

Distribution and Biology of *Eudesma undulata* (Coleoptera: Colydiidae), a Rare Beetle Occurring in Illinois

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ABSTRACT

A rare member of the Colydiidae, *Eudesma undulata* (Melsheimer), is described and its distribution and biology are discussed. Its historic distribution ranges from eastern Pennsylvania and Virginia in the east to eastern Illinois and Kentucky in the west, although records of the last 80 years are restricted to Ohio and Illinois. Fourteen specimens recently collected in Illinois are reported, in addition to eight museum specimens from other states. Recently, specimens have been collected in mature old growth and second growth forests.

INTRODUCTION

Eudesma undulata (Melsheimer) is a rare, enigmatic beetle. An indication of the rarity of this species is the fact that Stephan (1989) saw only three old museum specimens with very meager data in the context of his revision of the North American Colydiidae.

Eudesma undulata was described in 1846 by Melsheimer as *Bitoma undulata*. LeConte (1863) erected the monotypic genus *Eudesma* for this distinctive species in his comprehensive treatment of North American Coleoptera. Cockerell (1906) proposed the replacement generic name *Eudesmula* for *Eudesma* LeConte, which he thought was preoccupied by its prior use in 1838 in Rotifera. As a result, Stephan (1989) used this generic name in his revision of the family Colydiidae in North America. More recently, Ivie & Slipinski (1990) found *Eudesma* LeConte to be a valid name, stating: "This is a valid name, long unused due to unfortunate circumstances. Agassiz (1846) misspelled the name *Endesma* Ehrenberg 1838 (Rotifera) as *Eudesma*. Under Article 33.c of the IZCN, this misspelling has no status, and does not enter into homonymy. However, it was thought to be a correct spelling by Cockerell (1906), who proposed *Eudesmula* as a replacement name for LeConte's supposed homonym *Eudesma*. This has been followed by subsequent workers. LeConte's name is the valid one, and must be returned to use." No one has questioned the status of *Eudesma* as a distinctive, monotypic genus of Colydiidae.

Virtually nothing is found in the literature on the biology of *E. undulata*. The only published information is found in Blatchley (1910), who stated that this species "has ... been

taken by Dury, who found them running up and down and burrowing in the bark of a buckeye log.”

This research was prompted by my collection of seven specimens at two locations in Illinois in 1995 and 1996. These specimens were taken in two Illinois Nature Preserves for which I have had Special Use Permits to collect insects in the context of my research on Illinois Erotylidae. Five of these specimens were collected at Rocky Branch Nature Preserve, Clark Co., Illinois, and two were collected at Beall Woods State Park in Wabash Co., Illinois.

METHODS

In addition to analyzing data from previous collections, the following procedures were implemented.

Pitfall trapping

Unbaited pitfall traps were maintained at five widely separated woodland sites in Illinois from 1995 to 2000. Traps were of two designs. The first type, used from 1995-1998, consisted of plastic “soup bowls” with an outer diameter of 15.0 cm, buried with the rim flush with the ground surface. Bowls were filled to a depth of 3.0 cm with a 50% solution of ethylene glycol, which acted as a killing agent and preservative. The second type, used from 1998-2000, consisted of 16 oz. “Solocups” filled to a depth of 3.5 cm with 80% ethanol. A plastic funnel fashioned from the top of a two liter “pop” bottle was fitted into the top of each Solocup, to retard evaporation of the ethanol, while allowing trapped Coleoptera to slide easily into the preservative. Heavy covers consisting of 30 x 30 cm steel plates with 9.0 cm legs, which were pushed into the soil to a depth of approximately 6 cm, were utilized to minimize dilution of the preservative by rainfall and to exclude mammal scavengers from both types of traps. Traps were serviced on a weekly or biweekly basis, and Coleoptera collected were rinsed in 80% ethanol and mounted as dry specimens for the Spooner-Riegel-Goodrich Collection at Eastern Illinois University.

Sifting of “forest litter”

This process consists of scraping the bark from fallen dead branches, or material from under bark of rotten logs onto a coarse screen with openings 1.2 cm x 1.2 cm that was placed over a drop cloth. The debris resulting from this process was placed into a large Berlese separator to drive any arthropods in the sample into a collection jar of 80% ethanol. This is an excellent procedure for the collection of many species of Colydiidae, as discussed at length by Stephan (1989).

Malaise traps

I have maintained Malaise traps in 12 different woodland sites in Illinois over the past 16 years in the context of my research on Illinois Erotylidae. I have collected four species of Colydiidae in these traps, including one specimen of *Eudesma undulata*.

Hanging sugar traps

These traps are designed to collect insects that are attracted to sugar containing materials, particularly decaying and/or fermenting fruit. The trap consists of a gallon plastic milk container with a cut-out opening in the upper part of one side. A sugar syrup made from

one cup of sugar dissolved in a quart of water is mixed with a can of beer and poured into the container, which is suspended from a branch at a level about five feet above the ground.

Other collections

Thirty-six museums or private collections were checked for additional specimens of *E. undulata*, including major national museums, regional collections in the eastern and midwestern states where specimens of *E. undulata* have been reported in the literature, and the collections of known specialists in New World Colydiidae. In addition, a "Notice" was placed in the Coleopterists Bulletin requesting the loan of any specimens of *E. undulata* for study, which ran continuously from March 1997 to March 2000.

RESULTS

In the search of thirty-six North American insect collections, only four collections had specimens of *E. undulata*. Eight museum specimens were located and examined; only three of these were collected in the past 85 years. Two of these specimens were collected by Robert Androw of the Carnegie Museum in southern Ohio; one in a flight intercept trap, and one collected from the exposed area of heartwood of the trunk of a standing dead maple which had been cut into on the previous day by another entomologist (R. Androw, pers. comm.). The other recently collected specimen is also from southern Ohio. No specimens were received as a result of my notice in the Coleopterists Bulletin.

My collecting from 1995 to 2000 produced fourteen specimens from three locations in Illinois. Sifting debris from under bark of rotten logs and "forest litter" produced eight specimens; four specimens were taken in unbaited pitfall traps; one specimen in a Malaise trap; and one specimen in a "hanging sugar trap." Because collections of this beetle are so rare, I summarize here the collection data for all the specimens I have collected and all museum specimens examined.

Museum Acronyms

The following acronyms refer to the depositories for specimens:

AAPC	A. Allen personal collection, Boise, Idaho.
CMNH	Carnegie Museum of Natural History, Pittsburgh, Pennsylvania
CUIC	Cornell University Insect Collection, Ithaca, New York.
EIUC	Eastern Illinois University Collection, Charleston, Illinois.
KHSC	Karl H. Stephan personal collection, Red Oak, Oklahoma.
USNM	United States National Museum, Washington, D.C.

Illinois

CLARK Co.: Rocky Branch N. P., 15-23 Apr 1995, M. A. Goodrich, pitfall trap (1, EIUC); same data, 28 May - 11 Jun 1995 (1, EIUC); 16-23 Jul 1995 (1, KHSC); same location, 1 May 1996, M. A. Goodrich, sifted from forest litter (2, EIUC); same location, 14-18 May 1998, M. A. Goodrich, hanging sugar trap (1, EIUC). EDGAR Co.: 4 mi SSE Kansas, 2 Oct 1998, M. A. Goodrich, under bark of rotten log (1, EIUC); same data, 8 Oct 1998 (1, EIUC); 28 May 1999 (1, EIUC); 27 Sep 1999 (1, EIUC); 26 Apr 2000 (1, EIUC); same location, 5-12 Apr 2000, M. A. Goodrich, pitfall trap (1, EIUC). WA-

BASH Co.: Beall Woods S. P., 5 Apr 1996, M. A. Goodrich, sifted from forest litter (1, EIUC); same location, 9-16 May 1996, M. A. Goodrich, Malaise trap (1, EIUC).

Kentucky

No further data (1, CMNH).

Ohio

FAIRFIELD Co.: Barnebey Center, 28 Apr 1990, R. Androw (1, AAPC). PREBEL Co.: 23 Jun 1979, O. J. and J. H. Blanchard (1, CUIC). VINTON Co.: Lake Hope St. Pk., 6 Jul 1996, R. Androw, taken from exposed heartwood of dead maple, *Acer* sp. (1, CMNH).

Virginia

FAIRFAX Co.: Dead Run, 25 May 1915, R. C. Shannon (1, USNM); same location, 28 Jul 1915 (1, USNM); 6 Aug 1915 (1, USNM).

West Virginia

HANCOCK Co.: no date, Hubbard & Schwartz (1, USNM).

In addition to the records listed above, there is the published record from LeConte (1863) of York Co., Pennsylvania, for Melsheimer's type specimen. Blatchley's (1910) description of Dury's collection of *E. undulata* in Indiana provided no specific location within the state for this collection, nor did he indicate where the specimens were deposited. Purdue University, which holds much of Blatchley's collection, has no specimens of *E. undulata* (A. Provonsha, pers. comm.). Stephan (1989) listed specimens from IL, IN, OH, PA and VA, based on the three specimens he examined with state labels only, plus earlier published records.

CONCLUSIONS

Placing *Eudesma undulata* as a monotypic genus is clearly justified, based on its distinctive morphology. *Eudesma undulata* is easily separated from other species of Colydiidae in a series of keys in Stephan's 1989 revision of the family. In addition, the habitus drawing of *E. undulata* in this publication (Stephan 1989, Fig. 31) easily distinguishes this species from all other North American Colydiidae.

Description

Body cylindrical, strongly elongate; overall length 3.8-5.4 mm; width 0.9-1.5 mm. Dark reddish brown above, lighter reddish brown below.

Head broad and irregularly rectangular; dorsoventrally flattened anteriorly, raised posteriorly at the meson; antennae eleven-segmented with an abrupt, two-segmented club. Pronotum parallel sided, the lateral margins distinctly serrate, anterior angles slightly wider in some examples; dorsal surface strongly raised, with a network of ridges enclosing depressions. Elytra distinctly costate, two rows of large, nearly confluent punctures between costae; variegated in color, with lighter regions in a distinctive pattern bearing tufts of whitish hairs (Fig. 1)

Distribution

Based on my collections, the collection data from museum specimens, and the published records cited, *Eudesma undulata* can be described as having had a seven state range extending from eastern Pennsylvania and Virginia in the east to eastern Illinois and Kentucky in the west. The question of whether this historic distribution represents its present distribution is addressed below.

The collection data for the 17 recently collected specimens, indicate that *Eudesma undulata* is restricted to mature forest habitats. My three collection locations, which have produced 14 of the 17 modern specimens, are mature old growth or second growth forest habitats. The first of these, Rocky Branch Nature Preserve in Clark Co., Illinois, is an interesting wooded valley between sandstone bluffs in east central Illinois. The flora of this region has been described by Hughes & Ebinger (1973) and Clapp & Ebinger (1988). The second location is Baber Woods Nature Preserve in Edgar Co., Illinois. This 51 acre woodlot was an oak savannah in pre-settlement times that developed into a closed forest during the 19th century. These changes and the vegetation of the area were described by McClain & Ebinger (1968), Newman & Ebinger (1985) and Ebinger & McClain (1991). The third Illinois location, Beall Woods State Park, Wabash Co., Illinois has been described as the “biggest and best example of the immense old growth bottomland forest which once occurred along the Wabash” (McFall 1991). Ashby and Ozment (1967) have described the vegetation of this area. Robert Androw (pers. comm.) described the two locations in Ohio where he has collected *E. undulata* as mature second growth southern hardwood forest habitats. Considering the very small number of recent collections, I conclude that many populations of *E. undulata* have been extirpated; otherwise recent specimens from these areas should have been collected.

Sifting debris from under bark and “forest litter” has been described as a useful procedure for collecting many species of Colydiidae (Stephan 1989). This proved effective for collecting *E. undulata*, with eight specimens so collected. This procedure does not provide specific data regarding their habits, but may result in more collections and better data on the range of the species and the seasonal occurrence of adults. This also applies to collections by pitfall traps (four specimens collected), and by Malaise and flight intercept traps (two specimens collected).

Regarding the biology of *E. undulata*, Dury's comments (Blatchley 1910) about an association with buckeye (*Aesculus glabra*) are still of interest. The majority of the specimens of *E. undulata* known are from the valley of the Ohio River and its tributaries, as noted by Stephan (1989), where this tree is regularly found. However, *Aesculus glabra* does not occur in the Potomac River valley, the location of the three specimens in the USNM collected in 1915, nor does it occur in much of the eastern portion of the original range of *E. undulata*. Based on this information, as well as my own observations in Illinois, I conclude that *E. undulata* is not restricted to buckeye logs.

The collecting strategies employed in this study have no significant impact on insect populations (an important consideration when studying a rarely collected species). Neither Malaise traps nor pitfall traps attract insects, therefore individuals that crawl or fly into such traps can only be a tiny fraction of the population of the species present in the habitat. Similarly, scraping the bark from a few dead branches or rotten logs in a forest

into a drop cloth and placing the residue into a Berlese separator will sample only a tiny fraction of the habitat and therefore will have minimal impact on arthropod populations.

I would very much like to see additional specimens of this species. I am particularly interested in material with biological data, but specimens with any collection data are welcome.

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LITERATURE CITED

- Agassiz, L. 1846. Nomina Systematica Generum Rotatorum, tam viventium quam fossilium, secundum ordinem alphabeticum disposita, adjectis auctoribus, libris in quibus reperiuntur, anno editionis, etymologia et familiis ad quas pertinent. II + 5. In: L. Agassiz, Nomenclator Zoologicus continens Nomina Systematica Generum Animalium tam viventium quam fossilium, secundum ordinem alphabeticum disposita, adjectis auctoribus, libris in quibus reperiuntur, anno editionis, etymologia et familiis ad quas pertinent, in singulis classibus. Soloduri.
- Ashby, W. C. and J. E. Ozment. 1967. Plant species of Beall's Woods, Wabash Co., Illinois. Trans. Ill. St. Acad. Sci. 60:174-183.
- Blatchley, W. S. 1910. An illustrated descriptive catalog of the Coleoptera or beetles (exclusive of the Rhynchophora) known to occur in Indiana. Indianapolis, 1385 pp.
- Clapp, L. A. and J. E. Ebinger. 1988. Vegetation survey of Rocky Branch Nature Preserve, Clark County, Illinois. Trans. Ill. St. Acad. Sci. 81(1&2):19-24
- Cockerell, T. D. A. 1906. Preoccupied generic names of Coleoptera. Entomol. News 17:240-244.
- Ebinger, J. E. and W. E. McClain. 1991. Forest succession in the prairie peninsula of Illinois. Ill. Nat. Hist. Surv. Bull. 34(4):375-381.
- Hughes, J. T. and J. E. Ebinger. 1973. Woody vegetation survey of Rocky Branch Nature Preserve, Clark County, Illinois. Trans. Ill. St. Acad. Sci. 66(3&4):44-54.
- Ivie, M. A. and S. A. Slipinski. 1990. Catalog of the genera of the world Colydiidae. Annales Zoologici 43(supl. 1):1-32.
- LeConte, J. L. 1863. New species of North American Coleoptera. Smiths. Misc. Coll. 6(167):1-92.
- McClain, W. E. and J. E. Ebinger. 1968. Woody vegetation of Baber Woods, Edgar County, Illinois. Amer. Midl. Nat. 79:419-428.
- McFall, D. (Ed.) 1991. A Directory of Illinois Nature Preserves. Illinois Department of Conservation, Division of Natural Heritage. 382 pp.
- Melsheimer, F. E. 1846. Descriptions of new species of Coleoptera of the United States. Proc. Acad. Nat. Sci. Philad. 2:98-118.
- Newman, J. A. and J. E. Ebinger. 1985. Woody vegetation of Baber Woods: composition and change since 1965. Proceedings of the Fifth Central Hardwood Forest Conference: pp 178-180. Department of Forestry, University of Illinois, Urbana-Champaign.
- Stephan, K. H. 1989. The Bothriideridae and Colydiidae of America north of Mexico (Coleoptera: Clavicornia and Heteromera). Occ. Pap. Fla. St. Coll. Arthrop. 6:1-65.

Figure 1. Dorsal habitus of *Eudesma undulata* (Melsheimer) from Stephan 1989.



