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Ciidae of Michigan (Insecta: Coleoptera)

Cover Page Footnote

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Ciidae of Michigan (Insecta: Coleoptera)

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Abstract

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, *Dolicocis 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

Ciidae Leach, 1819 is a cosmopolitan family of beetles that primarily feed on polypore fungus (Lawrence 1973). These beetles prefer to reside in the basidiomes once the fungi have shed their spores and have begun to decompose. Upon hatching from their eggs, the larvae burrow into the fungus where they complete their life cycle. These beetles are generally benign and play an important role in recycling fungal nutrients to the soil. However, some species, including *Cis bilamellatus* Wood, 1884, may be invasive pests of commercial mushrooms (Lawrence 1991, Lopes-Andrade and Luer 2014).

Minute tree-fungus beetles are small (about 0.5 to 6 mm), usually cylindrical beetles with 4-4-4 tarsi (Thayer and Lawrence 2002). The spines and apical production of the tibia as well as the presence of an abdominal fovea and length and width associated with the prosternal process distinguish genera. Species are distinguished by the qualities of the elytral and pronotal setae and punctuation. The males of some species bear diagnostic tubercles, arising from the apex of the pronotum or the frontoclypeal ridge.

Ciidae is comprised of approximately 720 species among 51 genera with most of the diversity occurring in the tropics (Lawrence 1971). Thirteen genera and 84 species occur in the United States (Thayer and Lawrence 2002). Only three detailed regional surveys of this group have been published for California and the maritime Provinces of Canada (Lawrence 1974, Majka 2007, Lopes-Andrade et al. 2016). Faunistic studies for the

Northeastern United States or any of the included states have not been conducted. Given 40 years since the last review of the North American fauna (Lawrence 1971) and subsequent beetle surveys in the state, we review the specimens in the A. J. Cook Arthropod Research Collection, Michigan State University and several other entomological museums and provide new locality and species records. In addition, keys to the genera and species for Michigan are provided.

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

Table 1: All Ciidae species known to occur in Michigan. Source is the publication that lists the state record or a new record discovered in this study.

Species	Author	Source
<i>Ceracis minutissimus</i>	(Mellié, 1849)	Lawrence, 1982
<i>Ceracis pecki</i>	Lawrence, 1971	New State Record
<i>Ceracis punctulatus</i>	Casey, 1898	Lawrence, 1982
<i>Ceracis singularis</i>	(Dury, 1917)	Lawrence, 1982
<i>Ceracis sallei</i>	(Mellié, 1849)	Lawrence, 1982
<i>Ceracis thoracicornus</i>	(Ziegler, 1845)	Lawrence, 1982
<i>Cis americanus</i>	Mannerheim, 1852	New State Record
<i>Cis castlei</i>	(Dury, 1917)	Downie and Arnett 1996
<i>Cis creberrimus</i>	Mellié, 1849	Lawrence, 1982
<i>Cis fuscipes</i>	Mellié, 1849	Lawrence, 1982
<i>Cis horridulus</i>	Casey, 1898	Lawrence, 1982
<i>Cis levettei</i>	(Casey, 1898)	Lawrence, 1982
<i>Cis striatulus</i>	Mellié, 1849	Lawrence, 1982
<i>Cis submicans</i>	Abeille de Perrin, 1874	New State Record
<i>Cis subtilis</i>	Mellié, 1849	Lawrence, 1982
<i>Cis tristis</i>	Mellié, 1849	Lawrence, 1982
<i>Dolicocis manitoba</i>	Dury, 1919	New State Record
<i>Hadreule blaisdelli</i>	(Casey, 1900)	Lawrence, 1982
<i>Octotemnus glabriculus</i>	(Gyllenhal, 1827)	Lawrence, 1982
<i>Orthocis punctatus</i>	(Mellié, 1849)	Lawrence, 1982
<i>Plesiocis cribrum</i>	Casey, 1898	Lawrence, 1982
<i>Strigocis opacicollis</i>	Dury, 1917	Lawrence, 1982
<i>Strigocis opalescens</i>	(Casey, 1898)	Lawrence, 1982
<i>Sulcacis lengi</i>	Dury, 1917	Lawrence, 1982
<i>Sulcacis curtulus</i>	(Casey, 1898)	Lawrence, 1982

1967, Lawrence 1971). 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 glabriculus* (Gyllenhal), *Orthocis punctatus* Mellié, *Sulcacis lengi* Dury, and *Sulcacis curtulus* (Casey).

New Records (*new record)

***Ceracis minutissimus* (Mellié, 1849)** Michigan, Clinton Co., Rose Lake Wildlife Experiment Station. 21 Dec 1971. Daniel K. Young Coll. (MSUC-19). Michigan, Clinton Co. Bath. 18 April 1964. R. Matthews

coll. (MSUC-3). Michigan, Clinton Co., Rose Lake Wildlife experiment Station. 21 Dec 1971. Daniel K. Young Coll. (WIRC-20). Michigan, Oakland Co., Milford. 22 June 1921. T. H. Hubbell Coll. (UMMZ-2). Michigan, Oakland Co., Milford. 28 April 1922. T. H. Hubbell Coll. (UMMZ-1). Michigan, Washtenaw Co., Ann Arbor, 3rd Woods. 9 April 1921. T. H. Hubbell Coll. (UMMZ-2). Michigan, Charlevoix Co., Beaver Island. 28 Aug 1922. M. H. Hatch Coll. (UMMZ-1). Michigan, Washtenaw Co., Curtis Rd., 3 miles North of Ypsilanti. 8 Oct 1961. James E. Lloyd Coll. (UMMZ-9). Michigan, Paw Paw Lake. 20 July 1909. E. Liljeblad Coll. (UMMZ-1).

****Ceracis pecki* Lawrence, 1971** Michigan, Ingham Co. East Lansing. 11 Sep 1971. Daniel K. Young Coll. (WIRC-1). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station, 21 Dec 1971. Daniel K. Young Coll. (WIRC-12).

***Ceracis singularis* (Dury, 1917)** Michigan Berrien County, Warren Woods. 28 April 1984. L.E. Watrous Coll. (FMNH-3). Michigan, Berrien County Warren Woods State Park. 30 May 1992. A. Newton & M. Thayer Coll. (FMNH-5).

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

Wildlife Experiment Station, 21 Dec 1971. Daniel K. Young Coll. (MSUC-55). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station, 18 Dec 1971. Daniel K. Young Coll. (MSUC-8). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station, 11 Sep 1971. Daniel K. Young Coll. (MSUC-5). Michigan, Oakland Co. 27 March 1941. B. Summerville coll. (MSUC-4). Michigan, Detroit. 27 April 1938. Geo. Steyskal coll. (MSUC-3). Michigan, Kalamazoo Co., Gull Lake Biological Station. 01 Aug 1963. Anonymous coll. (MSUC-1). Michigan, Clinton Co., Bath. 18 April 1964. R. Matthews coll. (MSUC-1). Michigan, Clinton Co., East State Road – 1 mile North of Lansing. 09 - 10 June 2007. G. L. Parsons coll. ex UV Light Trap. (MSUC-1). Michigan, Oakland Co. 11 May 1947. B. Summerville coll. (MSUC-6). Michigan, Oakland Co. 21 May 1947. B. Summerville coll. ex. Fungi. (MSUC-2). Michigan, Midland Co. 18 May 1956. R. & K. Dreisbach coll. (MSUC-3). Michigan, Detroit. 27 April 1938. Geo. Steyskal Coll. (MSUC-10). Michigan, Roscommon Co. 14 July 1945. R. R. Dreisbach coll. (MSUC-2). Michigan, Midland Co. 19 April 1952. R. R. Dreisbach coll. (MSUC-2). Michigan, Midland Co. 15 May 1940. R. R. Dreisbach coll. (MSUC-1). Michigan, Missaukee Co. 23 May 1954. R. R. Dreisbach coll. MSUC-1). Michigan, Detroit. 11 April 1938. Geo. Steyskal coll. MSUC-1). Michigan, Detroit. Date Unknown (MSUC-12). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station, 21 Dec 1971. Daniel K. Young Coll. (WIRC-129). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station, 18 Dec 1971. Daniel K. Young Coll. (WIRC-35). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station, 11 Sep 1971. Daniel K. Young Coll. (WIRC-4). Michigan, Gratiot County, Gratiot-Saginaw State Game Area. 27 Oct 1972. D.K. Young Coll. (WIRC-5). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station, 19 Nov 1972. Daniel K. Young Coll. (WIRC-2). Michigan, Cheboygan County, Douglas Lake. 19 June 1949. R. Mitchell Coll. (FMNH-52). Michigan Berrien County, Warren Woods. 28 April 1984. L.E. Watrous Coll. (FMNH-5). Michigan, Detroit. 17 April 1938. Geo. Steyskal Coll. (UMMZ-11). Michigan, Detroit. 27 April 1938. Geo. Steyskal Coll. (UMMZ-2). Michigan, Washtenaw Co., Ann Arbor, 3rd Woods. 12 April 1921. T. H. Hubbell Coll. (UMMZ-1). Michigan, Northwood. 23 April 1911. (UMMZ-1).

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

Cis castlei (Dury, 1917) Michigan, Ingham County, East Lansing. 11 Sep 1971. Daniel K. Young Coll. (WIRC-16). Michigan,

Berrien County, Warren Woods. 28 April 1984. L.E. Watrous Coll. (FMNH-6).

Cis creberrimus Mellié, 1849 Michigan, Macomb Co. East of Memphis, 04 April 1967. C. Brivio Coll. (MSUC-1). Michigan, Saginaw Co. 12 Sep 1955. R. R. Dreisbach coll. (MSUC-1). Michigan, Livingston Co. (GR) 03 June 1950. R. R. Dreisbach coll. (MSUC-2). Michigan, Detroit. Date Unknown. (MSUC-2). Michigan, Ingham County, East Lansing. 11 Sep 1971. Daniel K. Young Coll. (WIRC-124). Michigan, Washtenaw Co., Ann Arbor, 3rd Woods. 07 April 1921. T. H. Hubbell Coll. (UMMZ-1). Michigan, Highland Park. (UMMZ-1).

Cis fuscipes Mellié, 1849 Michigan, Ingham Co. East Lansing. 11 Sep 1971. Daniel K. Young Coll. (MSUC-12). Michigan, Lake Co., Branch. 09 Sep 1975. R. L. Fischer Coll. (MSUC-2). Michigan, Montmorency Co. 05 Sep 1966. P. C. Kennedy Coll. Ex. Window pane trap. (MSUC-1). Michigan, Berrien Co. St. Joseph. 23 March 1964. Diana Dee Wilder Coll. (MSUC-1). Michigan, Kalamazoo Co., T13, R910, Sec 10. 02 May 1968. Norman T. Baker Coll. (MSUC-1). Michigan, Ingham Co., East Lansing, Toumey Woodlot. 01 May 1968. R. Fleming & J. E. McPherson Coll. Ex. Pitfall trap (MSUC-1). Michigan, Montmorency Co. 29-30 May 1966. L. F. Wilson Coll. Ex. Windowpane trap (MSUC-1). Michigan, Gladwin Co., NAD83: 43.901295N, -84.282528W. 03 July 2007. JB Coll. (MSUC-1). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station. 21 Dec 1971. Daniel K. Young Coll. (MSUC-1). Michigan, Roscommon Co. 08 Nov 1945. R. R. Dreisbach Coll. (MSUC-1). Michigan, Midland Co. 11 Jan 1945. R. R. Dreisbach Coll. (MSUC-2). Michigan, Ingham Co., Michigan State University, Lot 1576, Sub 2. 09 Dec 1950. (MSUC-4). Michigan, Macomb Co. East of Memphis, 09 June 1969. C. Brivio Coll. (MSUC-1). Michigan, Macomb Co. East of Memphis, March 1971. C. Brivio Coll. (MSUC-1). Michigan, Macomb Co. East of Memphis, 21 March 1968. C. Brivio Coll. (MSUC-2). Michigan, Macomb Co. East of Memphis, 31 Aug 1964. C. Brivio Coll. (MSUC-8). Michigan, Macomb Co. East of Memphis, 24 Sep 1970. C. Brivio Coll. (MSUC-9). Michigan, Macomb Co. East of Memphis, April 1966. C. Brivio Coll. (MSUC-3). Michigan, Huron Co., Huron City, 26 July 1967. C. Brivio Coll. (MSUC-5). Michigan, Wayne Co., Detroit, Sep 1976. C. Brivio Coll. (MSUC-1). Michigan, Manistee Co. 05 July 1957. R. & K. Dreisbach coll. (MSUC-10). Michigan Midland Co. 19 April 1952. R. R. Dreisbach coll. MSUC-1). Michigan, Midland Co. 18 May 1956. R. R. Dreisbach coll. (MSUC-1). Michigan, Missaukee Co. 29 May 1939. R. R. Dreisbach coll. (MSUC-5). Michigan, Gratiot Co. 14 June 1944. R. R.

Dreisbach coll. (MSUC-1). Michigan, Midland Co. 05 Sep 1930. R. R. Dreisbach coll. (MSUC-1). Michigan, Agriculture College. Date Unknown. H. E. Weed Coll. (MSUC-1). Michigan, Detroit. Date Unknown. (MSUC-4). Michigan, Mason Co., Ludington State Park, 44.032341N, -86.505737W. 10-24 July 2008. PI: A. Cognato coll. (MSUC-1). Michigan, Mason County, Ludington State Park, 44.032341N, -86.505737W. 13-27 June 2008. PI: A. Cognato coll. (MSUC-1). Michigan, Mason Co., Ludington State Park, 44.032341N, -86.505737W. 13-27 June 2008. PI: A. Cognato coll. (MSUC-1). Michigan, Ingham Co. East Lansing. 11 Sep 1971. Daniel K. Young Coll. (WIRC-15). Michigan, Ingham Co. East Lansing. 18 June 1972. Daniel K. Young Coll. (WIRC-2). Michigan, Lakeside, (Warren Woods). 09 Sep 1950. Anonymous Coll. (FMNH-1). Michigan, Ingham County, Dansville Game Area. 07 Nov 1965. David E. Bixler Coll. (FMNH-1). Michigan, Washtenaw Co., Ann Arbor, 3rd Woods. 30 May 1921. T. H. Hubbell Coll. (UMMZ-2). Michigan, Oakland Co., Milford. 23 April 1922. T. H. Hubbell Coll. (UMMZ-1). Michigan, Oakland Co. 05 Sep 1926. A. W. Andrews Coll. (UMMZ-1). Michigan, Oakland Co. 23 Oct 1921. S. Moore Coll. (UMMZ-1). Michigan, Pentwater. 13 July 1920. E. Liljeblad Coll. (UMMZ-1). Michigan, Pentwater. 19 July 1920. E. Liljeblad Coll. (UMMZ-1). Michigan, Detroit. 11 April 1938. Geo. Steyskal Coll. (UMMZ-3). Michigan, Missaukee Co. 24 May 1939. R. R. Dreisbach Coll. (UMMZ-1). Michigan, Charlevoix Co., High Island. 09 Aug 1922. S. Moore Coll. (UMMZ-1). Michigan, Leelanau Co. South Fox Island. 29 Aug 1923. S. Moore Coll. (UMMZ-1). Michigan, Washtenaw Co., Sharon Township. 21 May 1924. S. Moore Coll. (UMMZ-1). Michigan, Manistee Co. 05 July 1957. R. & K. Dreisbach Coll. (UMMZ-1). Michigan, Cheboygan. 14 June 1928. Wesley Clanton Coll. (UMMZ-1). Michigan, Chippewa Co. Whitefish Point. 03 July 1913. A. W. Andrews Coll. (UMMZ-1). Michigan, Gratiot Co. 15 June 1944. R. R. Dreisbach Coll. (UMMZ-1). Michigan, Paw Paw Lake. 07 July 1900. E. Liljeblad Coll. (UMMZ-1). Michigan, Saint Clair Co., Port Huron. 28 May 1924. S. Moore Coll. (UMMZ-1). Michigan, Isabella Co. 14 May 1929. R. R. Dreisbach Coll. (UMMZ-1).

***Cis levettei* (Casey, 1898)** Michigan, Clinton Co., Bath. 18 April 1964. R. Matthews Coll. (MSUC-5). Michigan, Clinton Co., Rose Lake Wildlife, Experiment Station, 21 Dec 1971. Daniel K. Young Coll. (MSUC-38). Michigan, Dickinson co. ELF Project T43N – R29W, Sec. 14. 20 May 1983. M. Arduser Coll. (MSUC-5). Ingham Co. East Lansing. 09 April 1960. George Eickwort Coll. (MSUC-44). Michigan, Midland Co. 18 May 1956. R. R. Dreisbach coll. (MSUC-20).

Michigan, Midland Co. 23 June 1944. R. R. Dreisbach coll. (MSUC-1). Michigan, Manistee Co. 05 July 1957. R. & K. Dreisbach coll. (MSUC-3). Michigan, Midland Co. 16 June 1945. R. R. Dreisbach coll. (MSUC-1). Michigan, Saginaw Co. 12 May 1940. R. R. Dreisbach coll. (MSUC-10). Michigan, Lapeer Co. 05 June 1945. R. R. Dreisbach coll. (MSUC-1). Michigan, Clinton County, Rose Lake Wildlife Experiment Station, 21 Dec 1971. Daniel K. Young Coll. (WIRC-11). Michigan, Ingham County, East Lansing, 11 Sep 1971. Daniel K. Young Coll. (WIRC-53). Michigan, Ingham County, East Lansing. 01 Jan 1972. Daniel K. Young Coll. (WIRC-29). Michigan, Ingham County, East Lansing. 03 April 1972. Daniel K. Young Coll. (WIRC-3). Michigan, Ingham County, East Lansing. 06 June 1972. Daniel K. Young Coll. (WIRC-3). Michigan, Ingham County, East Lansing. 03 April 1972. Daniel K. Young Coll. (WIRC-1). Michigan, Emmet County, Wilderness St. Pk. 24-25 June 1972. D.K. & D.C. Young Coll. (WIRC-60). Michigan, Keweenaw County, Isle Royale. 16-23 Aug 1974. Daniel K. Young Coll. (WIRC-141). Michigan, Gogebic County, Wakefield. 20 Aug 1964. W. Suter Coll. (FMNH-13). Michigan, Berrien County, Lakeside, Warren Woods. 06 May 1967. W. Suter Coll. (FMNH-6). Michigan, Berrien County, Warren Woods. 28 April 1984. L. E. Watrous Coll. (FMNH-7). Michigan, Berrien County, Lakeville. 03 July 1943. H. Dybas Coll. (FMNH-1). Michigan, Lakeside, (Warren Woods). 09 Sep 1950. H.S. Dybas Coll. (FMNH-1). Michigan, Charlevoix Co., Beaver Island. 05 April 1922. M. H. Hatch Coll. (UMMZ-52). Michigan, Charlevoix Co., Beaver Island. 26 Aug 1922. M. H. Hatch Coll. (UMMZ-2). Michigan, Charlevoix Co., Beaver Island. 28 Aug 1922. M. H. Hatch Coll. (UMMZ-6). Michigan, Charlevoix Co., Beaver Island. 09 Sep 1922. M. H. Hatch Coll. (UMMZ-4). Michigan, Jackson Co., F. Ammermann Coll. 30 March 1952. (UMMZ-1). Michigan, Gogebic Co., Hughitt-Rawson Preserve. 24 July 1919. T. H. Hubbell. (UMMZ-2). Michigan, Oakland Co. 20 Oct 1930. (UMMZ-1). Michigan, Oakland Co. Aug 1934. A. W. Andrews Coll. (UMMZ-1). Michigan, Oakland Co. 26 July 1940. A. W. Andrews Coll. (UMMZ-1). Michigan, Washtenaw Co. ? Aug 1964. A. E. Pace Coll. (UMMZ-1). Michigan, Washtenaw Co., Ann Arbor, 3rd Woods. 30 May 1921. T. H. Hubbell Coll. (UMMZ-1). Michigan, Livingston Co., E.S. George Reserve. 07 Oct 1949. K. Bohnsack Coll. (UMMZ-2). Michigan, Washtenaw Co. 05 Oct 1964. (UMMZ-1). Michigan, Oakland Co., Milford. 23 April 1922. T. H. Hubbell Coll. (UMMZ-1). Michigan, Saint Clair Co. 30 May 1949. R. R. Dreisbach Coll. (UMMZ-1). Michigan, Northwood. 23 April 1911. (UMMZ-1). Michigan, Northwood. 07

May 1911. (UMMZ-2). Michigan, Mackinac Co., St. Ignace. 12 June 1921. S. Moore Coll. (UMMZ-1). Michigan, Jackson Co., Waterloo. 30 March 1952. F. Ammermann Coll. (UMMZ-1).

***Cis striatulus* Mellié, 1849** Michigan, Cheboygan County, Douglas Lake. 19 June 1949. R. Mitchell Coll. (FMNH-57).

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

***Cis subtilis* Mellié, 1849** Michigan, Ingham Co. East Lansing. 11 Sep 1971. Daniel K. Young coll. (MSUC-2).

****Dolichocis manitoba* Dury, 1919** Michigan, Gogebic County, Wakefield. 20 Aug 1964. W. Suter Coll. (FMNH-2).

***Octotemnus glabriculus* (Gyllenhal, 1827)** Michigan, Ingham Co., East Lansing. 11 Sep 1971. Daniel K. Young coll. (MSUC-14). Michigan, Keweenaw County, Isle Royale. 16-23 Aug 1974. Daniel K. Young Coll. (WIRC-22). Michigan, Warren Woods, nr. Lakeside. 27 Sep 1958. Henry Dybas Coll. (FMNH-9). Michigan, Berrien County,

Warren Woods. L.E. Watrous Coll. (FMNH-1). Michigan, Ingham Co. 27 Aug 1932. Will England Coll. (UMMZ-1). Michigan, Ingham Co. 29 Aug 1932. Will England Coll. (UMMZ-2). Michigan, Ingham Co. 01 Sep 1932. Will England Coll. (UMMZ-1).

***Orthocis punctatus* (Mellié, 1849)** Michigan, Lake Co. Branch. 12 Aug 1975. R. L. Fischer coll. (MSUC-1).

***Sulcacis lengi* Dury, 1917** Previously known from Michigan (No specific locality). Michigan, Ingham Co. East Lansing. 11 Sep 1971. Daniel K. Young coll. (MSUC-27). Michigan, Clinton Co., Rose Lake Wildlife Experiment Station. 11 Sep 1971. Daniel K. Young coll. (MSUC-1).

***Sulcacis curtulus* (Casey, 1898)** Michigan, Ingham Co., East Lansing. 11 Sep 1971. Daniel K. Young coll. (MSUC-1). Michigan, Midland Co. 10 June 1945. R. R. Dreisbach coll. (MSUC-2). Michigan, Midland Co. 11 June 1945. R. R. Dreisbach coll. (MSUC-1).

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
 6
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

6. 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
7. Antenna with 10 antennomeres *Cis* Latreille
Antenna with 9 antennomeres 8
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 *Plesiocis* 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: *Dolichocis*

There are two North American species and one of them is found in Michigan.

Dolichocis 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: *Octotemnus*

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 punctation coarser and denser than that of pronotum... *Cer. minutissimus*
Elytral punctation finer and sparser than or as fine and sparse as that of pronotum 6
5. Pronotal punctation about as fine and sparse as elytral punctation, the punctures usually separated by more than one puncture diameter; males with an ovoid sex patch on first abdominal ventrite *Cer. sallei* (Mellié)
Pronotal punctation coarser and denser than elytral punctation, 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 punctation biordinal in size, with the smaller punctures bearing setae.... 5
Elytral punctation not biordinal in size *C. castlei*
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 punctation serrate; lateral margins of pronotum weakly to not crenulate *C. fuscipes*
Elytral punctation confused, not distinctly serrate; lateral margins of pronotum coarsely and distinctively crenulate *C. submicans*
7. Prosternum carinate; elytral punctation distinctly of two sizes; in male, apex of pronotum bearing two subtriangular processes *C. americanus*
Prosternum not distinctly carinate; elytral punctation of two sizes, but indistinctly so; apex of pronotum in male always simple 8
8. Elytral punctation not seriate; in male, frontoclypeal ridge bearing two tubercles; abdominal fovea absent *C. subtilis*
Elytral punctation seriate 9
9. Pronotal punctation dense, less than half a diameter between punctures; elytral bristles colorless *C. tristis* Mellié
Pronotal punctation sparse with more than half a diameter between punctures; elytral bristles yellow *C. striatulus*

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