

The Great Lakes Entomologist

Volume 48
Numbers 1 & 2 - Spring/Summer 2015 *Numbers*
1 & 2 - Spring/Summer 2015

Article 1

April 2015

First Record of the Enicocephalidae (Heteroptera) in Michigan and Ohio

Daniel R. Swanson
University of Illinois

Follow this and additional works at: <https://scholar.valpo.edu/tgle>



Part of the [Entomology Commons](#)

Recommended Citation

Swanson, Daniel R. 2015. "First Record of the Enicocephalidae (Heteroptera) in Michigan and Ohio," *The Great Lakes Entomologist*, vol 48 (1)

Available at: <https://scholar.valpo.edu/tgle/vol48/iss1/1>

This Peer-Review Article is brought to you for free and open access by the Department of Biology at ValpoScholar. It has been accepted for inclusion in *The Great Lakes Entomologist* by an authorized administrator of ValpoScholar. For more information, please contact a ValpoScholar staff member at scholar@valpo.edu.

First Record of the Enicocephalidae (Heteroptera) in Michigan and Ohio

Daniel R. Swanson¹

Abstract

The unique-headed bug, *Systelloderes biceps* (Say), is reported from Michigan and Ohio, resulting in two new state records for the family Enicocephalidae.

Enicocephalomorpha represents the most basal lineage of the heteropteran phylogeny, of which 13 species in 7 genera may be found in the United States and Canada (Wygodzinsky and Schmidt 1991). Commonly called unique-headed bugs for their bizarre appearance, or gnat bugs for the aerial lekking habits of some species, these small heteropterans typically occur in cryptic microhabitats, often under bark or in soil. They are predaceous, preying on soft-bodied arthropods encountered *in situ*. Usinger (1945) provided a classification of the family (then comprising both the Aenictopecheidae and Enicocephalidae). Kristky (1977a) contributed bionomic information for the family. Wygodzinsky and Schmidt (1991) revised the classification of the New World species and compiled knowledge concerning the infraorder in a large and well-illustrated monograph. Štys (1995a, 1995b, 1995c) broadly discussed the taxa on a global scale, keyed the genera (Štys 2002), and considered zoogeographical factors and the confounding influence of large numbers of undescribed taxa (Štys 2008).

Of the unique-headed bugs found in the United States, only one species, *Systelloderes biceps* (Say, 1831), is widely distributed in the eastern states. Froeschner (1988) recorded *S. biceps* from Arizona, District of Columbia, Florida, Illinois, Indiana, Iowa, Kentucky, Louisiana, Maryland, Missouri, New York, North Carolina, Pennsylvania, Quebec, Rhode Island, Tennessee, Utah, and Virginia. Drew and Van Cleave's (1962) record for Oklahoma was overlooked, Krauth and Young (1994) added Wisconsin, Polhemus (1997) added Kansas, and Maw et al. (2000) added Ontario and Nova Scotia. Kritsky (1978) provided the latest treatment of the genus *Systelloderes* Blanchard, 1852, which was more-or-less excluded from Wygodzinsky and Schmidt's (1991) monograph.

Herein, Michigan and Ohio are added to the range of *Systelloderes biceps*, and the first known record for the family Enicocephalidae in each state is presented.

Materials and Methods

Generic identification was accomplished using Kritsky's (1977b) key and Wygodzinsky and Schmidt's (1991) treatise, and thereafter, Kritsky's (1978) key to North American and Caribbean *Systelloderes* afforded a specific designation. Discussion of the wing venation follows the terminology of Wygodzinsky and Schmidt (1991). Label data are not transcribed verbatim, but complete locality information is included. Specimens are vouchered in one of the collections listed below. Data from these collections were supplemented with field observations from the Pittsfield Preserve in Michigan.

¹Department of Entomology, University of Illinois at Urbana-Champaign, 320 Morrill Hall, 505 South Goodwin Avenue, Urbana, IL 61801. (e-mail: drswanny@gmail.com).

Collections are designated as follows: Daniel R. Swanson, personal collection (DRS); Illinois Natural History Survey Insect Collection, University of Illinois, Champaign, Illinois (INHS); Albert J. Cook Arthropod Research Collection, Michigan State University, East Lansing, Michigan (MSUC); and University of Michigan Museum of Zoology Insect Collection, Ann Arbor, Michigan (UMMZ).

Results and Discussion

The Pittsfield Preserve is a 535-acre piece of land residing in Pittsfield Township of Washtenaw County. With portions set aside for recreational as well as preservational purposes, the Preserve contains several different habitats, including prairie, forest, marsh, vernal pools, and farmed plots of corn and soybean. On 8 April 2012, I collected one ultimate nymph of an enicocephalid from a log in a forested section (Loop A) of the Central Area Rural Preserve of the Pittsfield Preserve. On 13 April 2012, another ultimate nymph was collected in the same general area and microhabitat. Both specimens were kept alive and reared at my home in a vial provisioned with substrate from their natural habitat. The first nymph molted to an imago on 15 April 2012, but the date of death was not recorded. The second nymph, being additionally provisioned with syntopic collembolans as prey, molted to adulthood on 20 April 2012. Feeding was never observed, although daily observations were not maintained, and the second specimen died on 7 May 2012.

The site of collection was a mesic oak-hickory forest, typical of lower Michigan, encompassing Loop A of the Central Area Rural Preserve. The soil of the loop consists of Blount loam, 2–6% slope, as characterized by Engel (1977), with Morley loam, 2–6% slope, and Pewamo clay loam occurring in nearby areas of the forest. Both specimens were taken under the bark of fallen or downed oak logs; at some non-recent, earlier point, the logs had been sawn at both ends, presumably sectioned from a larger downed tree, suggesting some degree of maintenance/interference in the area. The logs generally were moist, and the bark disengaged with relative ease. Slowly peeling sections revealed a substrate of soft humus with various tunnels and networks carved in by various arthropods. Other logs were checked during each collection event, but no other specimens were found.

Enicocephalids occasionally have been found in close association with ants (Usinger 1945, Villiers 1960, Wygodzinsky and Schmidt 1991). The first specimen I collected was taken in a tunnel also containing *Ponera pennsylvanica* Buckley, 1866 (Hymenoptera: Formicidae: Ponerinae). When the unique-headed bug nymph came into contact with the ants, both parties abruptly changed course, an interesting outcome, as these interordinal encounters might be expected to be frequent. Other invertebrates found on the same log were *Augochlora pura* (Say, 1837) (Hymenoptera: Halictidae), several firefly larvae (Coleoptera: Lampyridae), and a few species of centipedes and terrestrial isopods. The second specimen was taken on a log with a colony of *P. pennsylvanica* and abundant poduromorph springtails [Collembola].

The first specimen (Fig. 1) collected has been vouchered in the University of Michigan Museum of Zoology (UMMZ), whereas the second specimen (Fig. 2) has been retained in the author's personal collection (DRS). The specimens bear the following label data: MICHIGAN: Washtenaw Co., Pittsfield, Pittsfield Preserve, Loop A, woods, 8 April 2012, 42.2103°N 83.7201°W, 890 ft., D. R. Swanson, #10/under bark of fallen oak trunk in woods/taken as ultimate nymph, molted to adult on 15 April/det. D. R. Swanson 2012, STATE RECORD – MICHIGAN [1 male] (UMMZ); idem. 13 April 2012, #15/taken as ultimate nymph, molted to adult on 20 April, died on 7 May [1 male] (DRS).

This species was expected to occur in Michigan, being known from surrounding states and territories (e.g., Illinois, Indiana, Ontario, New York, and



Figure 1. Dorsal habitus of live captive *Systelloderes biceps*, adult male. Photograph taken by Mark O'Brien (UMMZ).



Figure 2. Habitus of pinned specimen of *Systelloderes biceps*, adult male: (a) dorsal; and (b) dorsolateral view [flipped horizontally]. Images taken with Zeiss AxioCam HRc Rev. 3 digital camera mounted to Zeiss SteREO Discovery V.20 stereomicroscope with PlanApo S 0.63x objective. Images focus-stacked using Helicon Focus version 5.3 and resulting image processed using Adobe Photoshop CS5.

Wisconsin; see Fig. 3). Enicocephalomorphs often are overlooked in nature, and even actively searching for them when they are known to be present can be fruitless (Schuh 1970, Wygodzinsky and Schmidt 1991). Their small size, viz. less than 7 mm for Nearctic species, and covert habitats may account for this phenomenon, as well as explain the scarcity of records in the literature and comparatively meager representation in biological collections. Case in point, the two major collections in southern Michigan, viz. UMMZ and MSUC, were searched for dry and wet specimens, and no Michigan representatives of the family were found.

In addition to the specimens discussed above, I discovered the vestiges of two unverified records of *S. biceps* in Michigan:

1) In the latter half of 2012, during my time in the UMMZ, an old card catalog from the era pre-dating electronic databases was in the process of being discarded. The cards belonged to the McBee Keysort system of edge-notched cards (Anderson 1953). In the UMMZ, the system likely was implemented during the 1950s or 60s by T. H. Hubbell, Speed Rogers, and/or Roland F. Hussey in an effort to catalog and archive known insect distributions (M. F. O'Brien, pers. comm.). A single rescued card (Fig. 4) indicates that a specimen of *Systelloderus* [sic] *biceps* was taken in the E.S. George Reserve of Livingston County, Michigan, on or before 3 September 1952 and subsequently catalogued in the museum's McBee system. Although plausible, as previously mentioned, no voucher specimen could be located.

2) My recent matriculation at the University of Illinois at Urbana-Champaign prompted me to investigate the INHS collection for records of *Systelloderes biceps*. My search revealed one vial with material from Michigan under Hemiptera: Enicocephalidae. Further investigation showed that the vial contained



Figure 3. Current known distribution of *Systelloderes biceps* by state in the U.S.A. and Canada.

only one forewing (Fig. 5), although it clearly belongs to an enicocephalid. In addition, the individual may be referred to the genus *Styelloderes*, owing to the complete Cu, as well as the absence of a m-cu cross vein and, by extension, the absent basal cell and open discal cell (Kritsky 1977b, Wygodzinsky and Schmidt 1991). Indeed, the wing matches that of several examined specimens of *S. biceps*. Yet, Usinger (1945) noted that anomalies occasionally occur in the venation of one or both wings of various enicocephalid individuals, and this specimen exhibits a coalescence of the r-m with the Rs and M, a phenomenon present in other examined material and apparently not limited to one sex. The forewing bears the following label data: MICHIGAN: Berrien Co., Mud Lake Bog, 10 October 1971, ex. *Sphagnum*, T. G. Marsh et al., T. Marsh Collection, INHS Insect Collection 761,717.

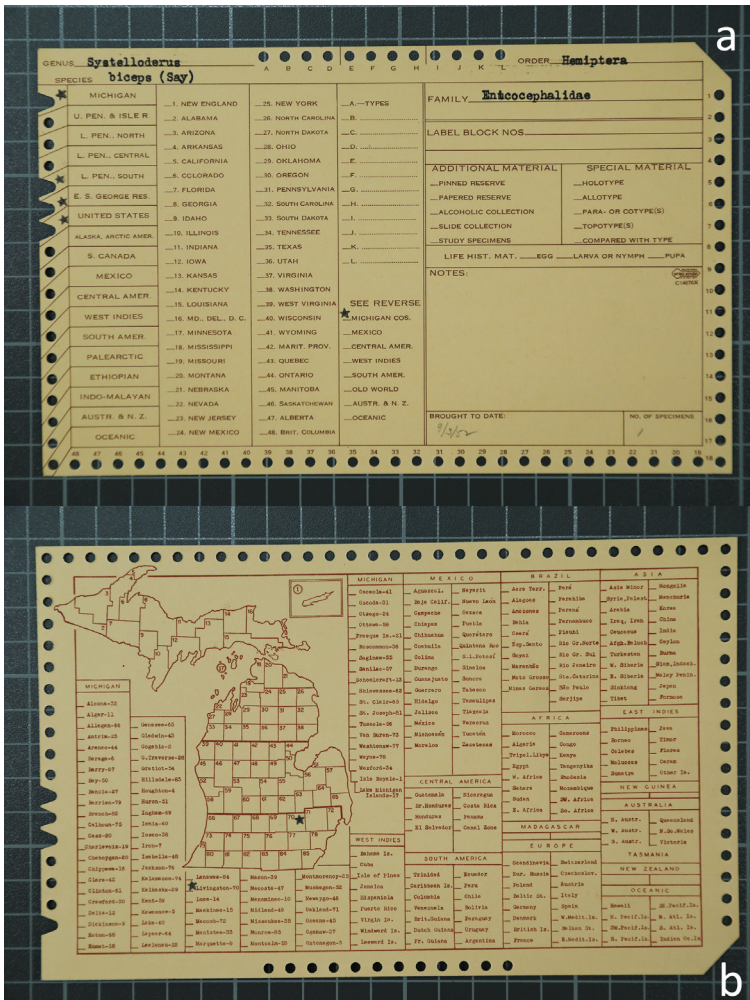


Figure 4. University of Michigan Museum of Zoology (UMMZ) McBee Keysort card for *Styelloderes biceps*: (a) front; and (b) back.



Figure 5. Single forewing of enicocephalid species, suspected *Systelloderes biceps*, from Berrien Co., Michigan, in the INHS Insect Collection. Image taken with a Canon EOS 50D digital camera mounted on a Leica DM2500 compound microscope using a 5x/0.12 objective.

My search of the INHS collection also uncovered a specimen of *S. biceps* from Ohio, herein reported as a new state record. The individual, a single adult female, bears the following label data: OHIO: Pike Co., 23 August 1958, Terry Marsh, det. D. R. Swanson 2014, INHS Insect Collection 761,719.

This insect surely is distributed widely in the Midwest, despite the scant records, which doubtlessly result from a combination of collecting bias and the other factors mentioned above. Wygodzinsky and Schmidt (1991) gave an extensive and varied list of habitats for species of *Systelloderes*:

"Found in berlese samples from forest leaf litter, old sawdust pile. Also under bark of trees, under wet cow droppings, in suspended soil at leaf bases, under rocks along stream, around corn roots, under moss."

Besides careful searching of suitable substrates, these insects also may be encountered in two other situations. First, the lekking habits of enicocephalids (e.g., Knab 1908, Usinger 1945, Schuh 1970), including *S. biceps* (Johannsen 1909, Kritsky 1977a), can provide unexpected but ample interaction with these minute bugs. Sharing similarities to nematoceran Diptera, these swarms typically take place in sunny areas and seem to facilitate the finding of mates. Although I have not knowingly experienced these aggregations personally, I have collected a single female specimen that alighted on my arm while walking through a park in Urbana, Illinois, in June, suggesting aerial encounters are a possibility. Furthermore, housed within the INHS, four individual vials, each representing a discrete collecting event from Champaign, Illinois, during the fall, contain 65, 75, 100, and 150 individuals of *S. biceps*. Each vial is variously annotated to indicate that the specimens were taken while swarming. Admittedly, three of these appear to be from the same locality but with different dates, and these collections were

made in 1949 and 1950. Second, *S. biceps* exhibits nocturnal phototaxis and therefore, could be encountered at lights at night. In Illinois, I have collected several male specimens from my porch light in Champaign in August. In addition to targeting these behaviors, further biosurvey work, particularly where special consideration is given to seclusive microhabitats, should demonstrate the presence of *S. biceps*, and possibly other unique-headed fauna, in additional eastern states.

Acknowledgments

I thank Mark O'Brien (UMMZ) and Gary Parsons (MSUC) for checking for specimens of this family in the collections under their care. To Mark O'Brien, I owe further thanks for identification of the halictids and information regarding UMMZ's use of the McBee Keysort system. I am indebted to Jared Thomas and Scott Cinel, Illinois Natural History Survey, for the time and patience given in the use of the photographic equipment during preparation of this note. Finally, I greatly appreciate the efforts of J. E. McPherson, Southern Illinois University, and A. G. Wheeler, Jr., Clemson University, for their constructive comments during the review of this manuscript.

Literature Cited

- Anderson, G. L. 1953.** The McBee Keysort system for mechanically sorting folklore data. *The Journal of American Folklore* 66(262): 340–343.
- Blanchard, E. 1852.** Orden VII. Hemipteros, pp. 113–320. In *C. Gay* (ed.), *Historia fisica y politica de Chile, segun documentos adquiridos en esta Republica durante doce años de residencia en ella y publicada bajo los auspicios del supremo gobierno*. Zoologia. Tomo Sétimo. Imprenta de Maulde y Renou, Paris. 471 pp.
- Buckley, S. B. 1866.** Descriptions of new species of North American Formicidae. *Proceedings of the Entomological Society of Philadelphia* 6: 152–172.
- Drew, W. A., and H. W. Van Cleave. 1962.** Notes on the distribution of *Systelloderes biceps* (Say) in Oklahoma (Hemiptera: Enicocephalidae). *Proceedings of the Oklahoma Academy of Science* 42: 123.
- Engel, R. J. 1977.** Soil survey of Washtenaw County, Michigan. United States Department of Agriculture Soil Conservation Service. 108 pp.
- Froeschner, R. C. 1988.** Family Enicocephalidae Stål, 1860 (=Hemicocephalidae, Stål, 1865). The unique-headed bugs, pp. 132–135. In T. J. Henry, and R. C. Froeschner (eds.), *Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States*. E. J. Brill, New York. 958 pp.
- Johannsen, O. A. 1909.** North American Hemicocephalidae. *Psyche* 16(1): 1–4.
- Knab, F. 1908.** Swarming of a reduviid. *Proceedings of the Entomological Society of Washington* 10(1–2): 7–8.
- Krauth, S. J., and D. K. Young. 1994.** First records of Enicocephalidae (Hemiptera: Heteroptera) from Wisconsin. *Entomological News* 105: 159–160.
- Kritsky, G. R. 1977a.** Observations on the morphology and behavior of the Enicocephalidae (Hemiptera). *Entomological News* 88(5–6): 105–110.
- Kritsky, G. R. 1977b.** Two new genera of Enicocephalidae (Hemiptera). *Entomological News* 88(7–8): 161–168.
- Kritsky, G. R. 1978.** The North American and Caribbean species of *Systelloderes* (Hemiptera: Enicocephalidae). *Entomological News* 89(2–3): 65–73.
- Maw, H. E. L., R. G. Foottit, K. G. A. Hamilton, and G. G. E. Scudder. 2000.** Checklist of the Hemiptera of Canada and Alaska. National Research Council of Canada, Ottawa. 220 pp.

- Polhemus, J. T. 1997.** New state and U.S. records and other distributional notes for Heteroptera (Insecta). *Entomological News* 108(4): 305–310.
- Say, T. 1831.** Descriptions of new species of heteropterous Hemiptera of North America. New Harmony, Indiana. 39 pp.
- Say, T. 1837.** Descriptions of new species of North American Hymenoptera, and observations on some already described. *Boston Journal of Natural History* 1(4): 361–416.
- Schuh, T. 1970.** Swarming in an undescribed enicocephalid from Costa Rica. *Entomological News* 82: 66–68.
- Štys, P. 1995a.** 11. Enicocephalomorpha, pp. 67. *In* R. T. Schuh, and J. A. Slater (eds.), *True Bugs of the World (Hemiptera Heteroptera), Classification and Natural History*. Cornell University Press, Ithaca. 336 pp.
- Štys, P. 1995b.** 12. Aenictopecheidae, pp. 68–70. *In* R. T. Schuh, and J. A. Slater (eds.), *True Bugs of the World (Hemiptera Heteroptera), Classification and Natural History*. Cornell University Press, Ithaca. 336 pp.
- Štys, P. 1995c.** 13. Enicocephalidae, pp. 70–73. *In* R. T. Schuh, and J. A. Slater (eds.), *True Bugs of the World (Hemiptera Heteroptera), Classification and Natural History*. Cornell University Press, Ithaca. 336 pp.
- Štys, P. 2002.** Key to the genus-group taxa of the extant Enicocephalomorpha of the world, their list, and taxonomic changes (Heteroptera). *Acta Universitatis Carolinae Biologica* 45: 339–368.
- Štys, P. 2008.** Zoogeography of Enicocephalomorpha (Heteroptera). *Bulletin of Insectology* 61(1): 137–138.
- Usinger, R. L. 1945.** Classification of the Enicocephalidae. *Annals of the Entomological Society of America* 38: 321–342.
- Villiers, A. 1960.** Revision des *Systemloderes* africains. *Revue Francaise d'Entomologie* 27(2): 155–162.
- Wygodzinsky, P. W., and K. Schmidt. 1991.** Revision of the New World Enicocephalomorpha (Heteroptera). *Bulletin of the American Museum of Natural History* 200: 1–265.