber* specimens from 17 states located throughout eastern North America.
Recent Publications, Webpages, and Work in Progress


of Food and Agricultural Sciences Extension, University of Florida, Gainesville. Online: http://edis.ifas.ufl.edu/in949.


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**List of Mecoptera species at FSCA by family and genus (and number of species represented)**

4818 specimens (mostly pinned) in 20 drawers, including 3 holotypes (*Panorpa appalachia* Byers 2002; *P. dividilacinia* Bicha 2006; *P. floridana* Byers 1993) and 4 allotypes (*Panorpa dividilacinia* Bicha 2006; *P. nudiramus* Byers 2002; *P. tecta* Byers 2002; *Neopanorpa similis* Byers 1999).

**Nannochoristidae** [2 total specimens]
*Nannochorista* Tillyard (1 species) – 2 specimens

*Nannochorista neotropica* Navás

**Boreidae** [78]
*Boreus* Latreille (5 species) – 78

*Boreus brumalis* Fitch
*B. californicus* Packard
*B. coloradensis* Byers
*B. nivoriundus* Fitch
*B. pilosus* Carpenter

**Meropidae** [319]
*Austromerope* Killington (1 species) – 5

*Austromerope poultoni* Killington

*Merope* Newman (1 species) – 314

*Merope tuber* Newman

**Eomeropidae** [1]
*Notiothauma* MacLachlan (1 species) – 1
Notiothauma reedi MacLachlan

**Panorpodidae** [120]
*Brachypanorpa* Carpenter (5 species) – 69

*Brachypanorpa carolinensis* (Banks)
*B. jeffersoni* Byers
*B. montana* Carpenter
*B. oregonensis* (MacLachlan)
*B. sacajewea* Byers

*Panorpodes* MacLachlan (3 species) – 51

*Panorpodes decorata* MacLachlan
*P. paradoxus* MacLachlan
*P. pulchra* Issiki

**Bittacidae** [686]
*Apterobittacus* MacLachlan (1 species) – 17

*Apterobittacus apterus* (MacLachlan)

*Bittacus* Latreille (20 species) – 417 (incl. 2 larvae)

*Bittacus andinus* Londt and Byers
*B. banksi* Esben-Petersen
*B. chilensis* Klug
*B. chlorostigma* MacLachlan
*B. coheri* Bicha
*B. disternum* Byers
*B. femoralis* Klug
*B. formosanus* Issiki
*B. indicus* Walker
*B. laevipes* Navás
*B. mexicanus* Klug
*B. monastyrskiyi* Bicha
*B. nipponicus* Navás
*B. occidentis* Walker
*B. pilicornis* Westwood
*B. punctiger* Westwood
*B. spatulatus* Byers
*B. stigmaterus* Say
*B. strigosus* Hagen
*B. texanus* Banks
Harpobittacus Gerstaecker (4 species) – 7

*Harpobittacus australis* (Klug)
*H. phaeoscius* Riek
*H. rubricatus* Riek
*H. tillyardi* Esben-Petersen

Hylobittacus Byers (1 species) – 240

*Hylobittacus apicalis* (Hagen)

Issikiella Byers (1 species) – 1

*Issikiella byersi* Penny and Arias

Orobittacus Villegas and Byers (1 species) – 4

*Orobittacus obscurus* Villegas and Byers

Panorpidae [3612]

Neopanorpa Weele (11 species) – 75

*Neopanorpa formosana* (Navás)
*N. k-maculata* Cheng
*N. makii* Issiki
*N. malaisei* Byers
*N. nielseni* Byers
*N. ophthalmica* Navás
*N. parvula* Willmann
*N. siamensis* Byers
*N. similis* Byers [ALLOTYPE]
*N. vietnamensis* Willmann
*N. youngi* Byers

Panorpa Linnaeus (79 species) – 3537 (incl. 7 larvae)

*Panorpa acuminata* Byers
*P. acuta* Carpenter
*P. alpina* Rambur
*P. americana* Swederus
*P. anomala* Carpenter
*P. appalachia* Byers [HOLOTYPE]
*P. azteca* Byers
*P. banksi* Hine
*P. banksiana* Penny and Byers
*P. bicornuta* MacLachlan
P. bifida Carpenter
P. bimacula Byers
P. bistriata Issiki
P. braueri Carpenter
P. capillata Byers
P. carolinensis Banks
P. choctaw Byers
P. claripennis Hine
P. cognata Rambur
P. communis Linnaeus
P. confusa Westwood
P. consuetudinis Snodgrass
P. contorta Byers
P. debilis Westwood
P. dissimilis Carpenter
P. dividilacinia Bicha [includes HOLOTYPE & ALLOTYPE]
P. dubitans Carpenter
P. ensigera Bicha
P. esakii Issiki
P. ferruginea Byers
P. flexa Carpenter
P. floridana Byers [includes HOLOTYPE]
P. fluvicaudaria Miyake
P. galerita Byers
P. germanica Linnaeus
P. gracilis Carpenter
P. helena Byers
P. hungerfordi Byers
P. hybrida MacLachlan
P. insolens Carpenter
P. isolata Carpenter
P. japonica Thunberg
P. latipennis Hine
P. lewisi MacLachlan
P. longicornis Carpenter
P. longiramina Issiki and Cheng
P. lugubris Swederus
P. maculosa Hagen
P. mirabilis Carpenter
P. nebulosa Westwood
P. neglecta Carpenter
P. nipponensis Navás
P. nudiramus Byers [includes ALLOTYPE]
P. nuptialis Gerstaecker
P. ochraceoauda Issiki
P. ochraceopennis Miyake
P. oconee Byers
P. pachymera Byers
P. pallidimaculata Issiki
P. palustris Byers
P. penicillata Byers
P. pryeri MacLachlan
P. robusta Carpenter
P. rufa Gray
P. rufostigma Westwood
P. sentosa Byers
P. setifera Webb
P. sigmoides Carpenter
P. speciosa Carpenter
P. subfurcata Westwood
P. submaculosa Carpenter
P. subulifera Byers
P. tecta Byers [ALLOTYPE]
P. truncata Byers
P. venosa Westwood
P. vernalis Byers
P. virginica Banks
P. vulgaris Imhoff and Labram
P. wormaldi MacLachlan