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New Species Records for Wisconsin False Click Beetles (Coleoptera: Eucnemidae), with a Checklist of the Wisconsin Eucnemid Fauna

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Abstract

In Wisconsin, *Microrhagus opacus* Otto, *Euryptychus ulkei* (Horn) and *Fornax bicolor* (Melsheimer) are recorded for the first time. Records for these three species are based on nine specimens, most of which were taken since 2008. Two specimens of *M. opacus* taken from a Grant County Malaise trap in the late 1970's as part of a statewide gypsy moth parasitoid recovery project, were previously identified as *Microrhagus audax* Horn. Most of the specimens reported herein were taken late in the collecting season, primarily during August. A checklist of the 20 genera and 41 species of Wisconsin Eucnemidae is also included.

Eucnemidae is a globally distributed, moderately sized elateroid family comprising approximately 1900 species in 200 genera (Otto 2016). Eucnemidae is most diverse in the subtropical and tropical regions of the world, with numerous radiations into temperate and boreal regions. In the Nearctic region, the family is comprised of 37 genera and nearly 100 species, including a number of new species to be described by the senior author (RLO) in forthcoming publications. Forty-one eucnemid species in 20 genera are currently known from Wisconsin, including the three species reported herein. Five additional, yet unconfirmed, species of Eucnemidae may also be present in the state based on collection records from neighboring or nearly adjacent states.

The common name, "false-click beetles," has been referred to a belief that beetles in the family lack the functional "clicking" mechanism common in adults of Elateridae (Muona 2000). However, many eucnemid species have the ability to click and in doing so produce a series of audible sounds, possibly forming a defensive strategy to startle any would-be predators (Muona 1993). The common name is still in use, but Eucnemidae is readily distinguished from Elateridae by the subterminal attachment of the antennal pedicel to the scape (terminal in Elateridae).

Associations with fungi present in coarse woody debris and dead trees within forested ecosystems are important factors in the family's role in forest ecosystem services, especially in tropical regions (Muona 2000; Otto 2016). Species of Eucnemidae are also good indicators of diverse forest composition (Muona 2000).

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Materials and Methods

Specimen Data and Specimens. Specimens were examined under ACE® Modulamp® unit with gooseneck fiber-optic illumination, through a Wild M3C 6.4–40x zoom stereo binocular microscope with 20x oculars.

All specimens of *Microrhagus opacus* Otto and most specimens of *Fornax bicolor* (Melsheimer) reported herein are vouchered in the Insect research Collection (WIRC) of the Department of Entomology, University of Wisconsin-Madison. A single specimen of *Euryptychus ulkei* (Horn) and one specimen of *F. bicolor* are deposited in the collection of the Global Eucnemid Research Project (GERP) also at the Department of Entomology, University of Wisconsin-Madison and under the current supervision of RLO.

Label data are presented verbatim, with text for each individual label placed inside quotation marks and separated from an underlying label by a slash (/). Each specimen deposited in the collection of the Global Eucnemid Research Project bears a green framed white label, "Collection of the Global Eucnemid Research Project, (Robert L. Otto)".

Figures. Habitus images were captured by the RLO as TIFF files taken with a JVC KY-F75U digital camera attached to a Leica® Z16 APO dissecting microscope with apochromatic zoom objective and motor focus drive, using a Synchroscopy Auto-Montage® Pro System and software version 5.01.0005,

Figures 1–3. Figure 1. *Microrhagus opacus* Otto: habitus, dorsal view; **Figure 2**. *Euryptychus ulkei* (Horn): habitus, dorsal view; **Figure 3.** *Fornax bicolor* (Melsheimer): habitus, dorsal view (Scale bar = 1.0 mm). Digital images: RLO.

resulting image stacks were processed using CombineZP®. Each image was modified through Photoshop Elements 10® (Adobe Systems Inc.) software on a Toshiba Satellite® C55 series laptop computer and all were collated into plates through the computer's paint program.

Results and Discussion

Muona (2000) identified two specimens from the WIRC as *Microrhagus audax* Horn taken from Malaise trap residues associated with a statewide survey to recover potential gypsy moth parasitoids. These specimens were recently re-evaluated by RLO and determined to represent *M. opacus* (Fig. 1), previously recorded from Alabama, Florida, Georgia, Indiana, Kansas, and New York (Otto 2015). One specimen was taken at a Malaise trap in the Lower Wisconsin River valley in southwestern Wisconsin [WI: Grant Co., T6N R6W sec. 17, 26 VII–9 VIII 1976, Gypsy Moth-MT (WIRC)]. A second specimen was taken from a same locale a year later [WI: Grant Co., T6N R6W sec. 17, 15–22 VI 1977, Gypsy Moth-MT (WIRC)]. Thirty-one years later, a third specimen of *M. opacus* was recovered by the junior author (DKY) from a barrier pitfall trap placed in an oak savanna restoration in southcentral Wisconsin, west of the village of Cross Plains [USA: WI: Dane County, Swamp Lover's Incorp., 43° 08'13"N, –89° 39'47"W, WGS84, 22–28 July 2008, coll: Daniel K. Young] / [barrier pitfall trap, upland savanna (WIRC)].

The new record for a single specimen of *E. ulkei* (Fig. 2) comes from a purple prism trap (Synergy Semiochemicals Inc., Vancouver, British Columbia, Canada) deployed in southwestern Wisconsin while monitoring for the adventive emerald ash borer, *Agrilus planipennis* Fairemaire [WI: Richland Co., along McCarthy Lane, N43.374134°, W-090.406902°, EABT103909B, 28 July 2011, Andy Anderson / Taken from EAB, prism trap baited, with Manuka oil, & Z3-Hexen-1-ol (GERP)]. *Euryptychus ulkei* has previously been confirmed from Georgia, Mississippi, Ohio, Pennsylvania and Virginia (Muona 2000; Hoffman et al 2009), thus the Wisconsin record represents a considerable northwestern range extension.

The new records for *F. bicolor* (Fig. 3) come from three collection events by DKY using Malaise traps. The first is from central Wisconsin [USA: WI: Adams County, Quincy Bluff Preserve, TNC, 43.86627°N, –89.88363°W, Geodetic datum: WGS84, 26 July–1 August 2011, collector: Daniel K. Young / ex. Malaise in *Populus*, *grandidentata* blow (1, GERP; 2, WIRC)]. Two additional specimens were taken from Jackson County [USA: WI: Jackson County, NE of Black River Falls, near Levis Creek [WGS84], 44.31134°N, –90.82335°W, 26 July–02 August 2011, collector: Daniel K. Young / ex. Malaise trap in, *Quercus-Pinus* forest (1, WIRC)]; [USA: WI: Jackson County, NE of Black River Falls, near Levis Creek [WGS84], 44.31134°N, –90.82335°W, 02–09 August 2011, collector: Daniel K. Young / ex. Malaise trap in, *Quercus-Pinus* forest (1, WIRC)]. *Fornax bicolor* is an eastern North American species previously known from Quebec, Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Louisiana, Missouri, New York, North Carolina, Pennsylvania, South Carolina, and Virginia (Muona 2000). The Wisconsin records reset the known northwestern distributional range boundary of this widespread but uncommonly encountered species.

Despite relatively intensive collecting efforts across Wisconsin for Eucnemidae and other Coleoptera in recent years, new records continue to be relatively easy to document, as evidenced by the current contribution which represents an 8% increase in the known eucnemid fauna of the state. Such revelations provide clear evidence that we are nowhere near approaching any hypothetical upper asymptote with respect to most of our regional insect species accumulation curves. This is not at all reassuring given the rates of habitat fragmentation and loss, climate change, and impacts of invasive species. It does, however, vividly illustrate that the need for even the most basic of biotic surveys and inventories—particularly with respect to insect species—is far from having been met. And without such baseline species inventories and collection event data, we remain far from being able to provide the kinds of evidence requisite to feed into predictive ecological modeling, or even common sense strategies, essential to the land managers and stewards of our precious and vanishing natural areas.

The complete checklist of false click beetles known to occur in Wisconsin includes the following:

EUCNEMIDAE OF WISCONSIN

SUBFAMILY PSEUDOMENINAE Muona, 1993
Tribe Schizophilini Muona, 1993
Schizophilus subrufus (Randall, 1838)

SUBFAMILY MELASINAE Fleming, 1821
Tribe Melasini Fleming, 1821
Isorhipis obliqua (Say, 1836)
Isorhipis ruficornis (Say, 1823)
Tribe Xylobiini Reitter, 1911
Xylophilus crassicornis Muona, 2000
Xylophilus cylindriformis (Horn, 1871)
Tribe Epiphanini Muona, 1993
Epiphanis cornutus Eschscholtz, 1829
Hylis frontosus (Say, 1836)
Hylis terminalis (LeConte, 1866)
Tribe Dirhagini Reitter 1911
Dirrhagofarsus ernae Otto, Muona & McClarin, 2014
Dirrhagofarsus lewisi (Fleutiaux, 1900)
Microrhagus audax Horn, 1886
Microrhagus breviangularis Otto, 2015
Microrhagus brunneus Otto, 2013
Microrhagus carinicollis Otto, 2015
Microrhagus lecontei Otto, 2015
Microrhagus opacus Otto, 2015
Microrhagus pectinatus LeConte, 1866
Microrhagus subsinuatus LeConte, 1852
Microrhagus triangularis (Say, 1823)
Entomophthalmus rufiolus (LeConte, 1866)
Rhagomicrus bonvouloiri (Horn, 1886)
Rhagomicrus humeralis (Say, 1836)
Sarpedon scabrosus Bonvouloir, 1875

SUBFAMILY EUCNEMINAE Eschscholtz, 1829
Tribe Mesogenini Muona, 1993
Stethon pectorosus LeConte, 1866
Tribe Eucnemini Eschscholtz, 1829
Eucnemis americana Horn, 1886

SUBFAMILY MACRAULACINAE Fleutiaux, 1922
Tribe Euryptychini Mamaev, 1976
Euryptychus heterocerus (Say, 1836)
Euryptychus ulkei (Horn, 1886)
Tribe Macraulacini Fleutiaux, 1922
Onichodon canadensis (Brown, 1940)
Onichodon downiei Muona, 2000
Onichodon orchesides Newman, 1838
Onichodon rugicollis (Fall, 1925)
Fornax bicolor (Melsheimer, 1844)
Isarthrus calceatus (Say, 1836)
Isarthrus rufipes (Melsheimer, 1844)
Dromaeolus badius (Melsheimer, 1844)
Dromaeolus cylindricollis (Say, 1836)
Dromaeolus harringtoni Horn, 1886
Dromaeolus striatus (LeConte, 1852)
Thambus horni Muona, 2000
Deltometopus amoenicornis (Say, 1836)
Tribe Nematodini Leiler, 1976
Nematodes penetrans (LeConte, 1852)

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