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Ciidae of Michigan (Insecta: Coleoptera)

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Cover Page Footnote
We thank these curators and/or managers for the loan of specimens or assistance: Crystal Meier (FMNH), Mark O'Brien (UMMZ), Gary Parsons (MSUC), Craig Brabant and Daniel Young (WIRC).

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The family Ciidae Leach, 1819, (Insecta: Coleoptera) occurs worldwide with approximately 720 species. In the United States there are 84 species in 13 genera. Given their relatively small size (~0.5 to 6 mm) and cryptic habitats, feeding in decaying fungi, recent regional fauna studies are lacking including the northeastern United States. To alleviate this gap in knowledge, in part, we review and identify 2,123 undetermined specimens collected in Michigan. We provide new state records for four species: Ceracis pecki Lawrence, 1971, Cis americanus Mannerheim, 1852, Cis submicans Abeille de Perrin, 1874, Dolococis manitoba Dury, 1919, which increases the total for Michigan to 25 species and update records for Michigan counties. In addition, we provide a modified key to Michigan species.

**Keywords:** Dichotomous key, horned beetles, faunistic study

**Material and Methods**

Approximately 2,123 undetermined specimens were examined and identified to species using the dichotomous key found in Lawrence (1971). The MSUC specimens were databased at http://symbiota4.acis.ufl.edu/scan/portal/index.php. General distribution for each species was determined using Lawrence (1971) except for the distribution of Ceracis (Lawrence 1967). Specimens were borrowed or used from the following entomological collections.

- Field Museum of Natural History (FMNH)
- Michigan State University Collection (MSUC)
- University of Michigan Museum of Zoology (UMMZ)
- Wisconsin Insect Research Collection (WIRC)

**Results and Discussion**

Previously, there were only ten species reported from Michigan (Lawrence...
Subsequent records (Lawrence 1982, Downie and Arnett 1996) and our new state records for Ceracis pecki Lawrence, Cis americanus Mannerheim, Cis submicans Abeille de Perrin, and Dolicocis manitoba Dury increase the known Michigan fauna to 25 species. Ceracis Mellié and Cis Latreille species mostly represent this fauna (Table 1). The most abundant species found among the Michigan specimens were Cis fuscipes Mellié, Cis levettei (Casey) and Ceracis thoracicornis (Ziegler). The previous studies that catalogued Michigan species did not give county records (Lawrence 1982, Thayer and Lawrence 2002). This study gives updated county records for Ceracis minutissimus (Mellié), Ceracis singularis (Dury), Ceracis thoracicornis, Cis castlei (Dury), Cis creberrimus Mellié, Cis fuscipes, Cis levettei, Cis striatulus Mellié, Cis subtilis Mellié, Octotemnus glabratus (Gyllenhal), Orthocis punctatus Mellié, Sulcacis lengi Dury, and Sulcacis curtulus (Casey).

**New Records (*new record*)**


**Ceracis thoracicornis** (Ziegler, 1845) Michigan, Clinton Co., Rose Lake

*Cis americanus* Mannerheim, 1852 Michigan, Gogebic County, Wakefield. 20 Aug 1964. W. Suter Coll. (FMNH-2).


*Cis submicans* Abeille de Perrin, 1874 Michigan, Clare Co. 07 May 1938. R. R. Dreisbach coll. (MSUC-2).


Systematics

The keys provided below, modified from Lawrence (1971), apply only to genera and species of Ciidae occurring in Michigan. See Lopes-Andrade et al. (2016) for habitus images for many of the Michigan species.

**Key to the Ciidae genera**

1 Prosternal process short, not extending to middle of coxae; first abdominal ventrite of male with triangular flap concealing pubescent sex patch. Distal third of tibia bearing spines on the outer edge. Antennae 8-segmented......*Octotemnus* Mellié Prosternal process extending beyond middle of coxae; First abdominal ventrite may have a sex patch in male, but never bearing flap-cover. Tibiae and antennae variable.............................2

2 Prosternum in front of coxae almost twice as long as prosternal process .................................................................*Hadreule* C. G. Thomson Prosternum in front of coxae not or only slightly longer than prosternal process .................................................................3

3 Outer angle of protibia expanded, rounded, and bearing several spines.............4 Outer angle of protibia not as above, blunt and angulate, not bearing spines ........................................................................................................................................4

4 Lateral edges of pronotum visible from above for their entire lengths; anterior pronotal angles slightly produced ...........................................*Strigocis* Dury Lateral edges of pronotum not visible from above for their entire lengths; anterior pronotal angles not produced .................................................................................................................................5

5 Prosternal process thin; short setae on pronotum and elytra, usually not visible under microscope, head and apex of pronotum in males usually produced to form horns.................................................................*Ceracis* Mellié Prosternal process wide; setae visible under scope, pronotum never produced .................................................................................................*Sulcacis* Dury
Outer apical angle of protibia narrowly rounded. elytral punctation single and uniform; body elongate and parallel-sided ........................................... Orthocis Casey

Outer apical angle of protibia mostly produced and dentate or blunt and angulate; elytral punctation not uniform ................................................................. 7

Antenna with 10 antennomeres ......................................................... Cis Latreille
Antenna with 9 antennomeres ............................................................ 8

Outer apical angle of protibia rounded; elongate, pronotum never produced
........................................................................................................ Dolichocisi Dury
Outer angle of protibia produced and dentate; prosternal process thin; pronotum in males produced ........................................................ Plesiociscis Casey

**Key to the genus: Sulcacis**
There are two North American species, both are found in Michigan.
1. Antennae 9-segmented ................................................................. S. lengi
   Antennal 10-segmented ................................................................. S. curtulus

**Key to the genus: Orthocis**
There are five North American species and only O. punctatus is found in Michigan (Lawrence, 1982).

**Genus: Dolicocis**
There are two North American species and one of them is found in Michigan. 
*Dolicocis manitoba* has been reported from the Northern regions of North America.

**Genus: Strigocis**
There are three North American species and two of them are found in Michigan (Lawrence, 1982). *Strigocis opalescens* (Casey, 1898) has been reported from Wayne County, Michigan (Lawrence 1971). *Strigocis opacicollis* Dury has also been reported from Michigan (Lawrence 1982).
1. Margin of pronotum with a wide, raised lip; elytral hairs colorless
   ........................................................................................................ S. opalescens
   Margin of pronotum narrow, now raised; elytral hairs yellow ...... S. opacicollis

**Genus: Hadreule**
*Hadreule blaisdelli* (Casey, 1900) has been reported from Allegan County, Michigan (Lawrence, 1971). This species has a more western distribution, but extends to eastern parts of the country.

**Genus: Plesiocis**
*Plesiocis cribrum* Casey, 1898 is the only species in this genus that is found in North America and has been reported from Iosco County, Michigan (Lawrence, 1971).

**Genus: Octotennus**
*O. glabriculus* is the only North American species and it has a widespread distribution throughout North America (Lawrence 1971).

**Genus: Ceracis**
There are 20 North American species and six occur in Michigan. 
Males occurring in Michigan can be distinguished by the presence of a sex patch on the first abdominal ventrite and most of the species have tubercles on the frontoclypeal ridge or on the apex of the pronotum. This key has a combination of male and female characters, where applicable.
Key to the genus Ceracis

1. Antennae with 10 antennomeres .................................................. Cer. singularis
   Antennae with less than 10 antennomeres ...................................... 2
2. Antennae with 9 antennomeres .................................................... 3
   Antennae with 8 or fewer antennomeres ....................................... 4
3. Elytral punctures usually smaller than those on pronotum and separated by more than one puncture diameter; males bearing two long, deeply emarginate tubercles on pronotum ................................................................. Cer. thoracicornus
   Pronotal punctures equal in size to elytral punctures and separated by less than one puncture diameter; males with two horns arising from pronotum, but not as long or as emarginate ................................................................. Cer. pecki
4. Elytral punctuation coarser and denser than that of pronotum ... Cer. minutissimus
   Elytral punctuation finer and sparser than or as fine and sparse as that of pronotum .......................... 6
5. Pronotal punctuation about as fine and sparse as elytral punctuation, the punctures usually separated by more than one puncture diameter; males with an ovoid sex patch on first abdominal ventrite ................................. Cer. sallei (Mellié)
   Pronot al punctuation coarser and denser than elytral punctuation, the punctures usually separated by less than one puncture diameter; male with a circular sex patch on first abdominal ventrite .................................................... Cer. punctulatus Casey

Key to the genus Cis

There are 43 North American species and ten are found in Michigan.

1. Body flattened or subcylindrical ................................................. 2
   Body not flattened, cylindrical .................................................. 3
2. Body flattened, male with fovea on first visible abdominal sternite; frontoclypeal ridge in male with 4 tubercles .................................................. C. creberrimus
   Body subcylindrical, fovea not present on first visible abdominal sternite in male .................................................. C. horridulus Casey
3. Setae minute, not or barely visible under microscope ................ C. levettei
   Setae long, visible under microscope ........................................... 4
4. Elytral punctuation biordinal in size, with the smaller punctures bearing setae... 5
   Elytral punctuation not biordinal in size ...................................... 5
5. Lateral margin of pronotum widely expanded; in dorsal view, pronotal margins visible for the entire lengths from above ........................................... 6
   Lateral margins of pronotum not or barely expanded; in dorsal view, pronotal margins not visible for the entire lengths from above ........................................... 7
6. Elytral punctuation serrate; lateral margins of pronotum weakly to not crenulate ................................................................. C. fuscipes
   Elytral punctuation confused, not distinctly serrate; lateral margins of pronotum coarsely and distinctively crenulate ........................................ C. submicans
7. Prosternum carinate; elytral punctuation distinctly of two sizes; in male, apex of pronotum bearing two subtriangular processes .................. C. americanus
   Prosternum not distinctly carinate; elytral punctuation of two sizes, but indistinctly so; apex of pronotum in male always simple ........................................... 8
8. Elytral punctuation not seriate; in male, frontoclypeal ridge bearing two tubercles; abdominal fovea absent .................................................. C. subtilis
   Elytral punctuation seriate ............................................................. 9
9. Pronotal punctuation dense, less than half a diameter between punctures; elytral bristles colorless ................................................................. C. tristis Mellié
   Pronotal punctuation sparse with more than half a diameter between punctures; elytral bristles yellow ................................................................. C. striatulus
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Literature Cited


