The bees of Michigan (Hymenoptera: Apoidea: Anthophila),
with notes on distribution, taxonomy, pollination, and natural history

JASON GIBBS\textsuperscript{1,2}, JOHN S. ASCHER\textsuperscript{3}, MOLLY G. RIGHTMYER\textsuperscript{4} & RUFUS ISAACS\textsuperscript{1}

\textsuperscript{1}Department of Entomology, Michigan State University, East Lansing, MI, USA 48824.
\textsuperscript{2}Current address: Department of Entomology, University of Manitoba, Winnipeg, MB, Canada R3T 2N2. E-mail: Jason.Gibbs@UManitoba.ca
\textsuperscript{3}Department of Biological Science, National University of Singapore, Singapore 117543.
\textsuperscript{4}San Diego, CA, USA, 92116.

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Table of contents

Abstract .................................................................................................................................................. 6
Introduction ........................................................................................................................................ 6
Methods ............................................................................................................................................... 9
Results and discussion ....................................................................................................................... 11
Bees of Michigan annotated checklist ............................................................................................ 14
ANDRENIDAE ..................................................................................................................................... 14
Andreninae .......................................................................................................................................... 14
Andrenini ............................................................................................................................................ 14
Genus Andrena Fabricius .................................................................................................................... 14
Subgenus Andrena Fabricius s. s. ........................................................................................................ 14
Subgenus Callandrena Cockerell s. l. .................................................................................................. 16
Subgenus Conandrena Hedicke ............................................................................................................ 17
Subgenus Conandrena Viereck ............................................................................................................. 19
Subgenus Eucalandra Hedicke .............................................................................................................. 19
Subgenus Gonandrena Viereck ............................................................................................................. 21
Subgenus Holandrena Pérez ................................................................................................................ 21
Subgenus Iomelissa Robertson ............................................................................................................. 22
Subgenus Larandrena LaBerge ............................................................................................................ 22
Subgenus Leucandrena Hedicke .......................................................................................................... 22
Subgenus Melandrena Pérez ................................................................................................................ 23
Subgenus Micrandrena Ashmead ......................................................................................................... 24
Subgenus Parandrena Robertson ......................................................................................................... 25
Subgenus Plastandrena Hedicke .......................................................................................................... 26
Subgenus Ptilandrena Robertson ......................................................................................................... 26
Subgenus Rhacandrena LaBerge .......................................................................................................... 27
Subgenus Scaphandrena Lanham ........................................................................................................ 27
Subgenus Scraptoropsis Viereck .......................................................................................................... 27
Subgenus Simandrena Pérez ................................................................................................................ 28
Subgenus Taenandrena Hedicke .......................................................................................................... 29
Subgenus Thyandrena Lanham ............................................................................................................ 30
Subgenus Trachandrena Robertson .................................................................................................... 30
Subgenus Tylandrena LaBerge ............................................................................................................ 32
Panurginae .......................................................................................................................................... 33
Callioptini ........................................................................................................................................... 33
Genus Callioptis Smith ......................................................................................................................... 33
Subgenus Callioptis Smith s. s. ............................................................................................................ 33
Subgenus Verbenapis Cockerell & Atkins ............................................................................................ 33
Perditini ................................................................................................................................................. 33
Genus Perdita Smith ............................................................................................................................ 33
Subgenus Cockerellia Ashmead .......................................................................................................... 34
Subgenus Perdita Smith s. s. ................................................................................................................ 34
Protandrenini ...................................................................................................................................... 35
Genus Protandrena Cockerell ............................................................................................................... 35
Genus Pseudopanurgus Cockerell ...................................................................................................... 36
APIDAE ............................................................................................................................................... 38
Apinae .................................................................................................................................................. 38
Anthophorini ........................................................................................................................................ 38
Genus Anthophora Latreille .................................................................................................................. 38
Subgenus Clisodon Patton ................................................................................................................... 38
Subgenus Melae Sandhouse ................................................................................................................ 39
Subgenus Mystacanthophora Brooks .................................................................................................. 39
Genus Habropoda Smith ..................................................................................................................... 39
Apini .................................................................................................................................................... 39
Genus Apis Linnaeus ........................................................................................................................... 39
Bombini ............................................................................................................................................... 40
Genus Bombus Latreille ....................................................................................................................... 40
Subgenus Bombias Robertson ............................................................................................................. 40
Subgenus Callumanobombus Vogt ...................................................................................................... 41
Subgenus Psithyrus Lepeltier .............................................................................................................. 41
Subgenus Pyrobombus Dalla Torre .................................................................................................... 42
Subgenus Subterraneanobombus Vogt ............................................................................................... 44
Subgenus Thoracobombus Dalla Torre .............................................................................................. 44
Eucerini ................................................................................................................................................. 45
Dieunomiini .......................................................... 98
Genus *Dieunomia* Cockerell ........................................ 98
Subgenus *Dieunomia* Cockerell s. s. ............................ 98
Rophitinae . ................................................................ 98
Genus *Dufouriella* Lepeletier ...................................... 98
MEGACHILIDAE .............................................................. 98
Megachilinae ............................................................... 98
Anthidiini ................................................................. 98
Genus *Anthidiellum* Cockerell .................................. 98
Subgenus *Loyolanthidium* Urban .............................. 98
Genus *Anthidium* Fabricius ....................................... 99
Subgenus *Anthidium* Fabricius s. s. ......................... 99
Subgenus *Proanthidium* Friese ................................. 100
Genus *Dianthidium* Cockerell ................................ 100
Subgenus *Dianthidium* Cockerell s. s. .................... 100
Genus *Stelis* Panzer .............................................. 101
Subgenus *Dolichostelis* Parker & Bohart ................ 101
Subgenus *Stelis* Panzer s. s. .................................... 101
Genus *Trachusa* Panzer ........................................ 102
Subgenus *Heteranthidium* Cockerell ....................... 102
Megachilini ............................................................. 103
Genus *Coelioxys* Latreille ..................................... 103
Subgenus *Procoelioxys* Mitchell .............................. 103
Subgenus *Coelioxys* Latreille ................................. 104
Subgenus *Cyrtocoelioxys* Mitchell ......................... 104
Subgenus *Paracoelioxys* Gribodo ............................ 105
Subgenus *Symocoelioxys* Mitchell ......................... 105
Subgenus *Xerochoelioxys* Latreille s. s. ............... 105
Genus *Megachile* Latreille .................................... 106
Subgenus *Acentron* Mitchell .................................. 106
Subgenus *Callomegachile* Michener ....................... 106
Subgenus *Chelostomoides* Robertson ...................... 106
Subgenus *Eutricharacea* Thomson ......................... 107
Subgenus *Leptorachis* Mitchell .............................. 108
Subgenus *Litomegachile* Mitchell ......................... 108
Subgenus *Megachile* Latreille s. s. ....................... 109
Subgenus *Megachiloides* Mitchell ......................... 110
Subgenus *Sayapis* Titus ....................................... 110
Subgenus *Xanthosarax* Robertson ........................... 111
Osmiini ................................................................. 112
Genus *Ashmeadiella* Cockerell ................................ 112
Subgenus *Ashmeadiella* Cockerell s. s. ................ 112
Genus *Chelostoma* Latreille ................................ 113
Subgenus *Prochelostoma* Robertson ...................... 113
Genus *Heriades* Spinola ....................................... 113
Subgenus *Neotryptetes* Robertson ......................... 113
Genus *Hoplitis* Klug ............................................ 114
Subgenus *Alicidamea* Cresspm ................................ 114
Genus *Osmia* Panzer ........................................... 115
Subgenus *Cephalosmia* Sladen ............................... 115
Subgenus *Diceratoma* Robertson ............................ 115
Subgenus *Helicosmia* Thomson ............................. 115
Subgenus *Melanosmia* Schmiedeknecht .................. 116
Subgenus *Osmia* Panzer s. s. ................................ 120
MELITIIDAE .............................................................. 121
Melittinae .............................................................. 121
Genus *Macropis* Panzer ........................................ 121
Subgenus *Macropis* Panzer s. s. ......................... 121
Acknowledgements .................................................................. 122
References ........................................................................ 122
Appendix 1 .................................................................... 139
Appendix 2 .................................................................... 141
Supplementary table 1 .................................................. 143
Supplementary table 2 .................................................. 144
Abstract

The state of Michigan occupies an area between the Great Plains and the northeastern United States, bordering four Great Lakes, with diverse biogeographical regions. Michigan also has the second most diverse agriculture in the country, with many crops that depend on bees for pollination. This unique combination provides a wide range of opportunities for bees to persist, yet there is no current published checklist of these important insects. This study was conducted to provide the first annotated checklist of the bee (Apoidea: Anthophila) fauna of Michigan, summarizing aspects of their taxonomy and behavior and to provide provisional conservation assessment. The list was compiled from a critical review of published literature, museum specimens, and database records, supplemented by new collections. In total, 465 species are included in the checklist, including 38 new records, however evidence for 13 species is poor, several more species require taxonomic revision, and the presence of additional species is expected. The exotic megachilid species *Megachile apicalis* Spinola, *M. pusilla* Pérez (=concina Smith, auct.) and *Osmia taurus* Smith are reported from Michigan for the first time. New state records of native species include *Anthidium temuflorae* Cockerell and *Nomada alpha alpha* Cockerell, both previously undocumented from eastern North America, and *Nomada sphaerogaster* Cockerell, which has rarely been recognized. The taxonomy of some bee species is clarified by the formal publication of 11 new synonymies (some previously reported online or in manuscripts). The following list cites junior synonyms first followed by the valid name: *Andrena chippewaensis* Mitchell 1960 = *A. (Simandrena) wheeleri* Graenicher 1904; *Osmia hendersoni* Cockerell 1907 = *O. (Melanosmia) tarsata* Provancher 1888; *Osmia michiganensis* Mitchell 1962 = *O. (M.) subarcctica* Cockerell 1912 (new status, removed from synonymy with *O. (M.) tersula* Cockerell 1912); *Sphecodes persimilis* Lovell and Cockerell 1907 = *S. davisi* Robertson 1897; *Sphecodes knetshi* Cockerell 1898 = *S. dichrous* Smith 1853; *Sphecodes carolinus* Mitchell 1956 = *S. coronus* Robertson 1956; *Sphecodes stygicus* Robertson 1893 = *S. mandibularis* Cresson 1872; *Sphecodes prostygius* Mitchell 1960 = *S. fattigi* Mitchell 1956; *Stelis vernalis* Mitchell 1962 = *S. coarctatus* Crawford 1916; and *Stelis michiganensis* Mitchell 1962 = *S. foederalis* Smith 1854. Poorly known *Andrena* (*Cnemidandrena*) are discussed, including *A. pannassiae* Cockerell, a new state record, *A. robervalensis* Mitchell, and the extralimital *A. runcinatae* Cockerell. Of these, only *A. robervalensis* was considered in the subgeneric revision, but we recognize all three as valid species pending further study. *Nomada binotata* (Robertson 1903) and *N. quadriracemulata* (Robertson 1903) are removed from synonymy with *N. ovata* (Robertson 1903), based on examination of the lectotypes. A new species, *Tripeolus eliseae* Rightmyer, the eastern representative of the *verbesinae* species group, is described. A putative undescribed species, *Osmia aff. trevoris*, is documented, but requires additional study for its status to be fully resolved. A rich bee fauna is documented that includes geo.

Key words: check list, faunal list, new species, nomenclature, pollinators, synonymies

Introduction

The bee fauna of North America remains incompletely documented, despite widespread interest in native bee conservation (Cariveau & Winfree 2015; Matheson et al. 1996). Assessing changing bee populations remains a challenging task (Williams et al. 2001), particularly given the limited published information on species distributions, incomplete digitization of historical collections, and lack of modern revisionary studies for many bee genera. However, recent analyses of these trends suggest a range of dynamics: declining populations in some taxa, increasing in others, and stable in the majority (Bartomeus et al. 2013a; Colla et al. 2012). Unfortunately, a considerable proportion of regional species cannot be analyzed due to a lack of adequate samples, a problem compounded by identification difficulties resulting from a lack of comprehensive taxonomic revisions. Future examination of bee population trends will depend on improved documentation of regional bee diversity (Berenbaum et al. 2007), including publication of annotated checklists of species for each state. Such efforts provide baseline data on species distribution and can spur further research on bee conservation and diversity.

Printed catalogs (Hurd 1979; Moure & Hurd 1987) and monographs on bees of the Eastern United States (Mitchell 1960, 1962) provide state-level distributional data for North American bees, but taxonomic and distributional data provided therein are now outdated. Subsequent publications have clarified the status of many genera including the species-rich and taxonomically challenging *Lasioglossum* (Gibbs 2010b, 2011; Gibbs et al. 2013; McGinley 1986), *Andrena* (Bouseman & LaBerge 1979; Donovan 1977; LaBerge 1977, 1980, 1987, 1989; Ribble 1968), and *Nomada* (Schwarz & Gusenleitner 2004; Droge et al. 2010). A compilation of taxonomic and distributional data for world bees assembled by JSA and published online at http://discoverlife.org (Ascher & Pickering 2017) is updated regularly to reflect a continuous influx of recently published records and reports, with
many hundreds of new state records mapped online together with specimen records from diverse sources with varying data quality. Contributions of verified state records come from multiple sources but particularly S. Drooge (USGS Patuxent Wildlife Research Center (PWRC)) and T. Griswold (USDA Bee Biology and Systematics Laboratory (BBSL)), who each maintain specimen databases, and records verified by JSA and captured in the Arthropod Easy Capture (AEC) database (http://sourceforge.net/p/arthropodeasy Version: 1.34, 2013; see Schuh et al. 2010). Specimen records captured by collaborative databasing efforts have recently become more accessible through data portals such as the USGS-run BISON (Biodiversity Information Serving Our Nation), but the quality of these data is inconsistent. Furthermore, a large proportion of records need to be digitized before they will be accessible for assembling state, county, and site lists of bees. State checklists allow for an inclusive and critical review of all available records that can support future studies of the bee fauna of that state and they can inform regional- and national-scale studies.

Several state lists for bees have been published recently in the United States, including Wisconsin (Wolf & Ascher 2009), Pennsylvania (Donovall & VanEngelsdorp 2010), Indiana (Jean 2010), and Colorado (Scott et al. 2011). Other state lists are in development or have been disseminated online (Drooge 2016; Pascarella & Hall 2012). Cory Sheffield (Royal Saskatchewan Museum) is leading an effort to document Canadian bees. Additional publications such as Zarrillo et al. (2016) for Connecticut supplement the historical baseline (Mitchell, 1960, 1962, Hurd, 1979) by detailing new and interesting state records. Some reports of new state records, however, are less reliable, e.g., most records of native bees reported for the first time from New Hampshire by Tucker & Rehan (2016) require additional scrutiny.

Michigan is nested within the Great Lakes Region and has biogeographic features of both the central eastern regions and northern tier states. For example, the Upper Peninsula (UP) and Isle Royale have affinities to more northern flora and fauna than does the Lower Peninsula (LP) (Husband et al. 1980). A floral tension zone crosses the LP, separating it into northern (NLP) and southern (SLP) zones that are distinct in climate, soils, and plant communities. Some bumble bees have northern or southern range limits which correspond well with this floral tension zone (Husband et al. 1980). Coastal habitats on the western edge of the LP include sand dunes adjacent to Lake Michigan, which influences the climate that is suitable for regionally unique agriculture as well as flora and fauna not seen in other parts of the state (Reznicek 1994). This region also represents the northern range limits of some bee species that are typically found further south (Tuell et al. 2009).

Historical collections of Michigan bees come from a variety of sources, one of the most important being that of Robert R. Dreisbach (Dow Chemical, Midland, Michigan), who collected extensively across the state and beyond, often with his wife Kathryn. Reported bee species richness is high for Midland County where he lived and worked (see map, Fig. 1). Dreisbach’s personal collection of over 250,000 insect specimens was willed to Michigan State University (Fischer 1965). Unfortunately, Dreisbach did not always maintain careful collection data (Cantrall 1968), and many of his labels only list the county, date, and collector without more specific locality data (Fig. 2A, B). It is rumored among local entomologists that Dreisbach intentionally sought to obtain multiple county records in a single collection bout by focusing his efforts around the boundaries between counties. The Dreisbachs’ Michigan collections have been used in the description of many insect species including numerous bees (Mitchell 1960, 1962), resulting in 23 Michigan holotypes of bees, nine of which are currently valid, and many additional paratypes of bees from Michigan. Details are provided in the species accounts below for the holotypes, which reside at the National Museum of Natural History (NMNH) in Washington, D.C. With the exception of type series, Mitchell (1960, 1962) did not provide more location-specific information nor did he indicate the source of state records. Mitchell (1960, 1962) recorded 398 species present in Michigan, based on his concepts of species, which is nearly twice the species totals he reported for adjacent states such as Indiana and Ohio.

A long-term study by Francis C. Evans (University of Michigan, Ann Arbor) summarized extensive bee collections initiated by Urless N. Lanham in the 1950’s, including floral association records from the Edwin S. George Reserve in Livingston County, Michigan (Evans 1986). Much of this important material, which includes several unique bee species records for the state, is housed at the University of Michigan, Museum of Zoology (UMMZ). The W.K. Kellogg Biological Station (KBS) of Michigan State University (MSU) located next to Gull Lake in Kalamazoo County has also been visited repeatedly by MSU collectors (Matthews 1965). Specimens from KBS, including many uncommon species for the state, frequently bear labels recording the collection locality as “Gull Lake Biol. Sta.” (Fig. 2C) and were collected by Roland L. Fischer who taught Introductory Entomology during the summer at KBS during his tenure at MSU from 1953 to 1992 (Stehr & Nielsen 1994). The names of his
students including the melittologist George C. Eickwort and the lepidopterist Ronald W. Hodges are frequently seen on labels from KBS and other sites. Ronald Hodges also collected important bee records from Isle Royale in Keweenaw County, the most northerly region of the state. Specimens from a dissertation on strawberry pollination are housed at MSU and contribute records to a number of counties, particularly the otherwise under sampled Manistee County (Connor 1973). During the 1980’s and early 1990’s, environmental impact studies related to testing of an extremely low frequency communications system by the U.S. Navy were conducted in the UP (Scott 1994, 1996; Strickler et al. 1996; Strickler & Scriber 1994). This resulted in numerous specimens from Dickinson and Iron Counties made by Roland Fischer and graduate students Karen Strickler and Virginia Scott. Records from Ingham and Washtenaw Counties are numerous due to the presence of MSU and the University of Michigan in these two counties, respectively. The high relative abundance of records from Cheboygan County, many of which are more than a century old, are due in part to the University of Michigan Biological Station located at Pellston. The station sits on the south end of Douglas Lake and many labels from the station list this as the locality. Hundreds of these records are housed in institutions outside of Michigan, including the American Museum of Natural History and Ohio State University. Other frequently collected localities include Rose Lake Wildlife Area in Clinton and Shiawassee Counties in central Michigan near MSU and the Yankee Springs Recreation Area in Barry County in the southwest. Most of the remaining counties in the state have been less frequently sampled for bees historically.

FIGURE 1. Map of Michigan showing counties colored by their known bee species richness.

Collections that are more recent come from a variety of sources. Mark O’Brien (UMMZ) has recently published studies on the distribution and nesting biology of megachilid bees in Michigan (O’Brien 2007; O’Brien et al. 2013; O’Brien & Craves 2008). Unpublished bee surveys by Ann Fraser and students from Kalamazoo
College in Kalamazoo and Barry Counties provide some valuable records (Arnosky 2009), including species not previously recorded for the state. Recent studies focused on documenting bees, primarily crop pollinators, in highbush blueberry fields in western Michigan have provided numerous records from Van Buren, Ottawa, and Allegan Counties (Gibbs et al. 2016; Tuell et al. 2008, 2009; Tuell & Isaacs 2009). Tuell et al. (2009) reported 166 species present in blueberry fields, including some new state records such as *Andrena confederata* Viereck and *A. neonana* Viereck. More recent sampling as part of the Integrated Crop Pollination Project (http://ProjectICP.org) in apple, blueberry, and cherry farms from the southwest region and north to Oceana and Leelanau Counties has produced several thousand new specimen records of crop pollinators (Gibbs et al. 2016, 2017). A survey of potato fields provided additional records from Montcalm County (Buchanan et al. 2017). The Great Lakes Bioenergy Research Center has funded pollinator research in Michigan biofuel crops (corn, switchgrass and prairie) including recent sampling of a number of additional counties across the Lower Peninsula (Bennett et al. 2014; Bennett & Isaacs 2014; Gardiner et al. 2010). Several recent and ongoing projects at MSU that extend earlier research on blueberries, old fields (Carson et al. 2016), prairie restoration, biofuels, and opportunistic collecting by the lead author, primarily near MSU, have contributed additional material for this study. These collection efforts have produced several-thousand bee specimens that have been summarized in this checklist.

![Figure 2](http://www.nmnh.si.edu/). **FIGURE 2.** Historical collection labels for type material of bees from Michigan at the National Museum of Natural History, Smithsonian Institution. A) Robert Dreisbach label. B) Robert and Kathryn Dreisbach label. C) Roland Fischer label. Photographs provided with the permission of the National Museum of Natural History, Smithsonian Institution, 10th and Constitution Ave. N.W., Washington, DC 20560-0193. (http://www.nmnh.si.edu/).

**Methods**

We also examined specimens from regional collections, particularly the A. J. Cook Arthropod Research Collection at Michigan State University, East Lansing, Michigan (MSUC), the University of Michigan Museum of Zoology, Ann Arbor, Michigan (UMMZ), and the insect collection at Kalamazoo College, Kalamazoo, Michigan (KCIC). Some type material at the Illinois Natural History Survey (INHS), NMNH, and California Academy of Sciences (CAS) were examined to clarify species concepts. MSUC collections currently housed in research labs are indicated using the abbreviation of the principal investigator (RI: Rufus Isaacs, DL: Doug Landis). These include the majority of specimens from recent collections in blueberry fields, biofuel plantings, and at pollinator habitat restoration sites. A number of interesting records from unpublished studies were available from research conducted at the Southwest Michigan Research and Extension Center (SWMREC) in Berrien County and Clarksville Research Center (CRC) in Ionia County. Many bumble bee records from Michigan were digitized as part of another study (Cameron et al. 2011) and 2,131 MSUC records were shared for six species by S. Cameron. Specimen data in the Digital Bee Collections Network captured using Arthropod Easy Capture (ACE) Software (2013; Schuh et al. 2010) resulted in several hundred additional records that are deposited in the American Museum of Natural History (AMNH, 562 records), Cornell University Insect Collection (CUIC, 96), Bohart Museum of Entomology, University of California, Davis (56), University of Massachusetts, Amherst (21), Connecticut Agricultural Experimental Station (15); and other collections combined for a total of 21 records: Field Museum of Natural History, Newark Museum, New York State Museum, Rutgers University, University of Connecticut at Storrs, University of New Hampshire and the NMNH. Records from the AMNH and other digitized collections also enhance our knowledge of broader distribution patterns of the regional bee fauna. Additional database records were gathered from the Illinois Natural History Survey (INHS, 497, of which 389 are Bombus), Snow Entomological Museum Collection, University of Kansas (SEMC, 518), C. A. Triplehorn Insect Collection, Ohio State University (OSUC, 528), USGS Patuxent Wildlife Research Center, Bee Monitory and Inventory Laboratory, located in Beltsville, Maryland (PWRC, 1,385; most ultimately to be deposited at the NMNH), University of Colorado (UCMC, 4) and USDA-ARS Bee Biology and Systematics Laboratory (BBSL, 5,466, of which 5,365 were Bombus see Cameron et al. 2011). These records were filtered to remove species that have undergone recent taxonomic changes making their identity uncertain. The type database maintained at the NMNH was also used for information related to type specimens originating from Michigan. These have been photographed and images are available online at http://collections.nmnh.si.edu/search/ento/. Hadel Go (AMNH) shared images of holotype specimens to help clarify taxonomic limits of some taxa. The Barcode of Life Data Systems (Ratnasingham & Hebert 2007) were checked for additional Michigan records of bees included in molecular diagnostic studies, most vouchers of which are housed at the Packer Collection at York University (PCYU). Recent collections by JG are deposited at MSUC: RI or the J. B. Wallis/R. E. Roughley Museum of Entomology (JBWM). A call for additional bee records was made to the Michigan Entomological Society (Gibbs 2015), resulting in a small number of additional county records, including Houghton County specimens donated to MSUC by Dana Richter (Michigan Technological University) and several county records from the private collection of Mark VanderWerp (MVWC). Additional records for Houghton County came as part of pilot study using citizen scientists, specimens are deposited at JBWM. Mike Arduser provided additional records and notes on Michigan bees from his personal collection. Thomas Wood (MSU) provided several valuable records from 2017 collections, which are currently deposited in his personal collection (TJWC).

Species names from earlier studies were updated to reflect current taxonomic and nomenclatural understanding when necessary. As examples, Heriades is treated as feminine and both Melissodes and Coelioxys are considered masculine (ICZN 1999: art. 30.1.2 and 30.1.4.4), although in the literature Heriades has often been treated as masculine and Melissodes and Coelioxys nearly always as feminine (LaBerge 1961; Rocha Filho & Packer 2016). However, prevailing usage is not considered relevant with respect to gender agreement in this situation by the International Code of Zoological Nomenclature, so we are compelled to adopt the correct gender as verified by Commissioner D. Yanega (personal communication). The spelling of changeable specific epithets for species in those genera therefore differs from most previous works. Subgeneric categories for Bombus and Lasioglossum follow recent studies of these genera (Gibbs 2016; Gibbs et al. 2013; Williams et al. 2008). Family-group taxonomy follows Michener (2007) and the World Bee Checklist (http://itis.gov/) from 2007, with some subsequent updates following Scott et al. (2011) and Ascher & Pickering (2017). Our list is organized
alphabetically by family, subfamily, tribe, genus, subgenus, and species. The species description follows the format of Rightmyer (2008). Specimens were loaned from NMNH, INHS, UCMC, Oregon State Arthropod Collection (OSAC), Rob Jean personal collection (RJPC), and CAS.

Since many specimens from Michigan have no locality information below the level of county, including those obtained by its most prolific historical collector, we have organized our list by county, compiling a list of all bee species occurrences for each of Michigan’s eighty-three counties. We included records based on our critical review of the literature as well as specimens examined from historical and recent collections. In all cases, we attempted to verify each record by examining specimens ourselves. Particular attention was paid to species of uncertain taxonomic status, known to have been misidentified by historical or recent specialists, or with a known range that made occurrence in Michigan implausible. We document separately from our main list those species likely to occur in, but not yet recorded from, Michigan based on known ranges which make occurrence in Michigan probable, e.g., occurrence in both southern Ontario and any combination of Midwestern states to the south or west of Michigan (Appendix 1). We also exclude from the main list those species that have been recorded in the literature but for which the current evidence does not support their occurrence (Appendix 2). We provide additional notes and details for a subset of bee species that are new state records, species of conservation concern, valid species and their junior synonyms where the name-bearing type is from Michigan (Supplementary table 1), and where recent taxonomic or nomenclatural confusion necessitates some additional discussion or clarification. Label information is provided in a standard format for consistency. Host plant records are updated to current taxonomic understanding based on the USDA plants list (plants.usda.gov). We provide some citations related to biological information for the species in our checklist when available. This is not intended as an exhaustive review of the biological literature, but is intended to provide readers with a starting point for more detailed study and stronger basis for analyses using biological data.

Results and discussion

Analysis of a wide range of sources and specimens resulted in 464 valid bee species and 1 putative undescribed species occurring in Michigan (Supplementary Table 2). This total is substantially more than the 398 species recorded in Mitchell’s (1960, 1962) distributional tables, but the totals are not directly comparable due to the differing concepts of species in his era. The substantial increase in species richness in our final list highlights both the contributions of subsequent authors and the importance of reviewing unpublished historical collections and the ongoing discovery of state-level bee records even in a relatively well-sampled region. Despite this, most counties in Michigan remain undersampled (Fig. 1), and the continuing discovery of new state records and of species and morphospecies new to science suggests that future additions can be expected, including native bees and additional exotic introductions (Gibbs et al. 2017; Martins et al. 2017). However, evidence for 13 species in our species list is poor, and some taxa such as various Nomada in the ruficornis species group require taxonomic revision that may change the total species documented here.

Museum collections housed substantial undocumented diversity. New state records, including Anthidium tenuiflorae Cockerell, Ashmeadiella buconis (Say), Coelioxys immaculatus (Cockerell), Megachile pusilla Pérez (as concinna), M. dakotensis Mitchell, and M. petulans Cresson, were found already identified at MSUC. Re-examination of specimens confirmed these unpublished records. New records for other species such as Lasioglossum fedorense (Crawford) were found among undetermined material (UMMZ in this case).

Several new species records for Michigan, including Anthidiellum notatum (Latreille), Lasioglossum oenotherae (Stevens), Megachile apicalis Spinola, M. mucida Cresson, Nomada sphaerogaster Cockerell, and Pseudopanurgus compositarum (Robertson), were first discovered based on collections made by JG. These were mostly found in Ingham County, near MSU, which is the best-documented county in the state highlighting that new species may be detected with greater sampling even in areas with previous extensive collection effort. The exotic species Osmia taurus Smith is newly recorded for the state, reflecting general expansion of this species (e.g., to New York City, JSA unpublished). Until recently, O. taurus was best known from Mid-Atlantic states, where it was probably introduced when the similar exotic species O. cornifrons (Radoszkowski) was intentionally established by USDA scientists (Batra 1979). The Michigan specimen was collected with a long series of the closely related O. cornifrons, highlighting the risk of missing closely related species if material is not examined by expert taxonomists.
Our total of verified bee species is comparable to those for other states in the northern Midwest and Northeastern US (Fig. 3), such as Massachusetts (377; Goldstein & Ascher, 2016); Wisconsin (391 Wolf & Ascher 2009; updated by Scott et al. 2011), Pennsylvania (371; Donovan & vanEngelsdorp 2010), Connecticut (349; Zarrillo et al. 2016), and New York (447; Ascher et al. 2014). Indiana, directly to the south of western Michigan has a reported 420 bee species (Jean 2010). No published estimate exists for Ohio, to the south of eastern Michigan other than the records available from Mitchell (1960, 1962). JSA’s online compilation (Ascher & Pickering 2017) records only 295 species, suggesting that the state remains undersampled. The province of Ontario to the north and east of Michigan likely has a similar number of bee species; certainly exceeding 400 according to Packer et al. (2007) and C. Sheffield (pers. comm.), although Ascher & Pickering (2017) record only 364 as verified. The relatively high number for Michigan is evidently a reflection of the existing collection effort in a range of habitat types and locations, combined with its unique biogeographical context. The contribution of species that are characteristic of the Great Plains, the northeastern United States, and the boreal region is unique among states.

The number of species recorded from each of Michigans’ counties varies considerably (Fig. 1). Ingham and Van Buren Counties both have 234 species. The former is the home of MSU and, until recently, the lead author, whereas the latter has been thoroughly sampled in recent years by RI’s lab group. In contrast, Luce County in the UP has the lowest total of a mere 30 bee species currently known. Such low species counts certainly reflect undersampling rather than true bee species richness. By contrast, five counties in the UP that received considerable sampling effort in the early 1990’s have more than 3 times that amount, including Dickinson County with 130 species. Counties with any level of systematic sampling, even if for a short time, typically have over 100 verified species records, but 57 of Michigan’s 83 counties do not reach that amount. Ingham County is largely unremarkable in terms of geographical location or landscape diversity so there is every reason to suspect that other counties will also have more than 200 species present. Livingston County, immediately adjacent to Ingham, also has over 200 species, but only 140 species in common with Ingham County, suggesting that true species richness for both counties, and by extension those surrounding them, could easily exceed 300 species. Such a high number is plausible as it is comparable to that found in Robertson’s (1929) exhaustive surveys of Carlinville, Illinois, and the 308 species reported from Tompkins County in central New York State (JSA, unpublished; most records are supported by specimens in the AEC database).

FIGURE 3. Relative bee richness of states in the Northeast and Midwestern United States with recently published records of species numbers. See text for sources.
The composition of the bee community is fairly typical for the region (Giles & Ascher 2006; Goldstein & Ascher 2016). Species richness of families are ordered from largest to smallest: Halictidae (123), Apidae (117), Andrenidae (102), Megachilidae (87), Colletidae (35) and Melittidae (one). A number of bee genera that are known from neighbouring states are noticeably absent from Michigan, including Melitoma, Ptilothrix (Apidae: Emphorini), Melecta, Xeromelecta (Apidae: Melectini), and Melitta (Melittidae).

Our analysis included documentation of the traits of the bee community, which can be useful for future ecological studies. Approximately 60% of species are solitary (including communal species and incipiently social members of the Xylocopinae), more than 22% are cleptoparasites or social parasites and nearly 18% are known or inferred to be eusocial. Due to taxonomic difficulties, predominantly in the genus Nomada, among which undescribed species exist even in well-studied areas of eastern North America (see Goldstein & Ascher, 2016) and a lack of direct observations of social behavior in most halictid bees, these percentages are likely to change. Lasioglossum display a wide diversity of social behaviors, but the social status of most species has not been studied in sufficient detail, if at all, so must be inferred based on phylogenetic patterns available for exemplar taxa (Danforth et al. 2003; Gibbs et al. 2012b). A number of reversals to solitary behavior have been reported in Lasioglossum (Danforth et al. 2003), so inferences of social behavior may prove to be incorrect in a minority of cases as additional biological data and improved phylogenetic reconstruction become available. The majority of nest-building species (70%) dig underground burrows. The remainder nest in pre-existing tunnels (12%), stems (8%), wood (2%), abandoned snail shells (Osmia conjuncta Cresson), or construct hives in larger cavities (5%) or on exterior surfaces or rocks or plant stems (three species). Nesting substrates of Osmia are sufficiently diverse (Cane et al. 2007) that the nesting habits for eight Michigan species are uncertain because of a lack of published information. Cavity and stem nesting species often bring foreign materials into the nest to construct cells. These include cut leaf pieces or masticated leaf pulp (43 species), plant resins (seven species), plant hairs (four species) or mud (four species). Some species use multiple materials, such as Osmia bucephala Cresson, which mixes wood fibers with leaf pulp in cell construction (Krombein 1967).

There has been widespread concern about the status and trends of wild bee populations (Cane & Tepedino 2001; Goulson et al. 2008), and reports of global declines despite awareness that for many regions of the world there is insufficient taxonomic and distributional information to accurately and comprehensively assess bee faunas. Berenbaum et al. (2007) and Gonzalez et al. (2013) highlighted the need for more thorough monitoring across the United States, but recognized that such studies are hampered by insufficient taxonomic and distributional resources for bees. Bartomeus et al. (2013a) examined historical changes of bees in the Northeast including a large proportion of species found in Michigan. Fifty-one of these were found to be significantly declining in relative abundance, 78 were stable, and 56 were increasing in relative abundance. Although statistical evaluation was possible for the majority of regional bee species, 166 species included in that study were insufficiently represented in historical databases at the time to assess the temporal trends in populations. The poorly represented species likely include many that are genuinely rare and deserving of highest priority for conservation action, but others were underrepresented due to difficulties in identification. The quality and completeness of our checklist and the ability to assess conservation status comprehensively would be much improved if recent revisions were available for certain taxa, especially Nomada and Sphecodes, genera for which existing species delimitations and identification criteria are unreliable. For many Nomada and some species in other genera, identifications of material other than the primary type are speculative, rendering records for these species in Michigan and other states open to doubt. Based on our examination of some primary types, we elevate two species of Nomada to species status, however in the absence of a revision the range and status of these species remains uncertain. A new species of Triepeolus is described below. In addition, it was necessary to clarify the taxonomy of Andrena (Cnemidandrena) to address the status of nominal species not treated in the revision of this subgenus (Donovan 1977) but subsequently placed there. Even recent revisions may be incomplete, leaving room for additional study. For example, despite integrative taxonomic revisions of Lasioglossum (Dialictus) for Canada (adjoining Michigan) and for Eastern North America (Gibbs 2010b, 2011) challenges remain for fully resolving the L. (Dialictus) in this region, due to uncertainty about some sex associations and about species limits in the L. viridatum species-group.

This bee species checklist and the information on host associations and nesting provided here can support the development of bee conservation strategies. Efforts to expand the area of pollinator plantings that provide foraging and nesting resources for bees have focused on diverse seed mixes assuming they will support the greatest diversity of bees (Williams et al. 2015), and there has been significant investment to establish pollinator habitat in Michigan.
by federal, state, and private organizations. There is also great interest in developing sustainable practices for crop pollination, and this may include conservation of wild bees to provide pollination services (Garibaldi et al. 2014). Although honey bees are the primary strategy used for crop pollination in large, commercial fields (Gibbs et al. 2016), wild bees can make important contributions (Isaacs & Kirk 2010). Highlighting their role in food production may also enhance support for broader adoption of practices to conserve bees in other landscapes.

Revitalized integrative taxonomic research of bees, digitization of historical records, mobilization of citizen scientist data including images, and improved understanding of natural history are needed to understand bee diversity and promote bee conservation. Lacking advances in each of these four areas of study, it will be challenging to understand what species are present, when and how they have been impacted by human activity or how to predict their occurrence or habitat requirements across the landscape. Previous studies taking advantage of extensive databasing efforts in the northeastern US have documented a diversity of historical trends including declines, stability and increasing abundance of exotics (Bartomeus et al. 2013a), changes in phenology (Bartomeus et al. 2011, 2013b) and range extensions (Zarrillo et al. 2016). Although our data are not fully digitized, it is evident that some changes to the Michigan bee fauna have occurred over time. In spite of extensive sampling, no contemporary collections of Bombus affinis Cresson have been found, supporting its well-documented decline (Cameron et al. 2011). In addition, the large distinctive bee Dieumonia heteropoda heteropoda has only recently been found in Michigan at the limits of its range (Gibbs et al. 2014), suggesting a possible range extension. Most recently, a collection of Osmia cornifrons (Radoszkowski) was made in mid-February 2017, which is evidence of a dramatically earlier spring emergence for bees in the region. Additional sampling efforts are also needed to fill gaps in our basic understanding of bee distribution. Given the paucity of records for many counties in Michigan, despite a history of active collectors, renewed effort to sample areas of the state and identify the collections are needed. The same is true for other areas of the country and globally.

With this study, we provide an updated and extensive resource for those interested in bees collected in Michigan or the Midwest region, whether for understanding which species are present or their ecology, conservation, or contributions to pollination of flowering wild and crop plants. Identification of 465 species of bees from Michigan is more than the richness reported from nearby states, suggesting a high proportion of the species pool has been reported here. However, with new state records becoming known as recently as 2017, continued sampling will undoubtedly result in additional discoveries and improved clarity of bee species distribution. We hope this report will stimulate additional interest in wild bees and their ecology across Michigan landscapes.

Bees of Michigan annotated checklist

ANDRENIDAE

Andreninae

Andrenini

Genus *Andrena* Fabricius


**Behavior:** *Andrena* are predominately solitary, although some species will form communal nests (Osgood 1989). Species are often narrowly polylectic or mesolectic, but many species are oligolectic, specializing on a particular floral host taxon (Linsley 1958; Robertson 1926).

**Subgenus Andrena Fabricius s. s.**

**Revision:** LaBerge 1980.
*Andrena (Andrena) carolina* Viereck 1909

**County records:** Alger, Allegan, Bay, Clare, Crawford, Dickinson, Jackson, Lake, Macomb, Mason, Midland, Montmorency, Muskegon, Oscoda, Ottawa, Presque Isle, Roscommon, Schoolcraft, Van Buren.

**Notes.** Specialist on *Vaccinium* (Ericaceae). *Andrena carolina* is abundant in blueberry fields and an important native pollinator of the crop.

*Andrena (Andrena) clarkella* (Kirby 1802)

**County records:** Clare, Crawford, Dickinson, Lake, Marquette, Ottawa, Van Buren.

**Notes.** Holarctic. Specialist on *Salix* (Salicaceae).

*Andrena (Andrena) frigida* Smith 1853

**County records:** Allegan, Antrim, Clare, Clinton, Emmet, Genesee, Grand Traverse, Ingham, Isabella, Luce, Marquette, Midland, Missaukee, Newaygo, Oakland, Saginaw, Van Buren, Wayne.

**Notes.** Specialist on *Salix* (Salicaceae). Nests in California were briefly described by MacSwain (1945, as *rhodotricha* Linsley).

*Andrena (Andrena) mandibularis* Robertson 1892

**County records:** Allegan, Berrien, Livingston, Oakland, Van Buren, Washtenaw, Wayne.

**Notes.** Polylectic.

*Andrena (Andrena) milwaukeensis* Graenicher 1903

**County records:** Alger, Berrien, Houghton, Ingham, Leelanau, Mackinac, Marquette, Oceana, Ottawa.

*Andrena (Andrena) rufosignata* Cockerell 1902

**County records:** Antrim, Arenac, Benzie, Chippewa, Dickinson, Emmet, Grand Traverse, Isabella, Kalkaska, Keweenaw, Lake, Leelanau, Mackinac, Manistee, Montmorency, Oceana, Schoolcraft, Van Buren.

*Andrena (Andrena) thaspii* Graenicher 1903

**County records:** Alger, Antrim, Baraga, Benzie, Cheboygan, Chippewa, Dickinson, Emmet, Gratiot, Ingham, Iron, Lenawee, Macomb, Manistee, Marquette, Midland, Ontonagon, Van Buren, Washtenaw.

*Andrena (Andrena) tridens* Robertson 1902

**County records:** Ingham, Van Buren, Washtenaw.

**Notes.** Polylectic, but may prefer *Ribes* (Grossulariaceae) (LaBerge 1980), making *A. tridens* a potentially beneficial wild pollinator of currants.
Subgenus *Callandrena* Cockerell s. l.

**Revision:** LaBerge (1967)

**Note.** *Callandrena* is apparently polyphyletic with none of the Michigan species belonging to *A. (Callandrena s. s.)* (Larkin *et al.* 2006).

*Andrena (Callandrena s. l.) aliciae* Robertson 1891 (*aliciae* group)

**County records:** Berrien, Ionia, Kalamazoo, Livingston, Oakland, Van Buren.

**Notes.** Asteraceae specialist, with preference for *Helianthus* (Asteraceae) (LaBerge 1967).

*Andrena (Callandrena s. l.) asteris* Robertson 1891 (*simplex* group)

**County records:** Bay, Crawford, Dickinson, Gladwin, Grand Traverse, Gratiot, Huron, Ingham, Isabella, Kalamazoo, Kent, Mackinac, Manistee, Mecosta, Midland, Missaukee, Montcalm, Montmorency, Otsego, Roscommon, Saginaw, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Specialist on *Symphyotrichum* and *Solidago* (Asteraceae) (LaBerge 1967).

*Andrena (Callandrena s. l.) gardineri* Cockerell 1906 (*gardineri* group) (New state record) (Fig. 4)

**County records:** Van Buren.

**Notes.** *Andrena gardineri* is a specialist on *Packera* (Asteraceae: Senecioneae) (Larkin *et al.* 2008). A series of *A. gardineri* was collected from *Packera aurea* (L.) Á. Löve & D. Löve (originally identified as *Senecio jacobaea* L.), found growing at the edge of a ditch adjacent to a commercial highbush blueberry farm. Subsequently, a single specimen collected in 2008 was identified from KCIC. In 2016, collections were also made from *Packera aurea* in two additional sites in Van Buren County, and the bee was found almost immediately in each location, suggesting it might be quite common where the host plant is found.

**Material examined.** Kalamazoo Co.: Sand Creek Preserve, 10 May 2008, A.M. Fraser (1 ♀ KCIC); Van Buren Co.: Almena, 4.5 km NNE, 20 May 2014, *Packera aurea*, A. Adamczyk (2 ♀, 1 ♂ MSUC: RI); Almena, 4.5 km NNE, 21 May 2014, *P. aurea*, J. Gibbs (1 ♀ JBWM); Almena, 4.5 km NNE, 23 May 2014, *P. aurea*, J. Gibbs (2 ♀ JBWM); Almena, 4.5 km NNE, 18 May 2016, *P. aurea*, K. Odanaka (1 ♂ MSUC: RI); Almena, 3 km NW, 19 May 2016, *P. aurea*, J. Gibbs (1 ♀ JBWM); Gobles, 3 km NW, 19 May 2016, *P. aurea*, J. Gibbs (4 ♀ JBWM).

**FIGURE 4.** *Andrena (Callandrena s.l.) gardineri* Cockerell female on *Packera*. Photographed by JG in Van Buren County, Michigan.
**Andrena (Callandrena s. l.) helianthi Robertson 1891 (helianthi group)**

**County records:** Dickinson, Ingham, Ionia, Jackson, Kalamazoo, Kent, Lenawee, Shiawassee, Van Buren, Washtenaw.

**Notes.** Specialist on *Helianthus* (Asteraceae) (LaBerge 1967).

**Andrena (Callandrena s. l.) krigiana Robertson 1901 (krigiana group)**

**County records:** Livingston, Midland.

**Notes.** Specialist on *Krigia* (Asteraceae) (LaBerge 1967).

**Andrena (Callandrena s. l.) placata Mitchell 1960 (simplex group)**

**County records:** Allegan, Bay, Cass, Cheboygan, Clinton, Dickinson, Ingham, Ionia, Jackson, Kalamazoo, Kalkaska, Leelanau, Livingston, Midland, Monroe, Oakland, Oceana, Ogemaw, Ottawa, Van Buren, Washtenaw.

**Notes.** Specialist on *Solidago* and *Symphyotrichum* (Asteraceae) (LaBerge 1967).

**Andrena (Callandrena s. l.) rudbeckiae Robertson 1891 (melliventris group)**

**County records:** Allegan, Berrien, Cass, Ingham, Ionia, Kalamazoo, Livingston, Ottawa, Saginaw, Van Buren.

**Notes.** Specialist on *Rudbeckia* and *Ratibida* (Asteraceae) (LaBerge 1967). Nesting biology and foraging described from Texas by Neff & Simpson (1997).

**Andrena (Callandrena s. l.) simplex Smith 1853 (simplex group)**

**County records:** Allegan, Bay, Huron, Ingham, Isabella, Mecosta, Midland, Muskegon, Ogemaw, Otsego, Roscommon, Shiawassee, Washtenaw.

**Notes.** Specialist on *Solidago* and *Symphyotrichum* (Asteraceae) (LaBerge 1967).

**Subgenus Cnemidandrena Hedicke**

**Revision:** Donovan (1977).

**Andrena (Cnemidandrena) canadensis Dalla Torre 1896 (nubecula group)**

**County records:** Alger, Bay, Benzie, Cass, Cheboygan, Crawford, Dickinson, Emmet, Gladwin, Gratiot, Ingham, Ionia, Iron, Kalkaska, Keweenaw, Lake, Lapeer, Livingston, Mackinac, Manistee, Marquette, Mecosta, Midland, Montcalm, Osceola, Oscoda, Roscommon, Saginaw, Schoolcraft, Van Buren, Wexford.

**Notes.** Specialist on *Solidago* and *Symphyotrichum* (Asteraceae).

**Andrena (Cnemidandrena) chromotricha Cockerell 1899 (chromotricha group)**

**County records:** Midland, Saginaw.
Andrena (Cnemidandrena) hirticincta Provancher 1888 (hirticincta group)

County records: Alger, Allegan, Bay, Benzie, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Delta, Dickinson, Emmet, Gladwin, Gogebic, Gratiot, Huron, Ingham, Iron, Isabella, Jackson, Kalamazoo, Keweenaw, Leelanau, Livingston, Luce, Manistee, Marquette, Menominee, Midland, Missaukee, Montcalm, Montmorency, Oakland, Otsego, Ottawa, Saginaw, Schoolcraft, Van Buren, Washtenaw, Wayne, Wexford.

Notes. Specialist on Solidago and Symphyotrichum (Asteraceae).

Andrena (Cnemidandrena) nubecula Smith 1853 (nubecula group)

County records: Calhoun, Cass, Clinton, Dickinson, Ingham, Jackson, Kalamazoo, Lapeer, Lenawee, Livingston, Marquette, Midland, Newaygo, Van Buren, Washtenaw.

Notes. Specialist on Solidago (Asteraceae).

Andrena (Cnemidandrena) parnassiae Cockerell 1902 (scutellinitens group) (New state record)
(Fig. 5A)

County records: Jackson.

Notes. Andrena parnassiae has been overlooked and is therefore of particular taxonomic and conservation interest. The type female (NMNH) was collected by S. Graenicher in Milwaukee, Wisconsin on 14 September (perhaps 1901). Mitchell (1960) also recorded it from Michigan and Vermont. Andrena parnassiae was included in subgenus Leucandrena (Hurd 1979; Lanham 1949; Mitchell 1960) until LaBerge (1986) removed it to Cnemidandrena, so it was not included in Donovan's (1977) revision of the latter subgenus. The record below was collected as part of a prairie-fen pollinator study (Fiedler et al. 2012) and subsequently identified by JG. The specimen was originally identified as A. runcinatae Cockerell, another poorly known species, by M. Arduser (see below; Gusenleitner et al. 2005). Andrena parnassiae can be distinguished from other members of the ‘scutellinitens’ group: clypeus with dark setae; labral process much broader than long, without median emargination; head distinctly wider than long (length/width = 0.75), following measurements of Donovan (1977); and mesoscutellum dull due to microsculpture.


Andrena (Cnemidandrena) peckhami Cockerell 1902 (chromotricha group) (New state record)
(Fig. 5B)

County records: Iron.

Notes. The type female (NMNH) of A. peckhami was described in the same publication as A. parnassiae, and was also collected in Milwaukee, Wisconsin, but on 24 July (likely 1901). This species resembles A. parnassiae but can be recognized by the smoother more sparsely punctate medial area of the clypeus and convergent eyes above. It should be noted that the convergent eyes of A. peckhami and A. chromotricha (above) is subtle and requires careful examination. A single female was compared to a Minnesota specimen determined by Mitchell (MSUC) and images of the type (NMNH).


**Andrena (Cnemidandrena) robervalensis** Mitchell 1960 (scutellinitens group)  
(Fig. 5C)

= **Andrena (Cnemidandrena) robervalensis** Mitchell 1960: 175.

**County records:** Gladwin, Isabella.

**Notes.** *Andrena robervalensis* was tentatively treated as a junior synonym of *A. runcinatae* Cockerell 1906 by Gusenleitner et al. (2005), based on JSA's examination of a paratype of *A. runcinatae* at the AMNH. However, Cockerell (1906), in his original description of *A. runcinatae*, describes the clypeus as “shining, with sparse strong punctures, the anterior middle smooth, but no median ridge”. The holotype female of *A. runcinatae*, from Florissant, Colorado in Teller County “a little over 8000 feet” collected by S. A. Rohwer on 22 July 1906 and deposited at the California Academy of Sciences, matches this description and also has a highly polished mesoscutellum, similar to Donovan's (1977) description of *A. specularia* Donovan. Donovan (1977) did not treat *A. runcinatae* in his revision of the subgenus *Cnemidandrena*. Hurd (1979) lists *A. runcinatae* in the subgenus *Simandrena*. The type of *A. runcinatae* was compared directly to a paratype of *A. robervalensis* (MSUC) and images of the holotype female (NMNH). *Andrena robervalensis* is noticeably duller than *A. runcinatae* on the clypeus (Fig. 5C, D) and mesoscutellum. A more thorough reexamination of Donovan’s entire ‘scutellinitens’ group in North America is required, i.e., the western species *A. scutellinitens* Viereck and *A. specularia*, the previously associated eastern species *A. robervalensis*, and the newly associated *A. runcinatae* and *A. parnassiae*.

**Material examined.** **Gladwin Co.:** T19N R2E Sec. 2, 4 Sep. 1959, R.L. Fischer (1 ♀ MSUC); **Isabella Co.:** (no locality), 9 Sep. 1950, R.R. Dreisbach (1 ♀ paratype MSUC).

**Subgenus Conandrena Viereck**

**Revision:** LaBerge 1986.

**Andrena (Conandrena) bradleyi** Viereck 1907

**County records:** Allegan, Clare, Grand Traverse, Kent, Livingston, Mackinac, Midland, Missaukee, Montcalm, Montmorency, Newaygo, Oakland, Schoolcraft.

**Notes.** Specialist on *Vaccinium* (Ericaceae) and a wild pollinator of highbush blueberry (LaBerge 1985; Gibbs et al. 2017).

**Subgenus Euandrena Hedieck**

**Revisions:** LaBerge & Ribble (1975), LaBerge (1977).

**Andrena (Euandrena) algida** Smith 1853

**County records:** Allegan, Clare, Gratiot, Iosco, Isabella, Lake, Midland, Missaukee, Montcalm, Montmorency, Newaygo, Oakland, Schoolcraft.

**Notes.** Polylectic, but may prefer *Salix* (Salicaceae).

**Andrena (Euandrena) geranii** Robertson 1891

**County records:** Allegan, Berrien, Clinton, Dickinson, Grand Traverse, Ingham, Isabella, Lapeer, Leelanau, Mackinac, Monroe, Osceola, Saginaw, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Specialist on *Hydrophyllum* (Hydrophyllaceae).

*Andrena (Euandrena) nigrihirta* (Ashmead 1890)

* = *Andrena (Thysandrena) crenata* Mitchell, 1960: 221 (Michigan holotype).


**County records:** Alcona, Allegan, Arenac, Baraga, Cheboygan, Dickinson, Eaton, Emmet, Ingham, Iron, Isabella, Jackson, Keweenaw, Mackinac, Midland, Newaygo, Ontonagon, Ottawa, Presque Isle, Schoolcraft.

**Notes.** Apparently polylectic (LaBerge & Ribble 1975). Mitchell (1960) lists the *crenata* holotype in the Dreisbach collection, the name-bearing types of which were transferred to the NMNH. The holotype is currently listed in the NCSU type database.

*Andrena (Euandrena) polemonii* Robertson 1891

**County records:** None.

**Notes.** This oligolectic species is known from neighbouring states. It is included based on Mitchell’s (1960) authority and records from the Chicago area within 100 km west of the southwest corner of Michigan (LaBerge
1977; Pearson 1933). It visits *Polemonium reptens* L., which is restricted to the southern corners of Michigan, but also *Geranium maculatum* L. and *Ranunculus hispidus* Michx., which are more widespread in the LP (Robertson 1929; Voss & Reznicek 2012).

**Subgenus Gonandrena Viereck**

Revision: LaBerge & Ribble (1972).

*Andrena (Gonandrena) fragilis* Smith 1853

**County records:** Alpena, Arenac, Barry, Bay, Berrien, Calhoun, Cheboygan, Chippewa, Clare, Clinton, Gratiot, Huron, Ingham, Isabella, Kent, Lake, Lapeer, Lenawee, Livingston, Macomb, Manistee, Midland, Missaukee, Montmorency, Oceana, Osceola, Presque Isle, Saginaw, Shiawassee, St. Joseph, Van Buren, Washtenaw.

**Notes.** Specialist on *Cornus* (Cornaceae) (LaBerge & Ribble 1972).

*Andrena (Gonandrena) integra* Smith 1853

**County records:** Allegan, Arenac, Bay, Calhoun, Clinton, Dickinson, Eaton, Gratiot, Hillsdale, Ingham, Ionia, Isabella, Jackson, Lapeer, Lenawee, Livingston, Midland, Saginaw, Sanilac, St. Clair, St. Joseph, Van Buren.

**Notes.** A specialist on *Cornus* (Cornaceae) (LaBerge & Ribble 1972), although *A. integra* and *A. persimulata* Viereck, below, were not included in a recent review of specialist bees of the Northeastern United States (Fowler 2016).

*Andrena (Gonandrena) persimulata* Viereck 1917

**County records:** Antrim, Berrien, Calhoun, Cheboygan, Chippewa, Clare, Delta, Dickinson, Livingston, Mackinac, Mason, Midland, Oakland, Osceola, Oscoda, St. Joseph, Tuscola, Van Buren.

**Notes.** Specialist on *Cornus* (Cornaceae) (LaBerge & Ribble 1972).

*Andrena (Gonandrena) platyparia* Robertson 1895

= *Andrena (Gonandrena) monroensis* Mitchell, 1960: 233 (Michigan holotype; Fig. 6A).


**County records:** Allegan, Antrim, Calhoun, Clinton, Grand Traverse, Ingham, Kalamazoo, Kent, Lapeer, Lenawee, Livingston, Macomb, Mason, Midland, Monroe, Oakland, Osceola, St. Joseph, Van Buren.

**Notes.** A relatively common specialist on *Cornus* (Cornaceae) (LaBerge & Ribble 1972).

**Subgenus Holandrena Pérez**

Revision: LaBerge (1986).

*Andrena (Holandrena) cressonii cressonii* Robertson 1891

**County records:** Allegan, Alpena, Barry, Berrien, Calhoun, Clare, Clinton, Eaton, Ingham, Ionia, Iosco, Isabella,
Jackson, Kalamazoo, Kalkaska, Livingston, Macomb, Manistee, Mecosta, Midland, Missaukee, Newaygo, Oakland, Oceana, Ottawa, Saginaw, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.


Subgenus *Iomelissa* Robertson


*Andrena (Iomelissa) violae* Robertson 1891

County records: Barry, Ingham, Jackson, Kalamazoo, St. Joseph, Van Buren, Washtenaw.

Notes. Specialist on *Viola* (Violaceae). Brief description of nest observed in New Jersey by Smith (1901).

Subgenus *Larandrena* LaBerge

Revision: Ribble 1967.

*Andrena (Larandrena) miserabilis* Cresson 1872


Notes. Nests have been described from Florida (Norden & Scarborough 1979) and Kansas (Michener & Rettenmeyer 1956; as *bipunctata*). One of the most abundant wild pollinators of apple and cherry in the state (Gibbs et al. 2017) and known to visit commercial plums and pears (Michener & Rettenmeyer 1956).

Subgenus *Leucandrena* Hedicke


*Andrena (Leucandrena) barbilabris* (Kirby 1802)


*Andrena (Leucandrena) erythronii* Robertson 1891

County records: Alger, Allegan, Arenac, Benzie, Chippewa, Clare, Dickinson, Houghton, Ingham, Kalkaska, Leelanau, Luce, Mackinac, Manistee, Oakland, Oceana, Osceola, Van Buren.

**Subgenus Melandrena Pérez**

**Revision:** Bouseman & LaBerge (1979).

**Andrena (Melandrena) barbara** Bouseman & LaBerge 1979

**County records:** Livingston.

**Andrena (Melandrena) carlini** Cockerell 1901

**County records:** Alger, Allegan, Antrim, Baraga, Barry, Benzie, Berrien, Calhoun, Chippewa, Clinton, Dickinson, Grand Traverse, Ingham, Ionia, Isabella, Huron, Jackson, Kalamazoo, Kent, Lapeer, Leelanau, Livingston, Mackinac, Midland, Monroe, Montcalm, Newaygo, Oakland, Oceana, Osceola, Ottawa, Sanilac, Schoolcraft, Shiawassee, Van Buren, Washtenaw, Wayne.

**Notes.** Nests from New Brunswick and Nova Scotia described by Schrader & LaBerge (1978) and Atwood (1933), respectively. Pollen provisions included apple, blueberry, cherry and strawberry (Schrader & LaBerge 1978). This vernal species is among the most abundant wild bees on apple, highbush blueberry and tart cherry in Michigan (Gibbs et al. 2016, 2017).

**Andrena (Melandrena) commoda** Smith 1879

**County records:** Allegan, Antrim, Bay, Berrien, Branch, Calhoun, Cass, Cheboygan, Crawford, Gladwin, Gratiot, Ingham, Isabella, Kalamazoo, Kent, Keweenaw, Lenawee, Livingston, Macomb, Manistee, Mecosta, Midland, Monroe, Montcalm, Oakland, Osceola, Ottawa, Saginaw, Shiawassee, Tuscola, Van Buren, Washtenaw, Wexford.

**Andrena (Melandrena) confederata** Viereck 1917

**County records:** Allegan.

**Notes.** A single male specimen of this primarily southern species has been recorded from Michigan (Tuell et al. 2009), but it could not be relocated at MSUC.

**Andrena (Melandrena) dunningi** Cockerell 1898

**County records:** Benzie, Berrien, Genesee, Grand Traverse, Houghton, Ingham, Kalamazoo, Kent, Leelanau, Livingston, Oakland, Oceana, Osceola, Ottawa, Shiawassee, Van Buren, Washtenaw, Wayne.

**Notes.** Nests were described by Johnson (1981, 1984) along with preferred pollen sources, which included cherry, and apple or pear (Johnson 1984).

**Andrena (Melandrena) hilaris** Smith 1853

**County records:** Allegan, Livingston, Midland, St. Joseph, Van Buren.

**Notes.** *Andrena hilaris* was first recorded from Michigan by Mitchell (1960). No specimens from Michigan or neighboring states were examined by Bouseman & LaBerge (1978) and they refer to it as a relatively rare, southeastern species. Four male Dreisbach specimens identified as *A. hilaris* were found at MSUC, but upon examination by JG were found to be *A. nivalis*. *Andrena hilaris* does occur in Michigan, based on three male specimens collected from a single site in Allegan County (Tuell et al. 2009).
Andrena (Melandrena) nivalis Smith 1853

County records: Alger, Alpena, Antrim, Baraga, Cheboygan, Chippewa, Clare, Delta, Dickinson, Emmet, Gladwin, Gogebic, Houghton, Ingham, Iron, Jackson, Kalamazoo, Kalkaska, Keweenaw, Leelanau, Livingston, Mackinac, Macomb, Manistee, Marquette, Missaukee, Montmorency, Muskegon, Newaygo, Oceana, Ontonagon, Ottawa, Roscommon, Schoolcraft.

Notes. Nesting in Oregon described by Miliczky et al. (1990), where it was a pollinator of pears.

Andrena (Melandrena) pruni Robertson 1891

County records: Allegan, Berrien, Kalamazoo, Midland, St. Joseph, Van Buren.

Notes. Underrepresented in historical collections from the eastern United States relative to its current prevalence (JSA, pers. obs.).

Andrena (Melandrena) regularis Malloch 1917

County records: Alger, Baraga, Cheboygan, Clare, Ingham, Iosco, Kalamazoo, Kalkaska, Mackinac, Missaukee, Osceola, Roscommon, Schoolcraft, Wexford.

Notes. Nests from New Brunswick described by Schrader & LaBerge (1978), where pollen provisions included apple, blueberry, cherry and strawberry, but not found in recent surveys of Michigan apple, blueberry and cherry.

Andrena (Melandrena) vicina Smith 1853


Subgenus Micrandrena Ashmead

Revision: Ribble (1968).

Andrena (Micrandrena) illinoiensis Robertson 1891 (illinoiensis group)

County records: Arenac, Clinton, Eaton, Gladwin, Ingham, Iosco, Isabella, Jackson, Kalkaska, Mecosta, Midland, Missaukee, Montcalm, Newaygo, Oakland, Osceola, Wexford.

Notes. Strongly prefers Salix (Salicaceae) (Ribble 1968).
**Andrena (Micrandrena) melanochroa Cockerell 1898 (piperi group)**

**County records:** Allegan, Clinton, Crawford, Dickinson, Ingham, Kalkaska, Livingston, Marquette, Ontonagon, Otsego, Roscommon, Van Buren, Wexford.

**Notes.** Polylectic, but prefers rosaceous plants in the genera *Fragaria* (strawberry) and *Potentilla* (Ribble 1968). This potential pollinator of strawberries can be collected in abundance from their flowers (Knerer & Atwood 1964a).

**Andrena (Micrandrena) neonana Viereck 1917 (piperi group)**

**County records:** Allegan, Van Buren.

**Notes.** First recorded from Michigan by Tuell *et al.* (2009) based on two female specimens. This is a notable range extension since Ribble (1986) recorded it only as far north as southern Illinois and Ohio. Subsequently, Jean (2010) recorded it from southern Indiana.

**Andrena (Micrandrena) nigrae Robertson 1905 (illinoiensis group)**

**County records:** Allegan, Arenac, Ottawa.

**Notes.** Strongly prefers *Salix* (Salicaceae) (Ribble 1968).

**Andrena (Micrandrena) personata Robertson 1897 (piperi group)**

**County records:** Branch, Ingham, Shiawassee.

**Notes.** Polylectic with some preference for Rosaceae, including *Crataegus* and *Rubus* (Ribble 1968). Nesting in Illinois described by Miliczky (1988).

**Andrena (Micrandrena) salictaria Robertson 1905 (illinoiensis group)**

**County records:** Allegan, Antrim, Arenac, Cheboygan, Clinton, Gladwin, Grand Traverse, Ingham, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Lake, Lapeer, Livingston, Midland, Missaukee, Montcalm, Newaygo, Oakland, Osceola, Ottawa, Saginaw, Washtenaw, Wexford.

**Notes.** Specialist on *Salix* (Salicaceae) (Ribble 1968).

**Andrena (Micrandrena) ziziae Robertson 1891 (piperi group)**

**County records:** Hillsdale, Ingham, Jackson, Midland, Monroe, Van Buren, Wayne.

**Notes.** Specialist on *Zizia* (Apiaceae) and other members of the family (Ribble 1968).

**Subgenus Parandrena Robertson**

**Revision:** LaBerge & Ribble (1972).

**Andrena (Parandrena) andrenoides (Cresson 1878)**

**County records:** Arenac, Clinton, Huron, Ingham, Isabella, Mecosta, Midland, Newaygo, Oakland, Van Buren, Washtenaw.

**Notes.** Specialist on *Salix* (Salicaceae).
Andrena (Parandrena) wellesleyana Robertson 1897

County records: Allegan, Antrim, Calhoun, Clare, Clinton, Crawford, Gladwin, Grand Traverse, Ingham, Ionia, Isabella, Kalkaska, Kent, Lake, Marquette, Midland, Montcalm, Newaygo, Oakland, Osceola, Ottawa, Shiawassee, Wayne, Wexford.

Notes. Visits Salix and Prunus (LaBerge & Ribble 1972).

Subgenus Plastandrena Hedicke


Andrena (Plastandrena) crataegi Robertson 1893 (crataegi group)


Notes. Communal nesting in Maine described by Osgood (1989). Andrena crataegi is one of the most abundant wild bees in apple and cherry orchards in Michigan (Gibbs et al. 2017), but the relatively late flight season of females, better matching the bloom of hawthorne, may reduce its value in some areas (Gardner & Ascher 2006).

Subgenus Ptilandrena Robertson


Andrena (Ptilandrena) distans Provancher 1888

County records: Berrien, Gladwin, Ingham, Jackson, Kalamazoo, Kent, Lake, Livingston, Midland, Oakland, Saginaw, Shiawassee, St. Joseph, Van Buren, Washtenaw.

Notes. Specialist on Geranium (Geraniaceae).

Andrena (Ptilandrena) erigeniae Robertson 1891

= Andrena (Leucandrena) bifurcata Mitchell, 1960: 211 (Michigan holotype: Fig. 6B).


County records: Alger, Allegan, Barry, Berrien, Calhoun, Clare, Gratiot, Ingham, Jackson, Kalamazoo, Kent, Lake, Lenawee, Livingston, Midland, Montcalm, Montmorency, Ottawa, Saginaw, St. Joseph, Van Buren, Washtenaw, Wayne.

Subgenus *Rhacandrena* LaBerge


*Andrena* (*Rhacandrena*) *brevipalpis* Cockerell 1930


**Notes.** Shows a strong preference for *Rhus* (sumac; Anacardiaceae) (LaBerge 1977).

*Andrena* (*Rhacandrena*) *robertsonii* Dalla Torre 1896

≡ *Andrena* (*Gonandrena*) *dreisbachi* Mitchell, 1960: 230 (Michigan holotype; Fig. 6C).


**County records:** Cheboygan, Ionia, Isabella, Lapeer, Lenawee, Livingston, Macomb, Missaukee, Newaygo, Osceola, Ottawa, Roscommon, Shiawassee, Van Buren, Washtenaw.

**Notes.** *Andrena robertsonii* is challenging to distinguish from its apparent sister species *A. brevipalpis* Cockerell (LaBerge 1977), which also occurs in Michigan. Mitchell identified specimens of *A. robertsonii* at MSUC were found to be *A. brevipalpis* upon reexamination by JG. It is known Mitchell (1960) misapplied the name leading him to redescribe true *robertsonii* as *dreisbachi* (LaBerge 1977).

Subgenus *Scaphandrena* Lanham


*Andrena* (*Scaphandrena*) *arabis* Robertson 1897 (*scurra* group)

**County records:** Allegan, Ingham, Kalamazoo, Montcalm, Ottawa, Van Buren, Washtenaw.

**Notes.** Specialist on Brassicaceae.

Subgenus *Scrapteropsis* Viereck

Revision: LaBerge (1971).

*Andrena* (*Scrapteropsis*) *alleghaniensis* Viereck 1907 (*alleghaniensis* group)

**County records:** Allegan, Antrim, Berrien, Branch, Clare, Grand Traverse, Ingham, Jackson, Kalamazoo, Leelanau, Livingston, Macomb, Manistee, Muskegon, Oakland, Ottawa, Saginaw, Schoolcraft, St. Joseph, Van Buren, Wexford.

**Notes.** Nesting biology in New York described by Batra (1990a).

*Andrena* (*Scrapteropsis*) *imitatrix* Cresson 1872 (*imitatrix* group)

**County records:** Antrim, Bay, Benzie, Berrien, Branch, Calhoun, Clare, Clinton, Crawford, Eaton, Gladwin,
Grand Traverse, Ingham, Iosco, Jackson, Kalamazoo, Leelanau, Livingston, Manistee, Mecosta, Midland, Muskegon, Oceana, Osceola, Oscoda, Otsego, Ottawa, Saginaw, Shiawassee, Van Buren, Washtenaw, Wayne, Wexford.

Notes. A relatively abundant wild bee in apple and tart cherry orchards in Michigan (Gibbs et al. 2017). Rau (1922) describes a nest in Missouri very briefly.

*Andrena (Scrapteropsis) morrisonella* Viereck 1917 (*imitatrix* group)

**County records:** Allegan, Clinton, Genesee, Ionia, Isabella, Kalamazoo, Leelanau, Lenawee, Midland, Oceana, Osceola, Ottawa, Saginaw, Shiawassee, Van Buren.

Notes. This relatively late-flying species remains a challenge to distinguish from *A. imitatrix*.

**Subgenus Simandrena Pérez**

**Revision:** LaBerge (1989).

*Andrena (Simandrena) nasonii* Robertson 1895

**County records:** Allegan, Barry, Berrien, Branch, Calhoun, Cass, Clare, Clinton, Eaton, Gladwin, Grand Traverse, Huron, Ingham, Jackson, Kalamazoo, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Macomb, Manistee, Midland, Monroe, Oceana, Osceola, Otsego, Ottawa, Saginaw, St. Joseph, Van Buren, Washtenaw.

Notes. *Andrena nasonii* is a relatively abundant wild bee in apple and tart cherry orchards in Michigan (Gibbs et al. 2017).

*Andrena (Simandrena) wheeleri* Graenicher 1904

=*Andrena (?Leucandrena) chippewaensis* Mitchell, 1960: 212 (New Synonymy; Michigan holotype; Fig. 6D).


**County records:** Antrim, Baraga, Cheboygan, Chippewa, Dickinson, Gladwin, Keweenaw, Leelanau, Mackinac, Marquette, Wayne.

Notes. *Andrena chippewaensis* was described based on two female specimens. The paratype, deposited at North Carolina State University and collected from New Brunswick, Canada was examined by JSA and determined to be *A. wheeleri*. Examination of images of the NMNH holotype confirms the synonymy. The basis for separation of *A. chippewaensis* from *A. wheeleri* in Mitchell’s (1960) key was the wide gena of the former (see couplet 104), but the holotype of *A. chippewaensis* does not seem to match Mitchell’s own description in this respect, having a relatively narrow gena. As a result, it should come to *A. wheeleri* in Mitchell’s key instead. A male specimen of *A. wheeleri* (MSUC) identified by Mitchell has identical collection information to the holotype of *A. chippewaensis*. LaBerge (1989) suggests it may be an important pollinator of blueberry, although it has not been collected in Michigan’s major highbush blueberry growing region in the southwest. It is also regularly collected from *Rubus*.


Subgenus Taeniandrena Hedice


Andrena (Taeniandrena) wilkella (Kirby 1802)


Notes. Exotic (Linsley 1958). This common species prefers plants in the Fabaceae (LaBerge 1989). Nests in Nova Scotia were described by Atwood (1933).
Subgenus *Thysandrena* Lanham

**Revision:** LaBerge (1977).

*Andrena (Thysandrena) bisalicis* Viereck 1908

**County records:** Alger, Allegan, Antrim, Baraga, Bay, Benzie, Clare, Gladwin, Grand Traverse, Houghton, Iosco, Kalkaska, Kent, Lapeer, Leelanau, Mackinac, Mecosta, Midland, Missaukee, Newaygo, Oceana, Osceola, Roscommon.

**Notes.** Specialist on *Salix* (Salicaceae).

*Andrena (Thysandrena) w-scripta* Viereck 1904

**County records:** Benzie, Clare, Crawford, Dickinson, Gladwin, Grand Traverse, Ingham, Kalkaska, Keweenaw, Lake, Lapeer, Leelanau, Mackinac, Marquette, Mecosta, Midland, Montmorency, Oceana, Osceola, Otsego, Presque Isle, Saginaw, Schoolcraft, Van Buren, Wexford.

Subgenus *Trachandrena* Robertson

**Revision:** LaBerge (1973).

*Andrena (Trachandrena) ceanothi* Viereck 1917

= *Andrena (Trachandrena) compacta* Mitchell, 1960: 181 (Michigan holotype; Fig 7A).


**County records:** Allegan, Antrim, Arenac, Clare, Crawford, Emmet, Grand Traverse, Gratiot, Houghton, Ionia, Iosco, Iron, Kalamazoo, Kalkaska, Lake, Livingston, Mecosta, Midland, Missaukee, Montcalm, Monroe, Montmorency, Muskegon, Newaygo, Oakland, Osceola, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Shiawassee, St. Joseph, Van Buren, Wayne, Wexford.

**Notes.** LaBerge (1973) records *A. ceanothi* as a polylectic species, although it was reported as a *Vaccinium* specialist by Goldstein & Ascher (2016) in an analysis lumping oligoleges and mesoleges. Nearly half its flower records are from *Rubus* (Rosaceae), but it does also show some preference for *Vaccinium* and may prove to be a valuable wild pollinator of berry crops.

*Andrena (Trachandrena) forbesii* Robertson 1891

**County records:** Allegan, Antrim, Bay, Benzie, Berrien, Branch, Calhoun, Clinton, Crawford, Dickinson, Eaton, Gladwin, Grand Traverse, Gratiot, Houghton, Ingham, Ionia, Isabella, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Leelanau, Livingston, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Midland, Montcalm, Muskegon, Oakland, Oceana, Ogemaw, Osceola, Ottawa, Roscommon, Saginaw, St. Joseph, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Common wild pollinator of Michigan tart cherry and apple orchards (Gibbs *et al.* 2017).
**Andrena (Trachandrena) heraclei** Robertson 1897

**County records:** Allegan.

**Notes.** *Andrena heraclei*, originally described from Carlinville, Illinois, has been recorded previously from southern New England and New York, where it is rarely collected (JSA, unpublished), to Kansas (LaBerge 1973). These new records extend the northern range of the species in the Midwest. A male of *A. heraclei* was collected in a blueberry field, but misidentified as the similar species *A. spiraeana* Robertson (Tuell et al. 2009). Females of *A. heraclei* were collected at the same site nine years later (Gibbs et al. 2016). The females of *A. heraclei* and *A. spiraeana* are readily distinguished by the punctuation of metasomal tergum 1 (LaBerge 1973).

**Material examined.** Allegan Co.: Lee Twp., (3.6 mi. ESE Pullman), 25 May 2004 (1 ♀ MSUC: RI); Pullman, 5 km E, 26 May 2013 on *Vaccinium corymbosum* (2 ♀ MSUC: RI); Ottawa Co.: Holland, 4 mi. WNW, 17 May 2005 (1 ♂ MSUC: RI).

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**Andrena (Trachandrena) hippotes** Robertson 1895

= *Andrena (Trachandrena) arenakensis* Mitchell, 1960: 177 (Michigan holotype; Fig 7B).


**County records:** Allegan, Alpena, Arenac, Benzie, Berrien, Calhoun, Clare, Clinton, Dickinson, Emmet, Genesee, Gladwin, Grand Traverse, Ingham, Iosco, Isabella, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Macomb, Manistee, Midland, Montmorency, Oceana, Osceola, Ottawa, Saginaw, Sanilac, Van Buren, Washtenaw, Wexford.

**Notes.** A common spring-flying species and a frequent visitor of tart cherry orchards (Gibbs et al. 2017).

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**Andrena (Trachandrena) mariae** Robertson 1891

**County records:** Allegan, Clare, Clinton, Dickinson, Eaton, Gladwin, Grand Traverse, Ingham, Kalamazoo, Kalkaska, Lake, Leelanau, Lenawee, Livingston, Mecosta, Midland, Otsego, Van Buren, Washtenaw.

**Notes.** Specialist on *Salix* (Salicaceae).

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**Andrena (Trachandrena) miranda** Smith 1879

**County records:** Alger, Antrim, Arenac, Baraga, Bay, Branch, Calhoun, Cheboygan, Clinton, Crawford, Delta, Dickinson, Eaton, Emmet, Gladwin, Grand Traverse, Gratiot, Hillsdale, Ingham, Iosco, Iron, Kalamazoo, Kent, Keweenaw, Lake, Leelanau, Lenawee, Livingston, Luce, Macomb, Mecosta, Midland, Missaukee, Montcalm, Oakland, Ogemaw, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Schoolcraft, St. Joseph, Van Buren, Washtenaw.

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**Andrena (Trachandrena) nuda** Robertson 1891

**County records:** Allegan, Berrien, Calhoun, Eaton, Gladwin, Ingham, Jackson, Kalamazoo, Livingston, Monroe, Ottawa, St. Joseph, Van Buren.

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**Andrena (Trachandrena) rehni** Viereck 1907

**County records:** Allegan, Eaton, Ottawa, Washtenaw.

**Notes.** Rare in most regional bee collections, but may be overlooked due to identification difficulties.
**Andrena (Trachandrena) rugosa** Cockerell 1906

**County records:** Allegan, Antrim, Benzie, Berrien, Dickinson, Eaton, Grand Traverse, Gratiot, Ingham, Kalamazoo, Leelanau, Livingston, Manistee, Montcalm, Muskegon, Newaygo, Oceana, Ottawa, St. Joseph, Van Buren, Washtenaw, Wexford.

**Notes.** A relatively common vernal species, frequently collected on commercial apple, highbush blueberry and tart cherry flowers (Gibbs et al. 2016, 2017).

**Andrena (Trachandrena) sigmundi** Cockerell 1902

**County records:** Alger, Allegan, Antrim, Clare, Clinton, Crawford, Dickinson, Gladwin, Grand Traverse, Ingham, Iosco, Isabella, Lake, Livingston, Mackinac, Midland, Montmorency, Otsego, Roscommon, Sanilac, Schoolcraft.

**Notes.** Specialist on *Salix* (Salicaceae) (LaBerge 1973).

**Andrena (Trachandrena) spiraeana** Robertson 1895

**County records:** Allegan, Ingham, Kalamazoo, Ottawa, Van Buren.

**Notes.** See notes for *A. heraclei* above.

**Andrena (Trachandrena) virginiana** Mitchell 1960

**County records:** Branch, Clare, Delta, Ingham, Keweenaw, Livingston, Macomb, Mason, Midland, Ottawa.

**Notes.** Polylectic, but may prefer to visit *Ceanothus* (Rhamnaceae) (LaBerge 1973).

**Subgenus Tylandrena** LaBerge

**Revision:** LaBerge & Bouseman (1970).

**Andrena (Tylandrena) erythrogaster** (Ashmead 1890)

**County records:** Allegan, Antrim, Arenac, Clare, Clinton, Eaton, Gladwin, Gratiot, Ingham, Ionia, Iosco, Isabella, Kalkaska, Lake, Mecosta, Midland, Montcalm, Newaygo, Oakland, Osceola, Saginaw, Schoolcraft, St. Clair, Van Buren, Washtenaw, Wayne.

**Notes.** A specialist on *Salix*. See Miliczky (1988) for notes on nesting biology from central Illinois.

**Andrena (Tylandrena) perplexa** Smith 1853

**County records:** Allegan, Berrien, Calhoun, Cass, Clinton, Eaton, Genesee, Gladwin, Ingham, Ionia, Jackson, Kalamazoo, Kent, Lapeer, Livingston, Midland, Newaygo, Oceana, Ottawa, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw.

**Notes.** Nesting biology and immatures studied by Stephen (1966a, b) in Oregon and nests from Washington D.C. described by Parker & Böving (1924).

**Andrena (Tylandrena) wilmattae** Cockerell 1906

= *Andrena (Bythandrena) acra* Mitchell, 1960: 111 (Michigan holotype; Fig 7C).

County records: Branch, Kalamazoo, Lake, Washtenaw.

Notes. LaBerge & Bouseman (1970) state that this large spring-flying bee is rare in collections but the number of available Michigan records and recent collection of a long series from Illinois (Griffin et al. 2017) suggest that it can be locally numerous.


Panurginae

Calliopsini

Genus Calliopsis Smith

Taxonomy: Mitchell (1960); Shinn (1967).

Behavior: Calliopsis are solitary and either polylectic or oligolectic.

Subgenus Calliopsis Smith s. s.

Calliopsis (Calliopsis) andreniformis Smith 1853


Notes. Nests from Kansas, Texas, Tennessee, and New Jersey described by Shinn (1967) and (Rozen 1967). Notes on Iowa nests described by Ainslie (1937). This species is considered polylectic, but it is usually found in association with Fabaceae and may be an effective pollinator of alfalfa and cultivated clovers (Shinn 1967).

Subgenus Verbenapis Cockerell & Atkins

Calliopsis (Verbenapis) nebraskensis Crawford 1902

County records: Ionia, Lapeer, Livingston, St. Joseph.

Notes. Specialist on Verbena (Verbenaceae) (Shinn 1967). Notes on nest sites in Missouri by Rau & Rau (1916).

Perditini

Genus Perdita Smith

Subgenus *Cockerellia* Ashmead

**Revision:** Timberlake (1954)

**Biology.** Specialists on Asteraceae.

*Perdita* (*Cockerellia*) *albipennis* Cresson 1868 *pallidipennis* Graenicher 1910

**County records:** Allegan, Barry, Berrien, Kalamazoo.

**Notes.** Specialist on *Helianthus* (Asteraceae). Nest from Kansas described by Danforth (1989). Wolf & Ascher (2009) expressed doubt regarding the status of this subspecies, and suggested it may be a subspecies of *P. bequaerti* Viereck (see below). If correct, then only a single species of *Perdita* (*Cockerellia*) would be present in Michigan.

*Perdita* (*Cockerellia*) *bequaerti* Viereck 1917 *indianensis* Cockrell 1922

**County records:** Allegan, Barry, Berrien, Cass, Gladwin, Ionia, Kent, Leelanau, Livingston, Van Buren.

**Notes.** Specialist on *Helianthus* (Asteraceae).

Subgenus *Perdita* Smith s. s.

**Taxonomy:** Timberlake (1958, 1960, 1968)

*Perdita* (*Perdita*) *gerhardi* *gerhardi* Viereck 1904 (*octomaculata* group)

**County records:** Allegan, Barry, Cass, Newaygo, Van Buren.

**Notes.** Specialist on *Monarda punctata* L. (Lamiaceae). Large numbers have been observed on dunes near Lake Michigan. Nesting in central Illinois described by Miliczky (1991).

*Perdita* (*Perdita*) *halictoides* Smith 1853 (*halictoides* group)

**County records:** Barry, Berrien, Clinton, Ingham, Kalamazoo, Midland, Oscoda, Saginaw, St. Joseph, Van Buren, Washtenaw.

**Notes.** Specialist on *Physalis* (Solanaceae). Nest from Florida described by Eickwort (1977).

*Perdita* (*Perdita*) *maculigera* Cockerell 1896 *maculipennis* Graenicher 1914 (*octomaculata* group)

**County records:** Alcona, Arenac, Delta, Gratiot, Hillsdale, Midland, Nwaygo, Saginaw, Tuscola, Washtenaw.

**Notes.** Specialist on *Salix* (Salicaceae), especially sandbar willow along streams and rivers. Nesting biology in Kansas described by Michener & Ordway (1963).

*Perdita* (*Perdita*) *octomaculata* *octomaculata* (Say 1824) (*octomaculata* group)

**County records:** Allegan, Arenac, Barry, Bay, Berrien, Clare, Clinton, Gladwin, Ingham, Isabella, Kalamazoo, Livingston, Midland, Oakland, Ottawa, Shiawassee, Van Buren, Washtenaw, Wayne.

**Perdita (Perdita) swenki** Crawford 1915 (*octomaculata* group)

**County records:** Alger, Cheboygan, Dickinson, Kalkaska, Leelanau, Mecosta, Van Buren.

**Notes.** Asteraceae specialist.

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**FIGURE 7.** Michigan holotype material at the National Museum of Natural History, Smithsonian Institution. A) *Andrena (Trachandrena) compacta* Mitchell, dorsal habitus (= *A. ceanothi* Viereck). B) *Andrena (Trachandrena) arenakensis* Mitchell, lateral habitus (= *A. hippotes* Robertson). C) *Andrena (Bythandrena) acra* Mitchell, lateral habitus (= *A. wilmattae* (Cockerell)). D) *Bombus ternarius* var. *expallidus* Cockerell, lateral habitus (subspecies not recognized). Photographs provided with the permission of the National Museum of Natural History, Smithsonian Institution, 10th and Constitution Ave. N.W., Washington, DC 20560-0193. (http://www.nmnh.si.edu/).

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**Protandrenini**

**Genus Protandrena** Cockerell

**Taxonomy:** Timberlake (1976).

**Protandrena bancrofti** Dunning 1897 (New state record)

(Fig. 8A)

**County records:** Kalamazoo, St. Joseph.

**Notes.** A prairie-associated species at the northeastern edge of its range. A recent record of this species from
New Hampshire (Tucker & Rehan 2016) is almost certainly erroneous as there are no verified records east of Michigan and Indiana. Brief notes on nests in Indiana are available (Chandler 1962).


*Protandrena cockerelli* Dunning 1897
(Fig. 8B)

**County records:** Berrien, Ionia, Newaygo.

**Notes.** A small number of males and a single female of this species have been recently collected, notably all from *Asclepias verticillata* L (Asclepiadaceae). Mitchell (1960) recorded this species from Michigan as *Psaenythia (Protandrena) mexicanorum* (type locality: [Ciudad] Juárez, Chihuahua, Mexico), with *cockerelli* (type locality: Topeka, Kansas) as a synonym. Timberlake (1955) treated *P. cockerelli*, as a subspecies of *mexicanorum*. A female from Newaygo County identified by Mitchell (MSUC) has facial and pronotal maculations consistent with *P. mexicanorum*, but Hurd (1979) recorded the Michigan record as *Protandrena cockerelli* instead. Based on the geographic distribution of *Protandrena* species (Timberlake 1976), it is unlikely that *P. mexicanorum* sensu stricto would occur in Michigan, as the closest currently accepted *P. mexicanorum* record is from West Texas (Timberlake 1976). Thus, we attribute Hurd’s (1979) records of *mexicanorum* from North Dakota, Nebraska, and Colorado to outdated identifications or taxonomic concepts (Chandler 1962). To further add to confusion about the true distribution of these bees, Timberlake (1976) recorded *P. cockerelli* from New Jersey, but this record seems implausible and likely involves mislabeled or misinterpreted material from much further west in North America (perhaps from New Mexico).


![A: Oblique habitus of male Protandrena bancrofti Dunning. B: Face of female Protandrena cockerelli Dunning from Michigan.](image)


**Genus *Pseudopanurgus* Cockerell**

**Taxonomy:** Mitchell (1960); Timberlake (1967, 1973); see also Scott *et al.* (2011).
**Pseudopanurgus aestivalis** (Provancher 1882) (*rudbeckiae* group)

**County records:** Allegan, Cheboygan, Iosco, Kalkaska, Lake, Leelanau, Livingston, Manistee, Oscoda, Van Buren.

**Notes.** Visits *Symphyotrichum* and *Solidago* (Hurd 1979). Prior to Sheffield & Perron (2014), this species was commonly referred to as *P. nebrascensis* (Crawford).

**Pseudopanurgus albitarsis** (Cresson 1872) (*rudbeckiae* group) (New state record) (Fig. 9)

**County records:** Berrien.

**Notes.** A member of the *rudbeckiae* species group (i.e. *Pterosarus* Timberlake) often associated with prairies, but extends east locally to North Carolina (Mitchell, 1960) and Virginia (Droege, pers. comm., 2015) and north in the Midwestern United States to Wisconsin (Droege, pers. comm., 2007) in addition to Michigan. Not reported from the Mid-Atlantic or Northeastern United States north of Virginia other than a state record for Connecticut by Mitchell (1960) that we cannot confirm and consider unlikely.


![FIGURE 9. Oblique habitus of male *Pseudopanurgus albitarsis* (Cockerell).](image_url)
**Pseudopanurgus andrenoides** *(Smith 1853) (rudbeckiae group)*

**County records:** Bay, Clinton, Jackson, Kalamazoo, Midland.

**Notes.** Specialist on *Solidago* (Asteraceae).

**Pseudopanurgus compositarum** *(Robertson 1893) (rudbeckiae group) (New state record)*

**County records:** Ingham, Kalamazoo.

**Notes.** A relatively scarce species at its northern range limits in the region. Like other members of the *rudbeckiae* group it is a specialist on Asteraceae. Michigan records in Zarrillo *et al.* (2016) are based on the specimens reported here.


**Pseudopanurgus labrosiformis** *(Robertson 1898) (rudbeckiae group) (New state record)*

**County records:** Leelanau.

**Notes.** An Astereaceae specialist recorded from Sleeping Bear Dunes by S. Droge (pers. comm.)

**Pseudopanurgus rugosus** *(Robertson 1895) (aethiops group) (New state record)*

**County records:** Jackson, Kalamazoo.

**Notes.** The only eastern member of the *aethiops* species group, i.e. *Pseudopanurgus* sensu stricto, is another example of a species occurring further north in the Midwestern states than in the Atlantic states, where it is recorded north only to Maryland. It is also a specialist on Asteraceae. Nesting biology in Illinois was described by Miliczky (1991).


**APIDAE**

**Apinae**

**Anthophorini**

**Genus Anthophora** Latreille

**Taxonomy.** Mitchell (1962); Brooks (1983).

**Subgenus Clisodon** Patton

**Anthophora (Clisodon) terminalis** Cresson 1869

**County records:** Alger, Allegan, Antrim, Baraga, Barry, Berrien, Cass, Cheboygan, Clinton, Crawford, Dickinson, Genesee, Gladwin, Gogebic, Ingham, Ionia, Iosco, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lapeer, Leelanau, Livingston, Mackinac, Manistee, Marquette, Mecosta, Menominee, Midland, Monroe, Montcalm, Oakland, Oceana, Oscoda, Ottawa, Presque Isle, Roscommon, Saginaw, Shiawassee, Van Buren, Washtenaw, Wayne.
Notes. Trap nesting in sumac stems from Wisconsin described by Medler (1964b), *Anthophora terminalis* nests in wood, not just in stems.

**Subgenus Melea Sandhouse**

**Revision:** Brooks (1983).

*Anthophora (Melea) abrupta* Say 1837 (*bomboides* group)

**County records:** Berrien, Eaton, Ingham, Keweenaw, Livingston, Mackinac, Manistee, Mecosta, Monroe, Montcalm.

**Notes.** Nests described by Norden (1984) and Rau (1926, 1929) from Maryland and Missouri, respectively.

*Anthophora (Melea) bomboides* Kirby 1837 (*bomboides* group)

**County records:** Barry, Cheboygan, Dickinson, Emmet, Houghton, Huron, Ingham, Jackson, Keweenaw, Mackinac, Manistee, Montcalm, Saginaw, Washtenaw, Wayne.

**Notes.** Nests of the Pacific Coast color form *stanfordiana* Cockerell were described by Nininger (1920) and by Brooks (1983).

**Subgenus Mystacanthophora Brooks**

*Anthophora (Mystacanthophora) walshii* Cresson 1869 (*montana* group)

**County records:** Allegan, Kalamazoo, Leelanau, Livingston, Nwaygo, Shiawassee.

**Notes.** Nesting notes in Kansas by Cane (1991). This species is notably rare and restricted in range in the Northeastern and Mid-Atlantic United States (Goldstein & Ascher 2016).

**Genus Habropoda Smith**

*Habropoda laboriosa* (Fabricius 1804) (New state record)

**County records:** Cass, Huron, Ingham, Livingston, Manistee, Midland, Oakland, Washtenaw.

**Notes.** An important blueberry pollinator in southern parts of its range.

**Apini**

**Genus Apis Linnaeus**

*Apis (Apis) mellifera* Linnaeus 1758

**County records:** Alcona, Alger, Allegan, Alpena, Antrim, Arenac, Baraga, Barry, Benzie, Berrien, Branch, Calhoun, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Delta, Dickinson, Eaton, Emmet, Genesee, Gladwin, Gogebic, Grand Traverse, Gratiot, Hillsdale, Houghton, Huron, Ingham, Ionia, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lake, Lapeer, Leelanau, Lenawee, Livingston, Luce, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Monroe, Montcalm, Montmorency, Muskegon, Nwaygo, Oakland, Oceana, Ogemaw, Ontonagon, Osceola, Oscoda,

**Notes.** This non-native managed species undoubtedly occurs in all counties. It is often the primary pollinator of commercial fruit and vegetable crops, but it may also have negative ecological impacts on native bees (Cane & Tepedino 2016; Lindström et al. 2016).

**Bombini**

**Genus Bombus Latreille**

**Taxonomy:** Milliron (1971, 1973a, b); Mitchell (1962); Laverty & Harder (1988); Williams et al. (2008, 2014).

**Biology.** Bumble bees are primarily eusocial with annual colonies, with the exception of social parasites, which in the continental United States are entirely within the subgenus *Psithyrus* (Heinrich 2004; Husband et al. 1980; Michener 1974; Plowright & Laverty 1984). Nests are commonly made in abandoned rodent nests underground (Husband et al. 1980), but other similar cavities may be used, including walls of houses, and some species typically nest above ground (Richards 1978).

**Subgenus Bombias Robertson**

**Biology.** Subgenus Bombias is unique among bumble bees in the isolation of eggs within the nest (Michener 1974).

**Bombus (Bombias) auricomus** (Robertson 1903)

**County records:** Allegan, Arenac, Barry, Bay, Benzie, Berrien, Calhoun, Cass, Clinton, Eaton, Genesee, Gratiot, Hillsdale, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Kent, Lake, Lapeer, Lenawee, Livingston, Macomb, Manistee, Midland, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Ottawa, Saginaw, Sanilac, Shiawassee, St. Joseph, Van Buren, Washtenaw, Wayne.

**Subgenus Bombus Latreille s. s.**

**Bombus (Bombus) affinis** Cresson 1863

**County records:** Alcona, Allegan, Alpena, Barry, Benzie, Berrien, Branch, Calhoun, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Emmet, Genesee, Gladwin, Grand Traverse, Gratiot, Hillsdale, Ingham, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lapeer, Lenawee, Livingston, Macomb, Manistee, Marquette, Mason, Mecosta, Midland, Monroe, Montcalm, Montmorency, Newaygo, Oakland, Oceana, Ogemaw, Osceola, Ottawa, Saginaw, Sanilac, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** The US Fish and Wildlife Service has approved this species for endangered status, after being sued for failing to act on a petition to list the species in an appropriate time frame. Although described as ‘uncommon’ in Michigan by Husband et al. (1980), Bombus affinis is relatively well represented in the LP historically as represented by specimens deposited at MSUC. Bombus affinis has suffered a catastrophic decline in population size (Giles & Ascher 2006; Cameron et al. 2011). No specimens are known from Michigan since 2000, but with extensive sampling effort (e.g., Cameron et al. 2011), a small number of recent specimens (since 2001) have been collected, photographed (see http://bugguide.net and http://bumblebeewatch.org), or observed in Ontario, Illinois, Indiana, Iowa, Maryland, Minnesota, Ohio, Virginia, and Wisconsin. A specimen collected in 2013 from Toledo, Lucas Co., Ohio, less than 13 km south of the Michigan border (http://bumblebeewatch.org), suggests that this species may persist in southeastern Michigan.
**Bombus (Bombus) terricola** Kirby 1837


**Notes.** *Bombus terricola* has undergone large contractions in its US distribution (Cameron et al. 2011) but with evidence of a recent partial recovery in some areas. Historically, the primarily northern species has been recorded throughout Michigan, but only rarely in the SLP (Husband et al. 1980). Recent collections examined are few and restricted to the NLP in Antrim, Leelanau, and Oceana Counties and Keweenaw County in the UP.

**Subgenus Cullumanobombus Vogt**

**Bombus (Cullumanobombus) fraternus** (Smith 1854) (*robustus group*)

Included based on the the authority of Franklin (1912), Frison (Milliron 1939), and Mitchell (1962), but no specimens of this primarily southern species have been examined.

**Bombus (Cullumanobombus) griseocollis** (DeGeer 1773) (*griseocollis group*)

**County records:** Alcona, Allegan, Alpena, Arenac, Baraga, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Delta, Dickinson, Eaton, Emmet, Genesee, Gladwin, Grand Traverse, Gratiot, Hillsdale, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Mackinac, Macomb, Manistee, Mason, Mecosta, Midland, Missaukee, Monroe, Montcalm, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Osceola, Oscoda, Otsego, Ottawa, Roscommon, Saginaw, Sanilac, Shiawassee, St. Clair, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Nests are made at the surface (Plath 1927).

**Bombus (Cullumanobombus) rufocinctus** Cresson 1863 (*rufocinctus group*)

**County records:** Alger, Alpena, Baraga, Bay, Charlevoix, Cheboygan, Chippewa, Clare, Emmet, Gladwin, Gogebic, Grand Traverse, Gratiot, Huron, Ingham, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lapeer, Livingston, Luce, Mackinac, Manistee, Mason, Mecosta, Menominee, Midland, Missaukee, Montcalm, Montmorency, Muskegon, Oakland, Ogemaw, Osceola, Otsego, Presque Isle, Saginaw, Shaivasse, Tuscola, Washtenaw, Wayne, Wexford.

**Notes.** Nests are made both underground and at the surface. A highly variable species, uncommonly seen in the state.

**Subgenus Psithyrus Lepeletier**

**Biology.** All members of this subgenus are social parasites of other bumble bees.

**Bombus (Psithyrus) ashtoni** (Cresson 1864) (*bohemicus group*)

**County records:** Alcona, Alger, Allegan, Alpena, Arenac, Baraga, Bay, Benzie, Charlevoix, Cheboygan,

**Notes.** *Bombus ashtoni* is a social parasite of *B. affinis* and *B. terricola* (Plath 1922, 1927). The severe declines in *B. affinis* and range contractions to the north of *B. terricola* (Cameron et al. 2011) imply even greater declines in *B. ashtoni*, decline of which was first noted in the late 1990s at Ithaca, Tompkins Co., New York by JSA (pers. obs.). To our knowledge, no specimen has been collected in Michigan since at least 1993 (OSUC record), but there has been a lack of recent collections in the UP and NLP where *B. terricola* is still present. Williams et al. (2014) treat *B. ashtoni* as a junior synonym of *B. bohemicus* Seidl, 1838, a relatively common species in the Palaearctic region. There are subtle differences between the two in male genitalia (Williams 1991), but DNA sequence data show few differences (Cameron et al. 2007; Williams et al. 2014). Because of this synonymy, Hatfield et al. (2016) list this species as data deficient due to the need for a global analysis, although the North American populations are recognized as critically endangered. Lack of recent records in both specimen and image databases (e.g., http://bugguide.net) validates concern about the status of North American populations of this bee.

*Bombus* (*Psithyrus*) *citrinus* (Smith 1854) (*citrinus* group)

**County records:** Alger, Allegan, Alpena, Antrim, Arenac, Barry, Bay, Berrien, Calhoun, Cass, Cheboygan, Chippewa, Clinton, Delta, Dickinson, Emmet, Genesee, Gladwin, Grand Traverse, Gratiot, Hillsdale, Huron, Ingham, Ionia, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lake, Lapeer, Lenawee, Livingston, Luce, Mackinac, Macomb, Marquette, Mecosta, Menominee, Midland, Missaukee, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Osceola, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Schoolcraft, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Social parasite of *B. impatiens*, *B. bimaculatus* and *B. vagans*.

*Bombus* (*Psithyrus*) *fernaldae* (Franklin 1911) (*sylvestris* group)

**County records:** Alger, Alpena, Baraga, Charlevoix, Cheboygan, Chippewa, Gogebic, Huron, Ingham, Kalamazoo, Keweenaw, Livingston, Luce, Mackinac, Macomb, Marquette, Mecosta, Menominee, Midland, Missaukee, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Osceola, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Schoolcraft.

**Notes.** Social parasite of *B. rufocinctus*. No recent specimens examined, although it still occurs in the eastern United States. Williams et al. (2014) treat *B. fernaldae* as a junior synonym of *B. flavidus* Eversmann.

*Bombus* (*Psithyrus*) *insularis* (Smith 1861) (*citrinus* group)

**County records:** Alger, Alpena, Baraga, Charlevoix, Cheboygan, Chippewa, Crawford, Delta, Emmet, Ingham, Kalamazoo, Lake, Luce, Mackinac, Marquette, Menominee, Schoolcraft.

**Notes.** Social parasite of *B. fervidus*, *B. rufocinctus*, *B. ternarius* and *B. terricola*. No recent specimens examined from Michigan, and the species has evidently declined more generally in its limited (northern) historical range in the eastern United States, although it remains numerous further north in Canada and further west in North America.

**Subgenus Pyrobombus** Dalla Torre

*Bombus* (*Pyrobombus*) *bimaculatus* Cresson 1863 (*lapponicus* group)

**County records:** Allegan, Alpena, Antrim, Arenac, Barry, Berrien, Branch, Calhoun, Cass, Cheboygan,

**Bombus (Pyrobombus)** frigidus Smith 1854 (*pratorum* group)

**County records:** None.

**Notes.** This is an alpine/boreal species recorded from Michigan based on misidentified specimens, but it may nevertheless occur in the state. Milliron (1939) included specimens from Isle Royale identified by Frison as *B. frigidus* var. *couperi*. These were re-examined by JG (MSUC, INHS) and were determined to be *B. sandersoni*, which is consistent with the *couperi* epithet being a junior synonym of *B. sandersoni*. Wolf & Ascher (2009) record this species from Oneida County, Wisconsin, which is directly south of Michigan’s Upper Peninsula. Laverty & Harder (1988) also map this species to the Thunder Bay area of Ontario, very near Isle Royale. The distribution of the species is such that the UP is likely part of its southern range in the east (Williams et al. 2014).

**Bombus (Pyrobombus)** impatiens Cresson 1863 (*lapponicus* group)

**County records:** Alcona, Allegan, Alpena, Antrim, Barry, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Charlevoix, Cheboygan, Clare, Clinton, Crawford, Eaton, Emmet, Genesee, Gladwin, Grand Traverse, Gratiot, Hillsdale, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Mackinac, Macomb, Manistee, Mason, Mecosta, Menominee, Midland, Missaukee, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Osceola, Ottawa, Saginaw, Sanilac, St. Clair, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** *Bombus impatiens* is often the most common wild pollinator of agricultural crops in Michigan. It is abundant as queens and workers in spring crops such as apple, blueberry and tart cherry (Gibbs et al. 2016; Russo et al. 2015) and the workers visit field crops such as cucumber and pumpkin (Artz & Nault 2011; Petersen et al. 2013; Smith et al. 2013). It nests underground (Plath 1922). Commercially produced colonies of this species are available, with a production facility located in Michigan.

**Bombus (Pyrobombus)** perplexus Cresson 1863 (*hypnorum* group)

**County records:** Alcona, Alger, Allegan, Alpena, Antrim, Baraga, Barry, Benzie, Calhoun, Charlevoix, Cheboygan, Chippewa, Clare, Delta, Dickinson, Emmet, Gladwin, Gogebic, Gratiot, Hillsdale, Houghton, Huron, Ingham, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kent, Keweenaw, Lapeer, Leelanau, Lenawee, Livingston, Mackinac, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Osceola, Ottawa, Saginaw, Sanilac, St. Clair, St. Joseph, Tuscola, Van Buren, Washtenaw.

**Notes.** Nests at surface and in hollow of trees and logs.

**Bombus (Pyrobombus)** sandersoni Franklin 1913 (*pratorum* group)

**County records:** Alger, Baraga, Cheboygan, Chippewa, Keweenaw, Marquette.

**Bombus (Pyrobombus)** ternarius Say 1837 (*lapponicus* group)

= **Bombus ternarius** var. expallidus Cockerell 1916: 9. (Michigan holotype; Fig. 7D)


Notes. The holotype of *B. t. expallidus* differs from most *B. ternarius* in having metasomal terga 2 and 3 entirely yellow (Cockerell 1916; Williams et al. 2014). Bumble bees routinely vary in color due to both genetic variation and wear, and it is not currently recognized as a valid taxon.

**Bombus (Pyrobombus) vagans vagans Smith 1854 (vagans group)**


Notes. Nests underground and at surface (Plath 1922).

Subgenus *Subterraneobombus* Vogt

**Bombus (Subterraneobombus) borealis Kirby 1837**


Subgenus *Thoracobombus* Dalla Torre

**Bombus (Thoracobombus) fervidus (Fabricius 1798) (pensylvanicus group)**


Notes. Nest locations may be above or below ground (Plath 1922).

**Bombus (Thoracobombus) pensylvanicus (DeGeer 1773) (pensylvanicus group)**

County records: Alger, Allegan, Alpena, Arenac, Barry, Bay, Benzie, Berrien, Branch, Calhoun, Cass,

Notes. No recent specimens examined. *Bombus pensylvanicus* is evidently a declining species in the northern extent of its historical range (Grixti et al. 2009), but is still commonly seen in the south and western part of its range (Cameron et al. 2011; many recent records at http://bugguide.net/node/view/65631).

**Eucerini**

**Genus Eucera Scopoli**

**Subgenus Synhalonia Patton**

**Revision:** Timberlake (1969)

*Eucera (Synhalonia) atriventris* (Smith 1854)

**County records:** Allegan, Berrien, Cass, St. Joseph, Van Buren.

Notes. First recorded from Michigan by Tuell et al. (2009) based on a single specimen. Dozens of specimens captured in blue vane traps during spring in the southwest have been subsequently examined (Gibbs et al. 2017).

*Eucera (Synhalonia) dubitata* (Cresson 1878) (New state record)

**County records:** Cass.

Notes. This species could be easily mistaken for *E. atriventris*, which is relatively abundant in the southwestern part of the state. Females can be distinguished from *E. atriventris* by the paler hind tibial scopa and the highly polished integument of the mesoscutum. Timberlake (1969) recorded *E. dubitata* from both Carlinville, Illinois and Columbus, Ohio.


*Eucera (Synhalonia) hamata* (Bradley 1942)

**County records:** Allegan, Barry, Berrien, Calhoun, Cass, Clinton, Ionia, Jackson, Kalamazoo, Lapeer, Livingston, Montcalm, Oakland, Oceana, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne.

Notes. Nests in central Illinois described by Miliczky (1985 as *Tetralonia*). This species may be expanding its range northward in some areas (see Zarrillo et al. 2016).

**Genus Florilegus Robertson**

**Subgenus Florilegus Robertson s. l.**

*Florilegus (Florilegus) condignus* (Cresson 1878)

**County records:** Barry, Kalamazoo.

Notes. These records are at the northern limit of the range of *F. condignus*, which extends into South America.
Nesting biology in Nebraska described by LaBerge & Ribble (1966a). Where abundant, it has been recorded as an important pollinator of alfalfa.

**Genus *Melissodes* Latreille**

**Taxonomy:** LaBerge (1956a, b, 1961); Mitchell (1962).

**Subgenus *Apomelissodes* LaBerge**

**Revision:** LaBerge (1956b).

*Melissodes (Apomelissodes) apicatus* Lovell & Cockerell 1906

**County records:** Allegan, Missaukee, Tuscola, Wexford.

**Notes.** Specialist on *Pontederia* (Pontederiaceae), which grows on lake and river margins. First recorded from Michigan by Tuell *et al.* (2009). Its occurrence in Wexford County is a notable northern extension of its range.

**Subgenus *Eumelissodes* LaBerge**

**Revision:** LaBerge (1961).

*Melissodes (Eumelissodes) agilis* Cresson 1878

**County records:** Allegan, Barry, Berrien, Cass, Grand Traverse, Eaton, Huron, Ingham, Jackson, Kalamazoo, Kent, Lenawee, Macomb, Manistee, Midland, Montcalm, Muskegon, Oakland, Ottawa, Saginaw, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne.

**Notes.** Specialist on *Helianthus* (Asteraceae). Ground nest in Missouri recorded by Rau (1922).

*Melissodes (Eumelissodes) denticulatus* Smith 1854

**County records:** Allegan, Ingham, Kalamazoo, Kent, Keweenaw, Newaygo, Saginaw, Van Buren, Washtenaw, Wayne.

**Notes.** Specialist on *Vernonia* (Asteraceae).

*Melissodes (Eumelissodes) dentiventris* Smith 1854

**County records:** Barry, Hillsdale, Kalamazoo, Livingston.

**Notes.** Specialist on Asteraceae, particularly *Helianthus* and *Chrysopsis*.

*Melissodes (Eumelissodes) druriellus* (Kirby 1802)

**County records:** Allegan, Barry, Benzie, Calhoun, Cheboygan, Clinton, Dickinson, Gladwin, Gogebic, Gratiot, Hillsdale, Huron, Ingham, Ionia, Iron, Jackson, Kalamazoo, Kent, Keweenaw, Leelanau, Livingston, Luce, Manistee, Mecosta, Menominee, Midland, Muskegon, Newaygo, Oakland, Oceana, Osceola, Otsego, Ottawa, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Specialist on Asteraceae. Nesting in Arkansas and Wyoming described by Cameron *et al.* (1996) and Clement (1973), respectively (as *rustica*).
Melissodes (Eumelissodes) illatus Lovell & Cockerell 1906

**County records:** Alger, Baraga, Bay, Cheboygan, Delta, Dickinson, Emmet, Keweenaw, Leelanau, Mackinac, Marquette, Midland, Montcalm, Oakland, Oceana, Ogemaw, Ontonagon.

**Notes.** Specialist on Solidago and Symphyotrichum (Asteraceae).

Melissodes (Eumelissodes) niveus Robertson 1895

**County records:** Livingston.

**Notes.** First recorded by Evans (1986). Specialist on Asteraceae.

Melissodes (Eumelissodes) subillatus LaBerge 1961

*Melissodes (Eumelissodes) subillata*, LaBerge, 1961: 568. (Michigan holotype)


**County records:** Arenac, Barry, Berrien, Cheboygan, Clinton, Eaton, Houghton, Ingham, Kalamazoo, Leelanau, Livingston, Midland, Montcalm, Oakland, Oceana, Ottawa, Saginaw, Van Buren, Washtenaw.

**Notes.** This Asteraceae specialist is relatively common in the LP. In addition to the holotype, LaBerge (1961) lists the following Michigan locations in the original description: Arenac Co., Cheboygan Co.: Cheboygan, Douglas Lake, Clinton Co., Eaton Co., Ingham Co.: East Lansing, Eaton Co., Midland Co., Oakland Co., and Oceana Co.. It is easily confused with other *Melissodes* species, in particular *M. illatus* Lovell and Cockerell and *M. denticulatus* Smith.

Melissodes (Eumelissodes) tinctus LaBerge 1961

**County records:** Dickinson, Ionia, Lake, Leelanau, Livingston, Ottawa, Van Buren.

**Notes.** Specialist on Asteraceae.

Melissodes (Eumelissodes) trinodis Robertson 1901

**County records:** Allegan, Cass, Emmet, Kalamazoo, Saginaw, Van Buren, Wayne.

**Notes.** Specialist on Asteraceae. Nests in the ground (Graenicher 1905).

Melissodes (Eumelissodes) wheeleri Cockerell 1906

**County records:** Alger, Leelanau, Livingston, Roscommon.

**Notes.** Specialist on Asteraceae. Specimens from Pictured Rocks National Park and Sleeping Bear Dunes National Lakeshore from PWRC identified by Karen Wright.

Subgenus Heliomelissodes LaBerge

**Revision:** LaBerge (1956b).

Melissodes (Heliomelissodes) desponsus Smith 1854

**County records:** Alger, Allegan, Arenac, Barry, Benzie, Cass, Cheboygan, Delta, Dickinson, Eaton, Emmet,

Notes. Specialist on *Cirsium* (Asteraceae).

**Subgenus *Melissodes* Latreille s. s.**

**Revision:** LaBerge (1956a).

**Melissodes** (*Melissodes*) *bimaculatus bimaculatus* (Lepeletier 1825)

**County records:** Allegan, Barry, Berrien, Calhoun, Cass, Clinton, Eaton, Huron, Ingham, Jackson, Kalamazoo, Kent, Lenawee, Livingston, Marquette, Midland, Montcalm, Muskegon, Newaygo, Oakland, Ottawa, Saginaw, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne.

Notes. A very broadly polylectic species, known to even visit corn (Terrell & Batra 1984) and a potentially valuable pollinator of summer crops such as cucumber. Ashmead (1894) records *M. bimaculatus* nesting in an open field, with the entrance under a stone.

**Melissodes** (*Melissodes*) *communis communis* Cresson 1878

**County records:** Allegan, Barry, Clinton, Ionia, Leelanau, Livingston, Montcalm, Ottawa.

Notes. Broadly polylectic.

**Genus *Peponapis* Robertson**

**Revision:** Hurd & Linsley (1964).

**Subgenus *Peponapis* Robertson s. l.**

**Peponapis** (*Peponapis*) *pruinosa* (Say 1837)

**County records:** Barry, Cass, Eaton, Ingham, Isabella, Jackson, Midland, Montcalm, Oakland, Oceana, Saginaw, Shiawassee, St. Joseph, Tuscola, Washtenaw, Wayne.

Notes. A cucurbit specialist. This is an important native pollinator of cucurbit crops in Michigan (Quinn 2015). Nests from California and Rhode Island were described by Hurd *et al.* (1974) and Mathewson (1968), respectively. Population genetics of the species in North America were investigated by López-Uribe *et al.* (2016).

**Genus *Svastra* Holmberg**

**Subgenus *Epimelissodes* Ashmead**

**Revision:** LaBerge (1956a).

**Svastra** (*Epimelissodes*) *obliqua obliqua* (Say 1837) (*obliqua* group)

**County records:** Alger, Berrien, Cass, Isabella, Mackinac, St. Joseph.

Notes. Nesting biology in Florida described by Rozen (1964). More county records are suggested by the map
attributed to this species in Hurd & Linsley (1980), but this map evidently pertains to *Melissodes agilis* due to an error, i.e. fig. 9 in that paper pertains to *M. agilis* whereas their fig. 10 pertains to *S. obliqua*. Based on the distribution of counties, it may occur throughout the state, but it is very uncommon.

**Nomadinae**

**Ammobatoidini**

**Genus Holcopasites Ashmead**

**Taxonomy:** Mitchell (1962); Hurd & Linsley (1972).

*Holcopasites calliopsidis calliopsidis* (Linsley 1943) (*heliopsis* group)

**County records:** Gogebic, Hillsdale, Houghton, Ingham, Ionia, Kalamazoo, Livingston, Monroe, St. Joseph, Van Buren.

**Notes.** Cleptoparasite of *Calliopsis andreniformis* (Ainslie 1937; Hurd & Linsley 1972; Rozen 1966, 1967; Shinn 1967; Swenk 1907) and possibly *Pseudopanurgus* (Linsley et al. 1956).

**Epeolini**

**Genus Epeolus Latreille**

**Taxonomy:** Mitchell (1962); Brumley (1965); Onuferko (2017).

**Behavior:** Cleptoparasites. All known hosts of *Epeolus* are in the genus *Colletes* (Michener 2007).

*Epeolus ainsliei* Crawford 1932 (New state record)

**County records:** Livingston.

**Notes.** Possibly a cleptoparasite of *Colletes susannae* Swenk. The two were recently collected together in relative abundance in Birds Hill Provincial Park, Manitoba, and have been found together in the past (Wolf & Ascher 2009). However, *Colletes susannae* is not known to occur in Michigan and the host plant of this bee, *Dalea purpurea* Vent., is rare and possibly adventive in the state (Voss & Reznicek 2012). *Colletes americanus* Cresson has also been collected in association with *E. ainsliei* (Wolf & Ascher 2009). The closest previous record of the prairie-associated *E. ainsliei* was from Wisconsin (Wolf & Ascher 2009).


*Epeolus americanus* (Cresson 1878)


**County records:** Kalkaska, Keweenaw, Livingston, Midland, Washtenaw.

**Notes.** *Epeolus americanus* has a primarily western distribution, but occurs in parts of eastern Canada and Michigan where it is uncommonly collected (Brumley 1965; Onuferko 2017).

**Material examined.** Kalkaska Co.: (no locality) 19 Jun.?49 (illegible), R.R. Dreisbach (1 ♂ E. lanhami paratype); Keweenaw Co.: Isle Royale, 3 Jul. 1957, *Trifolium repens*, R.W. Hodges (1 ♀ MSUC).

**Epeolus autumnalis** Robertson 1902

**County records:** None.

**Notes.** Recorded from Michigan by Mitchell (1962). The record is supported by the regional distribution of the species and its likely host, *C. compactus compactus* Cresson (see Ascher *et al.* 2014).

**Epeolus bifasciatus** Cresson 1864

**County records:** Berrien, Clinton, Ingham, Kalamazoo, Livingston, Manistee, Midland, Oakland, Shiawassee, Washtenaw.

**Notes.** A cleptoparasite of *Colletes latitarsis* Robertson (see Brumley 1965).

**Epeolus canadensis** Mitchell 1962

**County records:** Cheboygan, Livingston.

**Notes.** Considered by JSA (unpublished) to be a cleptoparasite of *C. kincaidii* Cockerell based on historical (but not recent) co-occurrence of these species at a single site in Tompkins County, New York.

**Epeolus interruptus** Robertson 1900

**County records:** Cheboygan, Kalamazoo, Lake, Livingston, Midland.

**Note.** A possible cleptoparasite of *Colletes aestivalis* Patton according to Brumley (1965), but this host is very rare in Michigan (and elsewhere) with no recent records from the state suggesting that an associated parasite would be of conservation concern.

**Epeolus lectoides** Robertson 1901

**County records:** Cass, Ionia, Kalamazoo, Kalkaska, Livingston, Shiawassee, St. Joseph, Van Buren, Washtenaw.

**Note.** Its presumed host is *Colletes nudus* Robertson (see Ascher *et al.* 2014).

**Epeolus minimus** (Robertson 1902)

**County records:** Alpena, Cheboygan.

**Notes.** Graenicher (1906) recorded *E. minimus* as a cuckoo of *Colletes kincaidii* (as *C. eulophi* Robertson).

**Epeolus pusillus** Cresson 1864

**County records:** Livingston, Mecosta, Midland, Oakland, Washtenaw, Wayne.

**Notes.** Reported to be a cleptoparasite of *Colletes compactus* (see Rozen & Favreau 1968), but the small body size of *E. pusillus* and its limited occurrence in certain localities (e.g., Tompkins County, New York) suggest an alternative or additional association with *C. americanus* (see Ascher *et al.* 2014).
**Epeolus scutellaris** Say 1824

**County records:** Alger, Bay, Cheboygan, Emmet, Ingham, Kalamazoo, Kalkaska, Livingston, Menominee, Midland, Washtenaw.

**Notes.** Presumably a cleptoparasite of *Colletes simulans armatus* Patton (Ascher et al. 2014).

**Genus Triepeolus** Robertson

**Revision:** Rightmyer (2008).

**Biology:** *Triepeolus* are cleptoparasites, primarily of the tribe Eucerini.

**Triepeolus concavus** (Cresson 1878)

**County records:** Ingham.


**Triepeolus cressonii** (Robertson 1897)

**County records:** Livingston.

**Triepeolus donatus** (Smith 1854)

**County records:** Gladwin, Huron, Ingham, Kalamazoo, Livingston, Menominee, Shiawassee.

**Notes.** Cleptoparasite of *Melissodes desponsus* (see Rightmyer 2008).

**Triepeolus eliseae** Rightmyer, new species (*verbesinae* group)

(Figs 10, 11)

**Diagnosis.** This is the only species of the *Triepeolus verbesinae* (Cockerell) species group found in eastern North America. Females are known by the circular pseudopygidial area (Fig. 10A) and strongly downturned S5 (Fig. 10B), both characters that are diagnostic for the species group as a whole in North America (Rightmyer 2008: 131). In addition, *T. eliseae* is one of a few *Triepeolus* species in which the banding of hairs on the body are extremely pale yellow to white (sometimes appearing grey) (Fig. 10C). Among those very pale yellow species, females and males of *T. eliseae* are known from other eastern North American species by the lack of a preoccipital carina on the dorsal margin of the head, short erect hairs on the mesepisternum (such hairs 0.5 OD or less in length) (Fig. 10D), absence of a midline on the clypeus (Fig. 10E), and short, rounded axillar spines (Fig. 10F).

Males of *T. eliseae* might be confused with *T. obliterator* but can be separated by the pygidial plate, which is very narrow (ca. 1 OD in width) and parallel-sided in *T. eliseae*, and wider and more triangular in appearance in *T. obliterator*, and by the axillar spines, which are somewhat rounded apically and do not reach the scutellar midpoint in *T. eliseae* (reaching or exceeding scutellar midpoint in *T. obliterator*).

**Description.** Length ca. 8–9 mm; ITW 1.6–1.9 mm. Integument black, orange on basal half of mandible, tegula, and legs, sometimes orange on apical margin of labrum, outer F1, and pronotal lobe; dorsal aspect with bands of setae very pale yellow, almost white, relatively narrow on metasoma (Fig. 10C). Clypeus convex in profile, lacking midline and larger punctures, asetose or sparsely covered with white setae (especially males). Mesepisternum lacking erect, simple setae or with sparse, short, erect, simple setae, with punctures nearly contiguous, but separated by up to one or two puncture diameters in a few places ventrally, these areas somewhat elevated, weakly tuberculate in appearance; with dense, white, branched setae on dorsal third, anterior margin, and...
anterior surface of mesepisternum, ventrally mostly asetose. Paramedian bands distinct (some females) or joined
laterally to diffuse pale setae on anterior margin of scutum (some females and all males). Scutellum with moderate
biconvexities; axillar spines triangular; sometimes rounded apically, almost reaching or reaching midpoint of
scutellum (Fig. 10F). T1 interspace widely ovate; T2 with lateral bands forming acute angle with apical transverse
band of pale setae (Fig. 10C). Female: Pseudopygidial area strongly circular (Fig. 10A); S5 strongly downcurved
(Fig. 10B); S2–S4 with white apical bands of setae. Male: Pygidial plate narrow, lateral margins nearly parallel-
sided, lacking or with weak basal transverse ridge; S3–S4 with brown apical fringes (slightly white laterally on
S4); S2–S3 with white apical bands of setae (medially extending past apical margin of S3).

FIGURE 10. Triepeolus eliseae Rightmyer, new species. Female from Michigan A) pseudopygidial area. B) S5 strongly
The Bees of Michigan


Comments. This species was referred to as Triepeolus n. sp. 1 in the key to males and females of the United States east of the Mississippi River and Eastern Canada (Rightmyer 2008: 26); it is also known as Triepeolus sp. 101 in the online guide Discover Life (http://discoverlife.org). JSA has examined additional specimens of what he considers to be this species from Maritime Canada (S. Javorek collection) and has identified images taken in New Brunswick as this taxon under the name “Triepeolus new species in the verbesinae group”: http://bugguide.net/node/view/826110/bgimage. An additional Michigan record was photographed in Grand Rapids, Michigan (Fig. 11) (see also: http://bugguide.net/node/view/967055/bgimage).

Distribution. Canada: Ontario; USA: Indiana, Maryland, Michigan, Minnesota, New Jersey, and Wisconsin.


Seasonal Records. June 27 to August 27.


Etymology. This species is named in honor of Mary Elise G. Y. Gee, daughter of M. G. Rightmyer.

County records: Alger, Dickinson, Leelanau, Kalkaska, Kent, Missaukee.
Triepeolus helianthi (Robertson 1897) (New state record)

County records: Wayne.

Material examined. Wayne Co.: Detroit, 14 Aug. 1929, G. Steyskal (1 ♀ MSUC).

Triepeolus lunatus (Say 1824)

County records: Ingham, Ottawa, Shiawassee, Washtenaw, Wayne.

Notes. Likely a cleptoparasite of Melissodes bimaculatus (see Rightmyer 2008).

Triepeolus michiganensis Mitchell 1962

(Michigan holotype; Fig. 12A)


County records: Shiawassee.

Notes. This cleptoparasite is quite rare. JSA observed this species at a nest site of a Melissodes (Eumelissodes) in Ithaca, New York (Rightmyer 2008). The host record was originally documented as M. denticulatus, but the identification needs to be rechecked as it more likely pertains to M. subillatus. Both Melissodes species are relatively common in southern Michigan.

Triepeolus pectoralis (Robertson 1897)

County records: Berrien, Cheboygan, Gogebic, Huron, Ingham.

Notes. Cleptoparasite of Melissodes druriellus (see Rightmyer 2008).

Triepeolus remigatus (Fabricius 1804)

County records: Berrien, Ingham, Shiawassee.

Notes. Cleptoparasite of Peponapis pruinosa.

Triepeolus simplex Robertson 1903 (simplex group)

County records: Kalamazoo, Kalkaska, Leelanau, Livingston, Saginaw.

Nomadini

Genus Nomada Scopoli

Taxonomy: Alexander & Schwarz (1994); Broemeling & Moalif (1988); Droege et al. (2010); Evans (1972); Mitchell (1962); Schwarz & Gusenleitner (2004).

Nomada is in serious need of revision, especially the species-rich ruficornis group, which may be paraphyletic and includes a particularly challenging subgroup of species with bidentate mandibles. Nomada is the most problematic genus for the state and the following list is likely to be changed substantially following taxonomic revision of the genus.

Biology. All Nomada are cleptoparasites. Hosts are primarily within the genus Andrena (the known or
suspected host of species in the ruficornis and vinca groups), but bees in other families are also be attacked including halictid (e.g., Agapostemon by species in the erigeronis and vegana groups) and apid (e.g., Eucera by species in the superba group) bees.

Nomada alpha alpha Cockerell 1905 (ruficornis group) (New state record) (not N. sphaerogaster var. α Cockerell, 1905b, see below)

County records: Iron, Marquette.

Notes. This species described from Fort Collins, Larimer Co., Colorado and its two valid subspecies N. alpha dialpha Cockerell 1921 and N. alpha paralpha Cockerell 1921 (both from Walden, Colorado) are currently only known from that state (Cockerell 1905a, 1921; Swenk 1912; Hurd 1979). The close proximity of the type localities (within approximately 100 km) for all the subspecies, including two from near Walden, Jackson Co., Colorado, does not fit the standard concept of subspecies as being geographically separated populations. There seems to be a close affinity with N. obliterata Cresson, although that species is unusual for having only two submarginal cells and differs from N. alpha in several respects, such as clypeal sculpture, hind tibial setae, and color. As is the case for many Nomada species as currently recognized, N. alpha and its putative subspecies requires additional study. Note that N. alpha was described by Cockerell (1905a) with the epithet alpha spelled in letters whereas the infrasubspecific name of N. sphaerogaster described by Cockerell (1905b) in that same year from Wisconsin was designated originally with a symbol α. We regard the former as valid and the latter as an unavailable name (see N. sphaerogaster below).


Nomada armatella Cockerell 1903 (ruficornis group)

County records: Kent, Livingston, Midland, Muskegon, Ottawa, Van Buren.


Nomada articulata Smith 1854 (erigeronis group)


Nomada australis Mitchell 1962 (erigeronis group)

County records: Barry, Ingham, Kent, Ottawa.

Nomada autumnalis Mitchell 1962 (erigeronis group)

(Michigan holotype; Fig. 12B)


County records: Montmorency, Oakland.

Notes. Species delimitation and identification of bees within the genus Nomada are notoriously challenging
and the ruficornis group, which may be paraphyletic (Alexander 1994) and includes the majority of eastern species (Alexander & Schwarz 1994), is in need of revision. The taxonomy of this species, which is nominally endemic to Michigan, remains in doubt.

**Nomada banksi** Cockerell 1907 (ruficornis group)

**County records:** Gladwin, Isabella, Menominee, Midland.

**Notes.** Possibly a cleptoparasite of *Nomada asteris* (see Ascher et al., 2014).

**Nomada bella** Cresson 1863 (ruficornis group: bidentate mandible)

**County records:** Jackson, Lapeer, Monroe, Ottawa.

**Nomada besseyi** Swenk 1913 (vincta group)

**County records:** Kalamazoo.

**Notes.** According to S. Droege, *N. besseyi* may be a junior synonym of *N. graenicheri* (Cockerell 1905b), a species known from relatively few specimens from Wisconsin and Ontario (Wolf & Ascher 2009) and recently reported from Minnesota (S. Droege, pers. comm.). Specimens from Michigan identified as *N. besseyi* in a revision (Broemeling & Moalif 1988) closely match images of the *N. graenicheri* holotype deposited at the NMNH. Broemeling & Moalif (1988) did not treat *N. graenicheri* in their revision of this group (as subgenus *Pachynomada*) and it was misplaced in the ruficornis species group by Alexander & Schwarz (1994). Members of this species group are cleptoparasites of *Andrena* (*Callandrena* s. l.) (Broemeling & Moalif 1988)


**Nomada bethunei** Cockerell 1903 (ruficornis group)

**County records:** Kalamazoo, Midland, Wayne.

**Nomada binotata** (Robertson 1903) (ruficornis group: bidentate mandible) (New status, new state record)

*Gnathias ovatus* form *binotatus* Robertson 1903: 175 [female lectotype, INHS]

**County records:** Allegan, Dickinson, Lake, Livingston, Macomb, Midland, Montcalm, Montmorency, Newaygo, Oakland, Ottawa, Wexford.

**Notes.** This species was originally described as *Gnathias ovatus* form *binotatus*. The name has been infrequently cited as a synonym of the nominal species (Alexander & Schwarz 1994; Hurd 1979; Mitchell 1962; Rodeck 1951). After examining lectotypes at INHS for this and the nominal species, JG considers that *N. binotata* deserves to be treated as distinct from *N. ovata*. *Nomada binotata* has a distinctive dense patch of 12 or more modified setae on the metatibial apex, but *N. ovata* has only four. A morphospecies recorded by Goldstein & Ascher (2016) from Massachusetts as “Nomada [Gnathias] sp. ["multispine"]” may prove to correspond with *N. binotata*, in which case it is likely widespread across northeastern North America. To clarify the status of this and other morphospecies in this species group, i.e. *Gnathias* sensu Mitchell (1962), revisionary study is required, to clarify, e.g., the status of the four “forms” of *N. ovata* described by Robertson (1903) [as forms of *Gnathias ovatus*]
with masculine specific epithets, octomaculata, plena, sexmaculata, and unicolor, in addition to the two reinstated here.


**Nomada composita** Mitchell 1962 (*ruficornis* group)

**County records:** Benzie, Chippewa, Grand Traverse, Lake, Ottawa, Presque Isle, Schoolcraft, Van Buren.

**Nomada cressonii** Robertson 1893 (*ruficornis* group)

**County records:** Allegan, Antrim, Kent, Leelanau, Livingston, Missaukee, Oakland, Ottawa, Van Buren, Washtenaw, Wexford.

*Notes.* Cleptoparasite of *Andrena crataegi*, *A. vicina* and *A. regularis* (Miliczky & Osgood 1995; Osgood 1989).

**Nomada cuneata** (Robertson 1903) (*ruficornis* group: bidentate mandible)

**County records:** Allegan, Antrim, Berrien, Cass, Charlevoix, Delta, Gogebic, Isabella, Kalkaska, Mackinac, Marquette, Ontonagon, Ottawa, Van Buren.

*Notes.* A cleptoparasite of *Andrena vicina* (Miliczky & Osgood 1995). *Nomada cuneata* is a large dark red bee with two long modified setae on the hind tibial apex. One is long and white and the second is thick and red. This is reminiscent of putative *N. bella* and *N. maculata*, but the setae are much closer to each other. Additional study is needed of this group to clarify species boundaries and Michigan records. Rodeck (1931, 1951) treated this name as a subspecies of *N. lepida* (see entry below). Robertson (1993) described four forms of *Gnathias cuneatus*: decemnotatus, octonotatus, sexnotatus and quadrisignatus, that have been treated as junior synonyms (Alexander & Schwarz 1994; Rodeck 1951) but that warrant further scrutiny.

**Material examined.** Van Buren Co.: 1 km SW Breedsville, 42.3406 -86.0819, 16 May 2016, *Barbarea vulgaris*, J. Gibbs, K. Gundersen (1 ♀ MSUC:RI); 2.5 km NW Breedsville, 42.3576 -86.0982, 16 May 2015, *Cerastium vulgatum*, J. Brokaw, S. Way (1 ♀ MSUC:RI); 3.5 km NW Gobles, 42.3824 -85.9147, 18 May 2015, *Cerastium vulgatum* (1 ♀ MSUC:RI); 4.5 km W Grand Junction, 42.4006 -86.126, 22 May 2015, *Barbarea vulgaris*, J. Gibbs (1 ♀ MSUC:RI).
Nomada decepta Mitchell 1962 (ruficornis group)

County records: Midland.

Nomada dentariae (Robertson 1903) (ruficornis group)

County records: Clare.

Notes. Recorded by Mitchell (1962). The veracity of this record is uncertain.

Nomada denticulata Robertson 1902 (ruficornis group)

County records: Allegan, Barry, Ingham, Monroe, Van Buren, Washtenaw.

Nomada depressa Cresson 1863 (ruficornis group)

County records: Jackson, Shiawassee, Washtenaw.

**Nomada dreisbachi** Mitchell 1962 (*ruficornis* group)
(Michigan holotype; Fig. 12C)


**County records:** Kent, Midland, Newaygo, Osceola.

**Notes.** This uncommon nominal species described from the male only is very similar to the common *N. cressonii*, differing in the more shallow medial impression of the mesoscutellum (Mitchell 1962). *Nomada dreisbachi* may be a junior synonym of *N. cressonii*.

**Material examined.** Midland Co.: (no locality) 4 May 1945, R.R. Dreisbach (1 ♂ paratype MSUC); Osceola Co.: (no locality) 3 May 1952, R.R. Dreisbach (1 ♂ paratype MSUC).

**Nomada erigeronis** Robertson 1897 (*erigeronis* group) (New state record)

**County records:** Ottawa.

**Notes.** The size and sculpturing of the male specimens examined are consistent with the female lectotype (INHS).

**Material examined.** Ottawa Co.: Marne, 2 km S. 43.0172 -85.8381, 2 Jul. 2015 on *Rudbeckia hirta*, J. Brokaw (2 ♂ MSUC: RI).

**Nomada fervida** Smith 1854 (*vegana* group)

**County records:** Benzie, Berrien, Huron, Livingston, Midland, Newaygo.

**Nomada gracilis** Cresson 1863 (*ruficornis* group)

**County records:** Chippewa.

**Nomada illinoensis** Robertson 1900 (*ruficornis* group)

**County records:** Antrim, Missaukee, Oakland, Ottawa, Van Buren, Washtenaw.

**Nomada imbricata** Smith 1854 (*ruficornis* group)

**County records:** Berrien, Calhoun, Clinton, Ingham, Iron, Kent, Livingston, Midland, Newaygo, Oceana, Van Buren, Washtenaw.

**Notes.** Cleptoparasite of *Andrena regularis* (Miliczky & Osgood 1995). *Nomada imbricata* has been observed at nest sites of *A. dunningi* in Winnipeg, Manitoba (JG, pers. obs.) and at Ithaca, New York (JSA, pers. obs.).

**Nomada lehighensis** Cockerell 1903 (*ruficornis* group)

**County records:** Marquette.
Nomada lepida Cresson 1863 (ruficornis group: bidentate mandible)

County records: Lake, Livingston, Manistee, St. Clair, Van Buren, Washtenaw, Wexford.

Notes. Scott et al. (2011) noted that type material of this species from Colorado and Illinois may not be conspecific and could not confirm presence in Colorado of material matching N. lepida from the eastern United States as described by Mitchell (1962) and identified by that author. They therefore removed this species from the fully confirmed Colorado state list. However, the male lectotype in the ANSP designated by Cresson (1916) was collected in Pike’s Peak, Colorado, making that occurrence correct by definition. The type series of lepida may prove to have been composite, and this would explain failure by Scott et al. (2011) to confirm non-type lepida from Colorado that match this species sensu Mitchell (1962) and as identified by subsequent bee specialists working on the eastern fauna. If lepida sensu Mitchell (1962) do diverge from the Colorado lectotype, then populations from the eastern United States, including Michigan, may require description as a new species unless another name is found to be applicable.

Nomada luteoloides Robertson 1895 (ruficornis group)

= Nomada (Heminomada) colorata Mitchell, 1962: 386. (Michigan holotype)


Notes. Likely a cleptoparasite of Andrena carlini (Goldstein & Ascher 2016). See Table 1 and above.

Nomada maculata Cresson 1863 (ruficornis group: bidentate mandible)

County records: Alger, Allegan, Antrim, Calhoun, Clinton, Grand Traverse, Ingham, Kalamazoo, Kent, Leelanau, Lenawee, Livingston, Midland, Oakland, Sanilac, St. Clair, Van Buren, Washtenaw, Wayne.

Nomada obliterata Cresson 1863 (ruficornis group)

County records: Allegan, Clinton, Kalamazoo, Oakland, Washtenaw, Wayne.

Notes. Miliczky (1988) and JSA at Ithaca, New York (pers. obs.) record this as a cleptoparasite of Andrena erythrogaster.

Nomada ochlerata Mitchell 1962 (ruficornis group) Michigan holotype


County records: Washtenaw.

Notes. The taxonomy and identification of N. ochlerata requires additional study. This species, described from the male only, may prove to be associated with one described from females only, such as N. xanthura Cockerell (see also other poorly understood brown-spined forms such as N. mendica Mitchell, described from the male, and N. composita described from the female; these should all be compared with N. gracilis Cresson, now known from both sexes following association of N. inepta Mitchell as a synonym).

Nomada ovata (Robertson 1903) (ruficornis group: bidentate mandible)

County records: Arenac, Berrien, Dickinson, Gogebic, Iron, Livingston, Mackinac, Ontonagon, Ottawa, Van Buren.
Nomada parva Robertson 1900 (ruficornis group)

County records: Ogemaw, Washtenaw.

Nomada perplexa Cresson 1863 (ruficornis group: bidentate mandible)

County records: Allegan, Bay, Mackinac, Manistee, Midland, Oakland, Van Buren, Washtenaw.

Nomada placida Cresson 1863 (roberjeotiana group)

(Fig. 13)

County records: Berrien, Van Buren, Washtenaw.

Notes. Rodeck (1949) in his revision of the subgenus Callinomada documented this species from the mid-Atlantic and Midwest, including records from Carlinville, Illinois and Lafayette, Indiana. Mitchell (1962) subsequently recorded N. placida from Michigan. This late summer-flying Nomada has been recently collected in the state. Hosts should be autumnal, composite-specialist Andrena.


**Nomada pygmaea** Cresson 1863 (ruficornis group)

**County records:** Allegan, Antrim, Ingham, Keweenaw, Livingston, Ottawa, Van Buren.

**Notes.** Cleptoparasite of *Andrena regularis* (Miliczky & Osgood 1995).

**Nomada quadrimaculata** (Robertson 1903) (ruficornis group: bidentate mandible) (New status, new state record)

*Gnathias ovatus* var. *quadrimaculatus* Robertson 1903: 175 [female lectotype, INHS].

**County records:** Alpena, Antrim, Clare, Gladwin, Oakland, Van Buren.

**Notes.** This species was originally described as *Gnathias ovatus* var. *quadrimaculatus*, but has not been in common usage, having been typically synonymized with the nominal species. JG makes this tentative determination based on examination of the lectotype. It differs from *N. ovata* in part by the more numerous five or six specialized setae on the apex of the hind tibia, but it is possible this character varies and is not reliable for species delimitation. Other putative forms of *N. ovata*, described by Robertson and listed above, differ in the number of these setae, in addition to their varying color patterns.


**Nomada rubicunda** Olivier 1811 (erigeronis group)

**County records:** Barry, Chippewa, Midland, Newaygo, Ottawa.

**Notes.** The localized distribution of this bee to sandy sites suggests an association with *Agapostemon splendens* (Lepeletier) (JSA, pers. obs.).

**Nomada sayi** Robertson 1893 (ruficornis group)

**County records:** Barry, Livingston, Van Buren.

**Nomada sobrina** Mitchell 1962 (ruficornis group)

*Nomada sobrina* Mitchell, 1962: 431. (Michigan holotype; Fig. 12D)


**County records:** Macomb.

**Notes.** The taxonomy and identification of this species requires additional study. The extensive red on the mesoscutum and yellow markings on the mesoscutellum and metasoma are reminiscent of Midwestern *N. bethunei* Cockerell (Droege *et al.* 2010).
Nomada sphaerogaster Cockerell 1903 (ruficornis group) (New state record) (Fig. 14)

= Nomada sphaerogaster var. α Cockerell 1905b (not N. alpha Cockerell 1905a)


County records: Allegan, Clinton, Ingham, Van Buren.

Notes. This poorly known species was described from a female collected Apr. 22 in Riverton, Burlington Co., New Jersey (Cockerell 1903a), to the west of the New Jersey Pine Barrens. Cockerell (1905b) subsequently described var. α from Milwaukee, Wisconsin (NMNH), although he evidently did not intend it to be a specific epithet since he appended to the description of the variety: “If the difference should prove constant in a long series, it ought to have a distinct name”. To our knowledge, it has not been used as a valid species group name and is therefore unavailable (ICZN art. 45.6.4). The variety α was excluded from catalogues by Hurd (1979), Alexander & Schwarz (1994), and Zuparko (2017). Furthermore, if it were valid it would be a primary homonym of N. alpha Cockerell, 1905a (see above). Nomada sphaerogaster has not been recognized subsequently from Wisconsin (Wolf & Ascher, 2009) or from elsewhere in the Midwest. Michigan specimens were collected at the edge of a clearing in a moderately damp woodland, with sandy soil, surrounded by suburban development. The Michigan specimens are quite distinctive among vernal Nomada as both sexes are black with complete yellow bands on T2-T5 (Fig. 14A), in combination with wide heads with distinct darkened facial setae (Fig. 14B). The Michigan specimen closely matches non-type specimens of N. sphaerogaster from New Jersey in the Museum of Comparative Zoology (S. Droge, det.). The holotype apparently differs from the Michigan specimens in having bands on T3 and T4.
narrowly interrupted. Cockerell (1905b) states in the description of *sphaerogaster* var. α that the bands are “narrowed or slightly interrupted in the middle”. The female has distinctive dark setae on the face and distinctly separated dark setae on the apex of the metatibia. Other spring *Nomada*, such as *N. luteoloides*, are superficially similar in the complete banding on the metasoma but differ in having a narrower head, lacking dark facial setae, and the apical setae of the metatibia are thicker and tightly compressed. *Nomada sphaerogaster* been collected during mid-April in central and southwest Michigan.

**Material examined.** *Allegan Co.*: 0.8 mi. N Fillmore, blueberry field, 16 Apr. 2005, J. Tuell et al. (1 ♀ MSUC: RI); 1.3 mi. NNE Glenn, blueberry field, 24 Apr. 2006, Tuell et al. (1 ♀ MSUC: RI); **Clinton Co.**: Bath, 6 Apr. 1963, G.C. Eickwort (1 ♂ MSUC); **Ingham Co.**: Harrison Meadows/Abbot Road Park, East Lansing, N42.7645 W84.7945, 19 Apr. 2014, on *Salix*, J. Gibbs (1 ♂ JBWM); Harrison Meadows/Abbot Road Park, East Lansing, N42.7645 W84.7945, 20 Apr. 2014, on *Salix*, J. Gibbs (1 ♂ JBWM); Harrison Meadows Park/Abbot Road, East Lansing, N42.7645 W84.7945, 60 Apr. 2014, on *Salix*, J. Gibbs (1 ♂ JBWM), **Van Buren Co.**: 2.6 mi. ESE Breedsville, blueberry field, 16 Apr. 2005, J. Tuell et al. (1 ♀ MSUC: RI).

**Additional Material examined.** New Jersey: *Morris Co.*: Great Swamp National Wildlife Refuge, (no date), J. Bequaert (1 ♀ Museum of Comparative Zoology, photographs).

*Nomada superba* Cresson 1863 (*superba* group) (New state record) (Fig. 15)

**County records:** Allegan, Berrien, Kalamazoo.

**Notes.** Newly recorded from Michigan based on two females. Mitchell (1962) records this species from Illinois, Indiana and Ohio and Evans (1972) records it from Wisconsin. Wolf & Ascher (2009) list *Eucera* (*Synhalonia*) as the host, which is consistent with other members of the *superba* group (Alexander 1991).


**FIGURE 15.** *Nomada superba* Cresson female from Michigan, lateral habitus.
**Nomada tiftonensis** Cockerell 1903 (*vegana* group)

*County records:* Barry, Dickinson, Ionia, Kalamazoo, Muskegon, Van Buren.

**Nomada vegana** Cockerell 1903 (*vegana* group) (New state record)

*County records:* Allegan, Cass.

**Notes.** Some taxonomic problems associated with members of the *vegana* species group were resolved by Droege *et al.* (2010). *Nomada vegana* was not treated in that paper, but Droege *et al.* (2010) provide useful information for comparison to other members of the group that occur in Michigan, including *N. fervida* (and its midwestern dark color form *N. wisconsinensis* Graenicher, previously considered as a distinct species, e.g., by Wolf & Ascher, 2009) and *N. tiftonensis* (treated as a junior synonym of *N. heiligbrodtii* Cresson by Mitchell, 1962 and Hurd, 1979, and also considered as a junior synonym of *N. texana* Cresson in earlier drafts of Ascher & Pickering, 2017).


**Nomada vicina** Cresson 1863 (*ruficornis* group)

*County records:* Kalkaska, Livingston, Marquette, Washtenaw.

**Notes.** Likely a cleptoparasite of *Andrena hirticincta* (see Ascher *et al.* 2014).

**Nomada vincta** Say 1837 (*vincta* group)

*County records:* Barry, Kalamazoo, Livingston, Montcalm, Wayne.

**Osirini**

**Genus Epeoloides** Giraud

**Taxonomy:** Mitchell (1962).

**Epeoloides pilosulus** (Cresson 1878)

*County records:* Berrien, Midland, Van Buren, Wayne.

**Notes.** This is a cleptoparasite of multiple *Macropis* species likely including *M. nuda* (Cockerell) (Sheffield *et al.* 2004) and *M. cilia* Patton (Wagner & Ascher 2008), which in turn are specialists on *Lysimachia* (Myrsinaceae, formerly Primulaceae) (Cane *et al.* 1983). Observations were lacking from its entire range for many decades (Michener 2000), but it has been rediscovered very locally in Canada (Sheffield *et al.* 2004) and in the United States in New England (Wagner & Ascher 2008) and New York (http://bugguide.net/node/view/954741). Of the four specimens examined from Michigan, none was collected in the last 70 years.

**Material examined.** *Berrien Co.:* Paw Paw Lake, 9 Jul. 1906, E. Liljeblad (1 ♂ UMMZ); *Midland Co.:* (no locality), 23 Jul. 1928, R.R. Dreisbach (1 ♀ MSUC); (no locality), 24 Jun. 1944, R.R. Dreisbach (1 ♂ MSUC); *Wayne Co.:* Detroit, 18 Jul. 1937, G. Steyskal (1 ♀ MSUC).
Xylocopinae

Ceratinini

Genus *Ceratina* Latreille

Subgenus *Zadontomerus*

**Taxonomy:** Mitchell (1962); Daly (1976); Rehan & Richards (2008); Rehan & Sheffield (2011).

*Ceratina* (Zadontomerus) *calcarata* Robertson 1900

**County records:** Alger, Allegan, Antrim, Barry, Bay, Berrien, Branch, Cass, Charlevoix, Cheboygan, Clinton, Eaton, Emmet, Gogebic, Grand Traverse, Gratiot, Huron, Ingham, Ionia, Iosco, Iron, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lake, Lapeer, Leelanau, Lenawee, Livingston, Macomb, Mason, Mecosta, Missaukee, Montcalm, Newaygo, Oakland, Oceana, Osceola, Ottawa, Saginaw, Sanilac, Shiawassee, St. Clair, Tuscola, Van Buren, Washtenaw, Wayne.

**Notes.** Nesting biology and behavior described by Rehan & Richards (2010, 2013) and Kislow (1976) in Ontario and Georgia, respectively. This was the second most abundant wild bee netted from sour cherry flowers in commercial orchards (Gibbs et al. 2017).

*Ceratina* (Zadontomerus) *dupla* Say 1837

**County records:** Allegan, Barry, Bay, Berrien, Calhoun, Cass, Clinton, Eaton, Huron, Ingham, Jackson, Kalamazoo, Lake, Lapeer, Leelanau, Lenawee, Livingston, Mecosta, Newaygo, Ottawa, Saginaw, Van Buren, Washtenaw.

**Notes.** Daly (1973) revised the *Ceratina* of America north of Mexico, which included examination of Michigan material. Due to problems with female identification, no doubt confounded by the presence of the then unknown *C. mikmaqi* Rehan & Sheffield, only males were identified in Daly’s revision. Specimens identified as *C. dupla* at MSUC were reexamined by JG. Of the 104 males identified by Daly as *C. dupla* only 12 were in fact that species. The remaining specimens were *C. mikmaqi*. Although most historical records of *Ceratina dupla* were misidentified, the species as currently defined is confirmed for 20 counties in the Lower Peninsula (see checklist entry below).

Nesting in Ontario described by Vickruck et al. (2011).

*Ceratina* (Zadontomerus) *mikmaqi* Rehan & Sheffield 2011

**County records:** Allegan, Antrim, Barry, Berrien, Calhoun, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Delta, Dickinson, Eaton, Gratiot, Hillsdale, Huron, Ingham, Ionia, Jackson, Kalamazoo, Kalkaska, Lake, Lapeer, Leelanau, Lenawee, Marquette, Mecosta, Montcalm, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Osceola, Ottawa, Roscommon, Saginaw, Shiawassee, St. Clair, St. Joseph, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** *Ceratina mikmaqi* was described recently based on material from Nova Scotia, Ontario, Maryland, Nebraska, New York, Wisconsin and Kentucky (Rehan & Sheffield 2011). Since then it has proven to be a common and widely distributed species (Zarrillo et al. 2016). The first published record for Michigan came several years after the original description (Carson et al. 2016). Males of *C. mikmaqi* are very similar to *C. dupla* and would have been treated as this species in earlier works (e.g., Daly 1973, see above). Males differ from *C. dupla* by the sparse mesoscatal punctation, ecirate hind tibia at ventral midlength, and wider T7 apical lamella. Females are similar to *C. calcarata* in the sparse mesoscatal punctation, but can be distinguished from that species by the sparse
pubescence of the metasomal sterna. We also reconfirm the presence of *C. calcarata* and *C. dupla* in Michigan. The males of *C. calcarata* are distinctive, so Daly’s identifications of these remain valid. As *Ceratina mikmaqi* has proven to be so widespread and abundant, we do not list specific records, but a list of counties is presented below. Nesting in Ontario described by Vickruck et al. (2011).

*Ceratina (Zadontomerus) strenua* Smith 1879

**County records:** Allegan, Barry, Berrien, Calhoun, Cass, Clinton, Eaton, Huron, Ionia, Jackson, Kalamazoo, Lapeer, Lenawee, Menominee, Monroe, Montcalm, Muskegon, Ottawa, Saginaw, St. Clair, St. Joseph, Tuscola, Van Buren, Washtenaw, Wexford.

**Notes.** Nest in Georgia described by Kislow (1976).

**Xylocopini**

**Genus Xylocopa Latreille**

**Subgenus Xylocopoides Michener**

**Taxonomy:** Hurd (1961); Mitchell (1962)

**Behavior:** Carpenter bees excavate nests in hardwood. Extra-limital species may use other substrates.

*Xylocopa (Xylocopoides) virginica virginica* (Linnaeus 1771)

**County records:** Allegan, Barry, Berrien, Branch, Calhoun, Cass, Clare, Clinton, Eaton, Hillsdale, Ingham, Ionia, Jackson, Kalamazoo, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Macomb, Muskegon, Newaygo, Oakland, Oceana, Saginaw, Sanilac, Shiawassee, Tuscola, Van Buren, Washtenaw, Wayne.

**Notes.** Carpenter bees are frequently found in man-made structures, but only occasionally are discovered in natural sites (Howard 1892). *Xylocopa virginica* has both single and multi-female nests. Social nests are unusual in that daughters may occupy nests without functioning as traditional workers (Richards 2011).

**COLLETIDAE**

**Colletinae**

**Genus Colletes Latreille**

**Taxonomy:** Mitchell (1960); Stephen (1954).

**Behavior:** Solitary ground-nesters known to line their nests with glandular secretions that harden into a cellophane-like material. Species may be floral specialists or generalists.

*Colletes aberrans* Cockerell 1897 (*americanus* group)

**County records:** Berrien, Ingham, Washtenaw.

**Notes.** A prairie associated species occurring widely in the Great Plains states, with the southern tier of Michigan counties appearing to be the eastern limit of its range.


**Additional material.** *Ingham Co.*: East Lansing, 29 Jul. 1947, R. Fischer (SEMC).
Colletes aestivalis Patton 1879 (*aestivalis* group) (New state record)
(Fig. 16A)

**County records:** Monroe, Wayne.

**Notes.** A male from Monroe Co. was identified by T.B. Mitchell, although he did not include Michigan in the species’ range in his 1960 revision. Stephen (1954) lists Carlinville, Illinois as the westernmost locality for *C. aestivalis*, whereas the closely related species *C. andrewsi* Cockerell occurs as far east as Wisconsin (Wolf & Ascher, 2009). Both are oligolectic on *Heuchera* spp. (Saxifragaceae). Identification of the two specimens from southeast Michigan reported below as *aestivalis* was confirmed by JG based on the relative length of the hind basitarsus (Stephen 1954) and reference to comparative material of that species from more eastern localities. There are very few recent records of *C. aestivalis* Patton and none from Michigan or, to our knowledge, from anywhere in the Northeastern United States. We therefore regard it as being of conservation concern.

**Material examined.** Monroe Co.: (no locality), 12 Jun. 1957, R & K. Dreisbach (1 ♂ MSUC); Wayne Co.: (no locality) 30 May 1959, R & K. Dreisbach, (1 ♂ MSUC).

Colletes americanus Cresson 1868 (*americanus* group)

**County records:** Alger, Allegan, Bay, Benzie, Cheboygan, Clare, Clinton, Crawford, Emmet, Gladwin, Grand Traverse, Huron, Ingham, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Leelanau, Livingston, Manistee, Mecosta, Midland, Montmorency, Oakland, Oscoda, Roscommon, Saginaw, St. Joseph, Van Buren, Wexford.

**Notes.** Visits late-season Asteraceae.

Colletes banksi Swenk 1908 (*hyalinus* group)

**County records:** Huron, Iosco, Lake, Leelanau.

**Notes.** Specialist of *Ilex* (Aquifoliaceae). Michigan is at the northwestern edge of its range.

Colletes brevicornis Robertson 1897 (*willistoni* group)

**County records:** Crawford, Midland, Oscoda.

**Notes.** Recorded from many flowers, but Robertson records it as a specialist of *Triodanis perfoliata* (L.) Nieuwl. (as Specularia).

Colletes compactus compactus Cresson 1868 (*compactus* group)

**County records:** Bay, Benzie, Cheboygan, Clinton, Huron, Ingham, Kalamazoo, Livingston, Manistee, Midland, Montcalm, Oakland, Van Buren, Washtenaw.

**Notes.** Nests described by Rozen & Favreau (1968) in New York. Specialist on *Symphyotrichum* and *Solidago* (Asteraceae).

Colletes consors Cresson 1868 *mesocopus* Swenk 1907 (*consors* group)

**County records:** Alcona, Alger, Cheboygan, Dickinson, Iosco, Kalkaska, Keweenaw, Otsego.

**Notes.** A northern bee of limited occurrence in the eastern United States. The species is Holarctic, with the nominate form restricted to the Palearctic.
**Colletes hyalinus** Provancher 1888 (*hyalinus* group)

**County records:** Baraga, Charlevoix, Cheboygan, Chippewa, Clare, Dickinson, Kalkaska, Keweenaw, Lake, Mackinac, Manistee, Missaukee, Montmorency, Ontonagon, Osceola, Otsego, Presque Isle, Wexford.

**Colletes impunctatus** Nylander 1852 *lacustris* Swenk 1906 (*impunctatus* group)

**County records:** Baraga, Cheboygan, Gladwin, Keweenaw, Marquette, Montmorency, Ontonagon.

**Colletes inaequalis** Say 1837 (*inaequalis* group)

**County records:** Alger, Allegan, Barry, Benzie, Berrien, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Dickinson, Emmet, Gladwin, Grand Traverse, Houghton, Ingham, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Leelanau, Livingston, Luce, Mackinac, Manistee, Marquette, Midland, Missaukee, Montcalm, Montmorency, Newaygo, Oceana, Ogemaw, Osceola, Otsego, Ottawa, Roscommon, Schoolcraft, Shiawassee, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Nests described from New Jersey, Kansas and Maryland by Smith (1901; as *compacta*), Stephen (1954), and Batra (1980), respectively. Population structure and nest suitability studies in New York by López-UrIBE *et al.* (2015). An abundant spring bee and important wild pollinator of spring crops including apple, blueberry and cherry (GIBBS *et al.* 2016, 2017).

**Colletes kincaidii** Cockerell 1898 (*simulans* group)

**County records:** Alcona, Alpena, Antrim, Barry, Bay, Calhoun, Charlevoix, Cheboygan, Clare, Clinton, Delta, Dickinson, Eaton, Emmet, Grand Traverse, Gratiot, Huron, Ingham, Iosco, Iron, Kalamazoo, Kalkaska, Keweenaw, Lake, Leelanau, Lenawee, Livingston, Manistee, Mason, Mecosta, Menominee, Midland, Missaukee, Muskegon, Newaygo, Oakland, Oceana, Ontonagon, Otsego, Presque Isle, Roscommon, Saginaw, Van Buren, Wayne, Wexford.

**Notes.** Nesting of Californian populations described by TORCHIO *et al.* (1988)

**Colletes latitarsis** Robertson 1891 (*latitarsis* group)

**County records:** Allegan, Berrien, Cheboygan, Huron, Ingham, Ionia, Kalamazoo, Kalkaska, Livingston, Midland, Oakland, Otsego, St. Joseph, Van Buren, Washtenaw.

**Notes.** Specialist on *Physalis* (Solanaceae).

**Colletes mandibularis** Smith 1853 (*americanus* group)

**County records:** Leelanau.

**Colletes nudus** Robertson 1898 (*nudus* group)

**County records:** Benzie, Cheboygan, Kalamazoo, Lake, Leelanau, Livingston, Manistee, Mason, Montmorency, Muskegon, Otsego, St. Joseph, Van Buren.
Colletes simulans Cresson 1868 armatus Patton 1879 (simulans group)

**County records:** Alcona, Allegan, Barry, Bay, Benzie, Cheboygan, Chippewa, Clare, Clinton, Crawford, Dickinson, Emmet, Gladwin, Gratiot, Hillsdale, Huron, Ingham, Iosco, Isabella, Jackson, Kalkaska, Kent, Keweenaw, Lake, Leelanau, Lenawee, Livingston, Luce, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Montcalm, Oakland, Oceana, Ogemaw, Ontonagon, Osceola, Ottawa, Roscommon, Saginaw, Tuscola, Washtenaw, Wexford.

**Notes.** Specialist on late-season Asteraceae.

Colletes solidaginis Swenk 1906 (americanus group)

**County records:** Allegan, Arenac, Barry, Bay, Chippewa, Gladwin, Kalamazoo, Lake, Livingston, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oceana, Washtenaw.

**Notes.** Specialist on Solidago (Wagner & Ascher 2014)

Colletes thoracicus Smith 1853 (inaequalis group)

**County records:** Allegan, Berrien, Ingham, Muskegon, Ottawa, Van Buren.

**Notes.** Nests described by Batra (1980), Cane (1991), and Parker & Böving (1924) from Maryland, New York, and Washington, D.C., respectively.

Colletes validus Cresson 1868 (inaequalis group)

**County records:** Allegan, Barry, Berrien, Chippewa, Crawford, Emmet, Iosco, Jackson, Kent, Lake, Livingston, Mackinac, Marquette, Midland, Missaukee, Montcalm, Montmorency, Newaygo, Oscoda, Roscommon, Saginaw, Schoolcraft, Van Buren, Wexford.

**Notes.** Due to its specialization on Vaccinium, this is a potentially valuable pollinator of blueberry. Nests described by Batra (1980) and Rajotte (1979) from Maryland and Connecticut, respectively.

Colletes willistoni Robertson 1891 (willistoni group)

**County records:** Cheboygan, Iron, Isabella, Kalamazoo, Lake, Leelanau, Otsego.

**Notes.** Physalis specialist.

Hylaeinae

Genus Hylaeus Fabricius

**Taxonomy:** Mitchell (1960); Snelling (1966b, 1968, 1970).

**Biology.** Hylaeus nest in pre-existing cavities including plant stems and abandoned sweat bee nests (Barrows 1975; Krombein 1967; Scott 1994).

Subgenus Cephalylaeus Michener

**Revision:** Snelling (1968).
**Hylaeus (Cephalylaeus) basalis** (Smith 1853)

**County records:** Alger, Cheboygan, Chippewa, Dickinson, Gogebic, Huron, Isabella, Keweenaw, Leelanau, Luce, Marquette, Mecosta, Midland, Missaukee, Oscoda, Sanilac, Schoolcraft, Wayne, Wexford.

**Notes.** Biological information available from trap nests set out by Fye (1965) and Scott (1994, 1996) in Ontario and Michigan, respectively. There seem to be few recent records from the Northeastern United States, although the species is still routinely found further north and west.

**Subgenus Hylaeus Fabricius s. s.**

**Revision:** Snelling (1970).

**Hylaeus (Hylaeus) annulatus** (Linnaeus 1758) (annulatus group)

**County records:** Alger, Allegan, Bay, Berrien, Cass, Charlevoix, Chippewa, Clare, Delta, Dickinson, Emmet, Gladwin, Gogebic, Ingham, Iron, Jackson, Keweenaw, Marquette, Mecosta, Midland, Montmorency, Ontonagon, Oscoda, Ottawa, Roscommon, Saginaw, Sanilac, Schoolcraft, Tuscola, Van Buren, Washtenaw.

**Notes.** Biological information, as *Hylaeus ellipticus*, available from trap nests set out in Ontario and Michigan by Fye (1965) and Scott (1994, 1996), respectively.

**Hylaeus (Hylaeus) fedorica** (Cockerell 1909) (mesillae group)

**County records:** Baraga, Hillsdale, Ionia, Tuscola.

**Hylaeus (Hylaeus) leptocephalus** (Morawitz 1871["1870"] (leptocephalus group)

**County records:** Arenac, Gladwin, Huron, Ingham, Manistee, Midland, Montcalm, Saginaw, Washtenaw, Wayne, Wexford.

**Notes.** Holarctic. Nesting biology in a Utah greenhouse study described by Torchio (1984) and occupancy in abandoned halictid ground nests by Barrows (1975), both as *H. binuatus*.

**Hylaeus (Hylaeus) mesillae** (Cockerell 1896) *cressonii* (Cockerell 1907) (mesillae group)

**County records:** Allegan, Antrim, Arenac, Barry, Bay, Berrien, Branch, Calhoun, Cass, Charlevoix, Cheboygan, Clare, Clinton, Crawford, Dickinson, Gladwin, Grand Traverse, Gratiot, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Leelanau, Livingston, Macomb, Manistee, Marquette, Mecosta, Midland, Montcalm, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Otsego, Ottawa, Saginaw, Shiawassee, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Stem nesting recorded by Rau (1922) and Hicks (1926) from Missouri and Colorado, respectively.

**Hylaeus (Hylaeus) rudbeckiae** (Cockerell & Casad 1895) (mesillae group) (New state record)

**County records:** Leelanau, Keweenaw.

**Notes.** A single male specimen from the northern LP identified by Roy Snelling and tentatively confirmed by JG is deposited at MSUC. A female record from PWRC remains uncertain due to the difficulty in distinguishing this sex from *H. mesillae* but is plausible given the boreal habitat present there. Although *rudbeckiae* is abundant in
the western United States, it has only rarely been recorded from states east of the Rocky Mountains, where expected only from near the Canadian border, but identification difficulties may obscure its true status. A Wisconsin record (Mitchell, 1960) was not accepted by Wolf & Ascher (2009) but should be reevaluated as it may prove valid. Mitchell’s records from Connecticut (also reported by Hurd, 1979) are less likely to be correct, and we consider a possible New Jersey record (Hurd, 1979) to be implausible given that confirmed records in eastern North America are from boreal sites.


**Hylaeus (Hylaeus) saniculae** (Robertson 1896) (*mesillae* group)

**County records:** Alpena, Bay, Cheboygan, Dickinson, Iosco, Iron, Kalkaska, Marquette, Wexford.

**Notes.** Across its range generally scarce in collections but may be underrecorded due to identification difficulties.

**Hylaeus (Hylaeus) verticalis** (Cresson 1869) (*verticalis* group)

**County records:** Alcona, Alger, Alpena, Antrim, Arenac, Bay, Calhoun, Cheboygan, Dickinson, Emmet, Genesee, Gogebic, Grand Traverse, Houghton, Iosco, Iron, Keweenaw, Manistee, Marquette, Midland, Montcalm, Newaygo, Osceola, Ottawa, Van Buren, Wayne.

**Notes.** Biological information available from trap nests set out in Ontario and Michigan by Fye (1965) and Scott (1994, 1996), respectively.

**Subgenus Metziella Michener**

**Revision:** Snelling (1968).

**Hylaeus (Metziella) sparsus** (Cresson 1869)

**County records:** Dickinson, Ingham, Jackson, Midland, Washtenaw.

**Notes.** This is a rarely collected species with a relatively broad distribution across eastern North America (Sellers & McCarthy 2015). *Hylaeus sparsus* has been collected from several plant species, but it has been suggested that it prefers flowers of the family Apiaceae (Sellers & McCarthy 2015) and a recent record from Brooklyn in New York City (3 Jun 2012, Prospect Park Wellhouse) was taken on that host family (JSA, unpublished).

**Material examined.** *Dickinson Co.:* T43N R30W sec. 19, 20 Jun. 1985 on *Ranunculus acris*, V.A. Scott (1 ♂ UCMC); *Ingham Co.:* Okemos, Nancy Moore Park, 42.733 -84.421, 31 Apr. 2017 (1 ♂ TJWC); *Jackson Co.:* Waterloo SRA, 42.318–84.244, 29 Apr. 2017 (1 ♀ TJWC); *Midland Co.:* (no locality), 17 Jun. 1945, R.R. Dreisbach (1 ♀ MSUC); *Washtenaw Co.:* Ann Arbor, Boehnke House, N42.2615 W82.7696, 29 May 2014, C. Vadiya (1 ♀ UMMZ).

A second female deposited at MSUC and collected in the 19th century has the following label information: “Ag. Coll. Mich., 6-26-88/76”, but the actual collection locality of the specimen is unknown.

**Subgenus Paraprosopis Popov**

**Revision:** Snelling (1970).
**Hylaeus (Paraprosopis) floridanus** (Robertson 1893) (*wootoni* group)

**County records:** Montcalm.

**Notes.** This uncommon species has a much wider distribution than the name suggests, as attested by its occurrence in Michigan, but it has been rarely detected for unknown reasons. Mitchell (1960) recorded *H. floridanus* from Michigan and Snelling (1970) states the range as Florida north to Maine and west to Minnesota.


**Subgenus *Prosopis* Fabricius**

**Hylaeus (Prosopis) affinis** (Smith 1853)

**County records:** Alcona, Allegan, Antrim, Arenac, Barry, Bay, Berrien, Cass, Cheboygan, Clare, Clinton, Dickinson, Eaton, Emmet, Genesee, Gladwin, Huron, Ingham, Ionia, Iosco, Iron, Isabella, Jackson, Kalamazoo, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Mackinac, Manistee, Marquette, Mecosta, Midland, Montcalm, Newaygo, Oakland, Osceola, Ottawa, Roscommon, Saginaw, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw.

**Notes.** Females are difficult to distinguish from *H. modestus*, see below.

**Hylaeus (Prosopis) gaigei** (Cockerell 1916) (Michigan holotype)

(Fig. 16B)

*Prosopis gaigei* Cockerell 1916: 2.

**Holotype.** ♀ Michigan, Schoolcraft Co.: Floodwood, 26 Jul. 1915, F.M. Gaige (NMNH: 23311).

**County records:** Schoolcraft.

**Notes.** Originally described from two specimens, the holotype has ‘29’ handwritten on the locality label. The specimen was collected as part of the UMMZ Bryant Walker expedition to Michigan’s Upper Peninsula. The collection locality refers to Floodwoods Road, on the Manistique River, 26 mi. northeast of Manistique (Rogers 1918).

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**FIGURE 16.** Colletidae faces from Michigan (not to scale). A) *Colletes aestivalis* Patton male. B) *Hylaeus gaigei* (Cockerell) holotype female. Photograph of *H. gaigei* provided with the permission of the National Museum of Natural History, Smithsonian Institution, 10th and Constitution Ave. N.W., Washington, DC 20560-0193. (http://www.nmnh.si.edu/).
Snelling (1970) transferred *H. gaigei* to the subgenus *H. (Prosopis)* and suggested it may be a synonym of *H. modestus*. A photograph of the type on the NMNH Department of Entomology website is distinguishable from the standard *H. modestus* female by its small facial maculations. However, coloration characters of this sort can be unreliable. It is already challenging to distinguish females of *H. modestus* from related species (Zarrillo et al. 2016), so resolving the identity of *H. gaigei* requires a dedicated taxonomic study.

Several females of *H. (Prosopis)* collected in Michigan’s Upper Peninsula also seem to have similarly reduced maculations. We provide information on these specimens to facilitate future study of this material.


**Hylaeus (Prosopis) illinoisensis** (Robertson 1896)

**County records:** Alcona, Berrien, Kalamazoo, St. Joseph.

**Hylaeus (Prosopis) modestus modestus** Say 1837

**County records:** Allegan, Antrim, Barry, Berrien, Charlevoix, Cheboygan, Clare, Clinton, Ingham, Ionia, Kalamazoo, Kent, Mackinac, Marquette, Midland, Missaukee, Oakland, Ottawa, Shiawassee, St. Clair, Van Buren, Washtenaw, Wayne.

**Notes.** Trap nests in New York described by Krombein (1967) and nests in Missouri sumac stems by Rau (1922, 1930).

**Hylaeus (Prosopis) nelumbonis** (Robertson 1890)

**County records:** Allegan, Bay, Ingham, Monroe, Sanilac.

**Notes.** This wetland specialist visits *Nelumbo* and *Nymphaea* (Hurd 1979), and was collected from Lake Lansing on *Pontederia* (JG, pers. obs.).

**Subgenus Spatulariella** Popov

**Taxonomy:** Sheffield et al. (2011a).

**Hylaeus (Spatulariella) hyalinatus** Smith 1842

**County records:** Eaton, Ingham, Washtenaw, Wayne.

**Notes.** *Hylaeus hyalinatus* is a recent introduction to the North American continent (Ascher 2001; Ascher et al. 2006; Tonietto & Ascher 2009). It is one of two members of *Hylaeus (Spatulariella)* in the Midwest and the only one currently known from Michigan, but see comments on *Hylaeus punctatus* (Brullé) in Appendix 1. *Hylaeus hyalinatus* is relatively common in urban centers in southern Michigan, including Detroit, Ann Arbor, Ypsilanti and Lansing.

**HALICTIDAE**

**Halictinae**
Augochlorini

Genus Augochlora Smith

Subgenus Augochlora Smith s. s.

Augochlora (Augochlora) pura pura (Say 1837)


Notes. A solitary species that nests in decaying wood as described in detail by Stockhammer (1966). *Augochlora pura* is a common pollinator of agricultural crops and is relatively abundant on highbush blueberry in spring (Gibbs et al. 2016, 2017).

Genus Augochlorella Sandhouse

Taxonomy: Coelho (2004); Mitchell (1960); Ordway (1966a).


Augochlorella aurata (Smith 1853) (aurata group)


Notes. Ground-nesting primitively eusocial species, based on colonies studied from Kansas and New York (Mueller 1996; Ordway 1966b; Sakagami & Michener 1962), as *A. striata*. However, the species makes solitary nests at high latitudes (Packer 1990) and may do so in the UP.

Augochlorella persimilis (Viereck 1910) (aurata group)

County records: Lenawee, Washtenaw.

Notes. Eusocial nesting in Kansas described by Ordway (1966b). This species is rare in Michigan and apparently limited to the southern part of the state.

Genus Augochloropsis Cockerell

Taxonomy: Mitchell (1960).

Subgenus Paraugochloropsis Schrottky
Augochloropsis (Paraugochloropsis) metallica (Fabricius 1793) fulgida (Smith 1853)

County records: Allegan, Antrim, Barry, Branch, Cass, Cheboygan, Clinton, Hillsdale, Ingham, Ionia, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Livingston, Montmorency, Muskegon, Oakland, Osceola, Oscoda, Presque Isle, Roscommon, Shiawassee, Van Buren, Washtenaw, Wayne.

Notes. A ground-nesting, putatively social species, based on excavation of a multi-female nest at Rose Lake State Wildlife Area, Shiawassee County, Michigan (Gibbs 2017).

Halictini

Genus Agapostemon Guerin-Meneville

Taxonomy: Mitchell (1960); Roberts (1972).


Subgenus Agapostemon Guerin-Meneville s. s.

Agapostemon (Agapostemon) sericeus (Förster 1771) (sericeus group)


Agapostemon (Agapostemon) splendens (Lepeletier 1841) (splendens group)


Notes. Solitary, ground-nester (Eickwort 1981; LaBerge & Ribble 1966b; Roberts 1969; Stevens 1921).

Agapostemon (Agapostemon) texanus Cresson 1872 (splendens group)


Agapostemon (Agapostemon) virescens (Fabricius 1775) (splendens group)

County records: Allegan, Barry, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Cheboygan, Clare, Clinton, Delta, Dickinson, Eaton, Genesee, Gratiot, Hillsdale, Huron, Ingham, Ionia, Jackson, Kalamazoo, Kalkaska, Kent, Lake,


Genus Halictus Latreille

Revision: Mitchell (1960); Sandhouse (1941).

Biology. Ground-nesting social species with solitary nesting in some contexts.

Subgenus Nealictus Pesenko

Halictus (Nealictus) parallelus Say 1837


Notes. Aspects of H. parallelus nesting have been documented outside of Michigan (Hungerford & Willlams 1912; Packard 1868; Sakagami & Michener 1962).

Subgenus Odontalictus Robertson

Halictus (Odontalictus) ligatus Say 1837


Notes. Social ground-nester. The nesting biology of H. ligatus has been well-studied (Cane 1991; Eickwort 1985; Hicks 1926; Michener & Bennett 1977; Packer 1986; Packer & Knerer 1986; Rau 1922; Rehan et al. 2013; Sakagami & Michener 1962) as has its relationship to its crypic sister species, H. poeyi Lepeletier (Carman & Packer 1996; Danforth et al. 1998, 1999; Packer 1999; Packer et al. 2016).

Subgenus Protohalictus Pesenko

Halictus (Protohalictus) rubicundus (Christ 1791)


Notes. Holarctic. Social ground-nester, but displays polyethism, reverting to solitary behavior at high latitudes and altitude (Eickwort et al. 1996; Field et al. 2010; Potts & Willmer 1997). The nesting of this widespread species has been documented across North America (Atwood 1933; Eickwort et al. 1996; Hicks 1926; Knerer & Atwood 1962; Soucy 2002; Yanega 1988).
Subgenus *Seladonia* Robertson

*Halictus* (*Seladonia*) *confusus confusus* Smith 1853


**Notes.** Holarctic. A social ground-nester based on studies of southern Ontario populations (Knerer & Atwood 1962; Richards *et al.* 2010), although Nova Scotia populations were thought to be solitary (Atwood 1933).

Genus *Lasioglossum* Curtis

**Taxonomy:** Gibbs (2010; 2011); Gibbs *et al.* (2013); Knerer & Atwood (1964b); McGinley (McGinley 1986, 2003); Mitchell (1960).

**Biology.** *Lasioglossum* is extremely behaviorally diverse including solitary, communal, eusocial nesting in underground burrows or rotten logs, a range of floral host preferences, and multiple origins of kleptoparasitism (Danforth *et al.* 2003; Gibbs *et al.* 2012a, 2013; Michener 1974; Sakagami & Michener 1962; Yanega 1997).

Subgenus *Dialictus* Robertson

**Taxonomy:** Gibbs (2010b, 2011); Mitchell (1960).

**Biology.** Most species are expected to be primitively eusocial ground-nesters (Danforth *et al.* 2003; Gibbs *et al.* 2012b), but there are a number of exceptions (Knerer 1969; Packer 1994) and categorization of an entire species can be problematic (Wcislo 1997). Only a small fraction have had their nesting biology studied in any detail.

*Lasioglossum* (*Dialictus*) *abanci* (Crawford 1932) (*viridatum* group)

**County records:** Clinton, Ingham, Osceola, Ottawa, Saginaw, Washtenaw, Wexford.

**Notes.** A problematic species that requires additional study. Individuals in the north of its range show some minor differences from the type material and specimens collected near the type locality in the Appalachian Mountains of North Carolina.

*Lasioglossum* (*Dialictus*) *achilleae* (Mitchell 1960)

**County records:** Allegan, Barry, Lake, Manistee, Mason.

**Notes.** Uncommon throughout its range.

*Lasioglossum* (*Dialictus*) *admirandum* (Sandhouse 1924) (*viridatum* group)

**County records:** Allegan, Barry, Calhoun, Cass, Clinton, Eaton, Gratiot, Huron, Ingham, Jackson, Kalamazoo, Lapeer, Manistee, Roscommon, Saginaw, St. Joseph, Tuscola, Van Buren, Washtenaw.
Lasioglossum (Dialictus) albipenne (Robertson 1890)

County records: Barry, Berrien, Cass, Cheboygan, Clinton, Dickinson, Eaton, Gratiot, Huron, Ingham, Jackson, Kalamazoo, Lapeer, Livingston, Manistee, Montcalm, Oceana, Roscommon, Saginaw, St. Joseph, Tuscola.

Lasioglossum (Dialictus) anomalum (Robertson 1892)


Notes. The type species of the subgenus.

Lasioglossum (Dialictus) atwoodi Gibbs 2010 (viridatum group)

County records: Allegan, Antrim, Van Buren.

Lasioglossum (Dialictus) bruneri (Crawford 1902)


Notes. A common species in urban gardens of New York City (Matteson et al. 2008), so potentially an urban-associated species.

Lasioglossum (Dialictus) callidum (Sandhouse 1924)

County records: Kalamazoo.

Notes. Past confusion with L. versatum (see Gibbs 2010).

Lasioglossum (Dialictus) cattellae (Ellis 1913)

County records: Clinton, Ingham, Jackson, Kalamazoo, Lenawee, Mecosta, Van Buren, Washtenaw.

Lasioglossum (Dialictus) ceanothi (Mitchell 1960)

County records: Mackinac.

Notes. Rare. Record based on paratype.

Lasioglossum (Dialictus) coeruleum (Robertson 1893)

County records: Allegan, Barry, Benzie, Berrien, Cheboygan, Clinton, Delta, Grand Traverse, Ingham, Jackson, Kalamazoo, Kalkaska, Kent, Lapeer, Leelanau, Livingston, Montcalm, Osceola, Ottawa, Saginaw, Shiawassee, St. Clair, Van Buren, Washtenaw.

Notes. Wood-nesting and a social species based on detailed studies in Kansas (Stockhammer 1967). Nests have been recorded from elm (Stockhammer 1967) and maple (Knerer & Atwood 1962).
Lasioglossum (Dialictus) coreopsis (Robertson 1902)

County records: none.

Notes. Michigan and Wisconsin are among the northern limits of its range. No Michigan specimens were examined, but the species was included based on Mitchell (1960). It is most likely to occur in the southwest near Lake Michigan.

Lasioglossum (Dialictus) cressonii (Robertson 1890)


Notes. Recorded as a wood-nester based on a specimen collected in Maryland by Krombein and Moure (Mitchell 1960). It was never encountered during multiple excavations of logs in the Lansing area.

Lasioglossum (Dialictus) dreisbachi (Mitchell 1960) (viridatum group)

Dialictus dreisbachi Mitchell, 1960: 391. (Michigan holotype)


County records: Allegan, Antrim, Arenac, Charlevoix, Cheboygan, Clare, Clinton, Crawford, Eaton, Gladwin, Ionia, Iosco, Isabella, Kalkaska, Kent, Lake, Lapeer, Lenawee, Midland, Montcalm, Ottawa, Saginaw, Shiawassee, Van Buren, Washtenaw.

Notes. This species appears to have a northern distribution, reaching its southernmost limits in states that border Canada. Its range remains uncertain due to insufficient sampling in boreal regions of Canada and northern states, and because bee specialists have not been able to distinguish this from other species in the taxonomically challenging Lasioglossum viridatum species group of Gibbs (2010b). Nevertheless, L. dreisbachi has unique mesepisternal sculpturing, which abruptly changes from coarsely rugose to smooth (Gibbs 2010b).


Lasioglossum (Dialictus) ellisiae (Sandhouse 1924) (tegulare group)


Notes. Prior to Gibbs (2009), L. ellisiae was included in L. tegulare.

Lasioglossum (Dialictus) ephialtum Gibbs 2010 (viridatum group)


Notes. Most commonly collected in urban settings.
**Lasioglossum (Dialictus) fattigi** (Mitchell 1960) (*viridatum* group)

**County records:** Cass, Clinton.

**Notes.** Rarely seen, but recorded by Tuell *et al.* (2009) based on JG determinations. Easily confused with *L. paradmirandum*.

**Lasioglossum (Dialictus) floridanum** (Robertson 1892) (*pilosum* group) (New state record)

**County records:** Lake, Newaygo, Ottawa, Van Buren.

**Notes.** Until Gibbs (2011), this was considered a subspecies of *L. pilosum* (Smith) that was restricted to the southeastern USA. *Lasioglossum floridanum* was found to range further north to overlap extensively with *L. pilosum*, including the northwest corner of Illinois (Gibbs 2011; Grundel *et al.* 2011). It was raised from subspecific status by Gibbs (2011) based on the morphological and molecular differences and sympatric distribution with *L. pilosum*.

**Material examined.** *Lake Co.*: (no locality), 5 May 1945, R.R. Dreisbach (1 ♀ MSUC); *Newaygo Co.*: (no locality), 15 Jul. 1950, R.R. Dreisbach (1 ♀ MSUC); *Van Buren Co.*: Covert, 3 mi. SSE, 1 Jul. 2013, *Hypechaeris radicata* (1 ♀ MSUC: RI).

**Lasioglossum (Dialictus) foveolatum** (Robertson 1902)

**County records:** Allegan, Barry, Berrien, Clinton, Jackson, Kalamazoo, Kalkaska, Kent, Livingston, St. Joseph, Washtenaw.

**Lasioglossum (Dialictus) gotham** Gibbs 2011 (New state record)

**County records:** Ingham, Van Buren.

**Notes.** Nesting biology described by Batra (1987) as *laevissimum*. Nests have been seen frequently near East Lansing, Michigan in soil at the base of fallen trees (JG, pers. obs.).

**Material examined.** *Ingham Co.*: Fenner Nature Ctr., N42.709, W84.521, 4–24 Aug. 2015, lab reared from excavated nest (10 ♀ 6 ♂ JBWM); *Van Buren Co.*: 2 km SW Laurence, N42.2071, W86.0822, 6 May 2015, ex. *Prunus cerasus* (1 ♀ MSUC:RI).

**Lasioglossum (Dialictus) hartii** (Robertson 1892)

**County records:** Barry, Saginaw.

**Notes.** An apparent wetland specialist.

**Lasioglossum (Dialictus) heterognathum** (Mitchell 1960)

**County records:** Allegan, Bay, Huron, Kalamazoo, Lake, Montcalm, Newaygo, Sanilac, Shiawassee, Van Buren, Washtenaw.

**Lasioglossum (Dialictus) hitchensi** Gibbs 2012

**County records:** Allegan, Barry, Bay, Berrien, Calhoun, Cass, Clinton, Eaton, Genesee, Gratiot, Huron, Ingham,
Ionia, Jackson, Kalamazoo, Lapeer, Livingston, Manistee, Midland, Montcalm, Newaygo, Oakland, Ogemaw, Ottawa, Roscommon, Saginaw, Shiawassee, St. Clair, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne.

*Lasioglossum (Dialictus) illinoense* (Robertson 1892)

**County records:** Allegan, Barry, Berrien, Calhoun, Cass, Clinton, Eaton, Genesee, Gratiot, Ingham, Ionia, Jackson, Kalamazoo, Kent, Leelanau, Lenawee, Livingston, Montcalm, Ottawa, Saginaw, Shiawassee, St. Joseph, Van Buren, Washtenaw.

*Lasioglossum (Dialictus) imitatum* (Smith 1853)

**County records:** Allegan, Arenac, Barry, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Clare, Clinton, Eaton, Emmet, Genesee, Grand Traverse, Gratiot, Hillsdale, Huron, Ingham, Ionia, Isabella, Jackson, Kalamazoo, Kent, Lake, Lapeer, Leelanau, Lenawee, Livingston, Manistee, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Ottawa, Saginaw, Sanilac, Shiawassee, St. Clair, St. Joseph, Van Buren, Washtenaw.

**Notes.** A primitively eusocial ground-nester whose nesting biology was studied in detail in Kansas (Michener & Wille 1961).

*Lasioglossum (Dialictus) laevissimum* (Smith 1853) = *Dialictus solidaginis* Mitchell, 1960: 443. (Michigan holotype)


**County records:** Alger, Allegan, Antrim, Baraga, Barry, Cheboygan, Chippewa, Clinton, Delta, Dickinson, Gogebic, Houghton, Ingham, Iron, Kalamazoo, Keweenaw, Livingston, Luce, Mackinac, Marquette, Montcalm, Ontonagon, Osceola, Osceola, Oscoda, Otsego, Ottawa, Saginaw, Sanilac, Schoolcraft, St. Clair, Van Buren, Washtenaw, Wexford.

**Notes.** A primitively euocial ground-nester based on studies from Alberta and Nova Scotia (Brittain 1933; Packer 1992; Packer et al. 1989a).

*Lasioglossum (Dialictus) leucocomum* (Lovell 1908) (*pilosum* group)


**County records:** Allegan, Antrim, Barry, Benzie, Berrien, Calhoun, Cass, Cheboygan, Clinton, Crawford, Delta, Dickinson, Emmet, Genesee, Grand Traverse, Gratiot, Hillsdale, Huron, Ingham, Isabella, Jackson, Kalamazoo, Kalkaska, Lake, Lapeer, Leelanau, Livingston, Macomb, Manistee, Midland, Montcalm, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Osceola, Oscoda, Osceola, Otsego, Ottawa, Saginaw, Sanilac, Schoolcraft, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wexford.

**Notes.** Until Gibbs (2010), *L. leucocomum* was included within *L. pilosum*.

*Lasioglossum (Dialictus) lineatulum* (Crawford 1906)

*Halictus lineatulus* Crawford 1906: 5.


**County records:** Alcona, Allegan, Alpena, Antrim, Arenac, Barry, Bay, Benzie, Berrien, Branch, Calhoun, Cass, Cheboygan, Clare, Clinton, Crawford, Delta, Dickinson, Eaton, Emmet, Genesee, Gladwin, Gogebic, Grand
Traverse, Gratiot, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Leelanau, Livingston, Manistee, Mason, Mecosta, Midland, Missaukee, Montcalm, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Osceola, Oscoda, Otsego, Ottawa, Roscommon, Saginaw, Sanilac, Shiawassee, St. Clair, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

Notes. A ground-nesting primitively eusocial species studied in detail in New York (Eickwort 1986). The type locality is uncertain. A number of specimens at MSUC were labeled as “Ag. Coll. Mich.” at a time when MSU was known as the “Agricultural College of the State of Michigan”. However, these labels may refer to the specimens as the property of the Agricultural College rather than the original collection locality. Careful records of accession were not maintained in the early management of MSUC. The type series is likely from Michigan since the collector, Robert H. Wolcott, studied at the University of Michigan until 1893 (Hungerford 1935), which coincides with the collection date. The species is common in the state and region.

Lasioglossum (Dialictus) lionotum (Sandhouse 1923) (cephalotes group)

County records: Clare, Ingham, Isabella, Kalamazoo, Leelanau, Midland, Shiawassee, Van Buren.

Notes. A social parasite of *L. imitatum* (Smith) (Wcislo 1997), *L. lionotum* was recently recognized as a senior synonym of *Paralictus asteris* Mitchell (Gibbs 2011).


Lasioglossum (Dialictus) michiganense (Mitchell 1960) (platyparium group)

*Paralictus michiganensis* Mitchell, 1960: 448. (Michigan holotype)


County records: Allegan, Ingham, Kalamazoo, Wayne.

Notes. *Lasioglossum michiganense* is presumed to be a social parasite of other *L. (Dialictus)* (Michener 1978, Gibbs *et al.* 2012), but its host is unknown and range limits remain uncertain. The female examined was collected in a riparian area adjacent to a woodlot. Collection locations are frequently associated with nearby wooded habitat (*e.g.*, Giles & Ascher 2006). However, it has also been reported from an urban park in the city of Chicago (Tonietto & Ascher 2009).


Lasioglossum (Dialictus) nigroviride (Graenicher 1911)

County records: Allegan, Cheboygan, Chippewa, Clinton, Dickinson, Emmet, Gogebic, Ingham, Kalamazoo, Kalkaska, Keweenaw, Mackinac, Marquette, Midland, Osceola, Oscoda, Otsego, Ottawa, Roscommon, Van Buren.

Notes. Wood-nesting. This relatively large species was observed nesting in a rotten log at Six-mile Creek, Ithaca, New York (J. Gibbs, pers. obs.).

Lasioglossum (Dialictus) novascotiae (Mitchell 1960) (viridatum group)

County records: Allegan, Mackinac.
**Lasioglossum (Dialictus) oblongum** (Lovell 1905) (*viridatum* group)

**County records:** Alger, Allegan, Clinton, Dickinson, Gogebic, Ingham, Jackson, Missaukee, Osceola, Ottawa, Saginaw, Van Buren.

**Notes.** A wood-nesting species (Gibbs 2011).

**Lasioglossum (Dialictus) obscurum** (Robertson 1892) (*viridatum* group)

**County records:** Allegan, Barry, Berrien, Cheboygan, Clinton, Ingham, Ionia, Jackson, Kalamazoo, Monroe, Saginaw, St. Clair, Van Buren, Wayne.

**Lasioglossum (Dialictus) oceanicum** (Cockerell 1916)

**County records:** Allegan, Antrim, Barry, Berrien, Branch, Calhoun, Cass, Clare, Clinton, Eaton, Gladwin, Gratiot, Huron, Ingham, Ionia, Iosco, Jackson, Kalamazoo, Kalkaska, Kent, Lapeer, Leelanau, Livingston, Manistee, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Osceola, Ottawa, Saginaw, Sanilac, St. Joseph, Tuscola, Van Buren, Wexford.

**Notes.** There has been some confusion over the name of this bee. *Halictus nymphaearum* was proposed as a replacement for the preoccupied *Halictus palustris* Robertson (1890) (*not* *Halictus palustris* Morawitz 1876), and subsequently the species has most often been referred to as *Dialictus nymphaearum* (Robertson 1895) or as *L. (D.) nymphaearum* (Robertson 1895). Gibbs (2010b) resurrected the name *L. oceanicum* (Cockerell 1916) from synonymy as the valid name for this species after discovering that the apparent lectotype of *H. palustris* Robertson, labeled as such and deposited at ANSP, pertained to another well-known species *L. albipenne* (Robertson 1890) rather than to *Dialictus nymphaearum* sensu auct. (e.g., Mitchell, 1960). Gibbs (2011) reversed this decision based on an inability to find a valid lectotype designation, but this was in fact validly published by Cresson (1928) showing the decision by Gibbs (2010) to have been correct (*contra* Gibbs 2011). Thus, *Lasioglossum oceanicum* is the correct name for this species, i.e. the names *Halictus palustris* Robertson and *H. nymphaearum* return to synonymy under *L. albipenne*.

**Lasioglossum (Dialictus) paradmirandum** (Knerer & Atwood 1966) (*viridatum* group)

**County records:** Barry, Berrien, Calhoun, Cass, Clinton, Eaton, Gratiot, Huron, Ingham, Ionia, Kalamazoo, Kent, Lapeer, Midland, Montcalm, Newaygo, Oakland, Ogemaw, Osceola, Ottawa, Saginaw, Shiawassee, Tuscola, Washtenaw, Wayne.

**Lasioglossum (Dialictus) perpunctatum** (Ellis 1913)

**County records:** Allegan, Arenac, Barry, Benzie, Berrien, Calhoun, Cheboygan, Chippewa, Clare, Clinton, Dickinson, Eaton, Gratiot, Hillsdale, Huron, Ingham, Ionia, Jackson, Kalamazoo, Kalkaska, Lake, Lapeer, Leelanau, Livingston, Manistee, Mecosta, Midland, Montcalm, Montmorency, Oakland, Osceola, Ottawa, Roscommon, Shiawassee, St. Joseph, Tuscola, Van Buren, Wexford.

**Lasioglossum (Dialictus) pictum** (Crawford 1902)

* = *Dialictus muskegonensis* Mitchell, 1960: 439. (Michigan holotype)


**County records:** Allegan, Barry, Berrien, Cass, Clare, Clinton, Gladwin, Ingham, Jackson, Leelanau, Livingston,
Macomb, Manistee, Mecosta, Midland, Monroe, Montcalm, Muskegon, Oceana, Ottawa, Shiawassee, St. Joseph, Van Buren.

Notes. Michigan is at the eastern range limits of this species, as records of similar bees from the Atlantic states pertain to *Lasioglossum* (*Dialictus*) *arantianum* Gibbs 2011.

**Lasioglossum** (*Dialictus*) *pilosum* (Smith 1853) (*pilosum* group)

**County records:** Alcona, Allegan, Antrim, Arenac, Barry, Bay, Berrien, Calhoun, Cass, Cheboygan, Clare, Clinton, Dickinson, Eaton, Emmet, Genesee, Gladwin, Grand Traverse, Gratiot, Hillsdale, Huron, Ingham, Ionia, Iosco, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Leelanau, Livingston, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Osceola, Oscoda, Otsego, Ottawa, Roscommon, Saginaw, Schoolcraft, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wexford.

**Notes.** Michigan is at the eastern range limits of this species, as records of similar bees from the Atlantic states pertain to *Lasioglossum* (*Dialictus*) *arantianum* Gibbs 2011.

**Lasioglossum** (*Dialictus*) *planatum* (Lovell 1905) (*viridatum* group)

**County records:** Charlevoix, Cheboygan, Dickinson, Grand Traverse, Huron, Keweenaw, Saginaw, Tuscola, Wexford.

**Lasioglossum** (*Dialictus*) *platyparium* (Robertson 1895) (*platyparium* group)

**County records:** Clinton, Eaton, Van Buren, Washtenaw.

Notes. Social parasite or cleptoparasite. Host unknown but presumably a *L. (Dialictus)*.

**Lasioglossum** (*Dialictus*) *pruinosum* (Robertson 1892) (*pilosum* group)

**County records:** Cass, Clinton, Ingham, Leelanau, Tuscola.

Notes. Nest described by Melander & Brues (1903).

**Lasioglossum** (*Dialictus*) *rufulipes* (Cockerell 1938)

**County records:** Dickinson, Marquette.

Notes. *Lasioglossum rufulipes* has a boreal distribution. The UP of Michigan is at the southern edge of its range in the east (Gibbs 2011) and is otherwise unknown from the Eastern United States although it occurs as far east as Quebec in Canada. It was previously recorded from Michigan by Gibbs (2011).


**Lasioglossum** (*Dialictus*) *sagax* (Sandhouse 1924) (*viridatum* group)

**County records:** Oceana.

Notes. A taxonomically challenging and problematic species that would benefit from additional study.

**Lasioglossum** (*Dialictus*) *sheffieldi* Gibbs 2010 (*perdifficile* group) (New state record)

**County records:** Alger.
Notes. *Lasioglossum sheffieldi* is a sand dune specialist, originally described from coastal areas of the Canadian Maritime Provinces and the western bank of the St. Lawrence River in Quebec (Gibbs 2010b). Two additional specimens, one from a Manitoba dune system and the other from the west coast of Lake Michigan in Wisconsin, were examined but not included as paratypes due to their disjunct localities (Gibbs 2010b). A long series of males and females were recently examined from Pictured Rocks National Lakeshore, which fills an important gap in the known distribution of this species, and points to the likelihood of additional unknown localities in other dune and lakeshore habitats, which may connect the inland populations to the populations on the Atlantic Coast.

**Material examined.** *Alger Co.*: Pictured Rocks National Lakeshore (PWRC).

*Lasioglossum (Dialictus) smilacinae* (Robertson 1899)

**County records:** Barry, Berrien, Cheboygan, Clinton, Ingham, Jackson, Kalamazoo, Lake, Lapeer, Livingston, Manistee, Mecosta, Missaukee, Montcalm, Newaygo, Oakland, Osceola, Ottawa, Van Buren, Washtenaw.

Notes. Nest descriptions by Brittain (1933) are referred to *L. laevissimum* (see above).

*Lasioglossum (Dialictus) subversans* (Mitchell 1960)

*Dialictus subversans* Mitchell, 1960: 419. (Michigan holotype)


**County records:** Dickinson, Ontonagon, Otsego, Van Buren.

Notes. *Lasioglossum subversans* was poorly documented in the literature until revisionary studies by Gibbs (2010b, 2011) who treated it as synonymous with *Dialictus perpunctatulus* Knerer & Atwood. *Lasioglossum subversans* appears to have a northern distribution, extending across Canada but only reaching south into the USA in northern Michigan and Maine.


*Lasioglossum (Dialictus) subviridatum* (Cockerell 1938) (*viridatum* group)

**County records:** Allegan, Charlevoix, Clinton, Ingham, Ottawa, Saginaw, Shiawassee, Van Buren, Wayne.

Notes. Wood-nesting (Gibbs 2011). Nests of this species are common under the bark of fallen trees in wooded areas near East Lansing, Michigan (JG, pers. obs.). Ripiphorid beetles have been reared from *L. subviridatum* nests (J.G., unpublished data).

*Lasioglossum (Dialictus) taylorae* Gibbs 2010 (*viridatum* group)

**County records:** Charlevoix, St. Clair.

Notes. *Lasioglossum taylorae* was recently described from a small number of specimens. It was subsequently documented from Michigan without specific localities (Gibbs 2011).

Lasioglossum (Dialictus) tegulare (Robertson 1890) (tegulare group)

County records: Allegan, Cass, Jackson, Ingham, Leelanau, Livingston, Saginaw, Tuscola, Van Buren.

Notes. Many historical records, especially northward, pertain to L. ellisiae.

Lasioglossum (Dialictus) tenax (Sandhouse 1924)

County records: Alger, Dickinson, Keweenaw, Marquette.

Notes. This species has an alpine/boreal distribution. Michigan’s UP is near the southern edge of its range in the east. Nests in Alberta are solitary (Packer 1994).

Lasioglossum (Dialictus) timothyi Gibbs 2010

County records: Allegan, Crawford, Grand Traverse, Kalamazoo, Kalkaska, Lake, Manistee, Midland, Missaukee, Montmorency, Muskegon, Newaygo, Osceola, Ottawa.

Lasioglossum (Dialictus) trigeminum Gibbs 2011

County records: Gogebic, Ottawa.

Notes. A primitively eusocial ground-nester (see Gibbs 2011; Michener 1966 as versatum).

Lasioglossum (Dialictus) versans (Lovell 1905)

= Evylaeus divergenoides Mitchell, 1960: 351 (Michigan holotype)


Lasioglossum (Dialictus) versatum (Robertson 1902)


Notes. Primitively eusocial ground-nesting species based on Kansas and Ontario populations (Breed 1975; Knerer & Atwood 1966). Note past taxonomic confusion with L. callidum (see above).

Lasioglossum (Dialictus) vierecki (Crawford 1904)

County records: Allegan, Arenac, Barry, Berrien, Calhoun, Clare, Clinton, Delta, Gladwin, Gratiot, Ingham, Ionia, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Leelanau, Livingston, Manistee, Midland, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Oscoda, Otsego, Ottawa, St. Joseph, Tuscola, Van Buren, Washtenaw, Wexford.

Notes. A sandy soil loving species. Lasioglossum vierecki is a solitary species (Knerer 1969; Packer 1993).
Lasioglossum (Dialictus) viridatum (Lovell 1905) (viridatum group)


**County records:** Alger, Allegan, Antrim, Baraga, Benzie, Calhoun, Cass, Charlevoix, Chippewa, Clinton, Dickinson, Emmet, Gogebic, Huron, Kalamazoo, Keweenaw, Mackinac, Marquette, Midland, Monroe, Ontonagon, Roscommon, Saginaw, Schoolcraft, Shiawassee, St. Clair, St. Joseph, Tuscola, Van Buren, Wexford.

**Notes.** Social nesting in Nova Scotia was reported by Atwood (1933), but the identification is unreliable (Zarrillo et al. 2016).

Lasioglossum (Dialictus) weemsi (Mitchell 1960)

**County records:** Ottawa, Washtenaw.

Lasioglossum (Dialictus) zephyrum (Smith 1853)

**County records:** Allegan, Bay, Berrien, Calhoun, Cheboygan, Clare, Clinton, Eaton, Huron, Ingham, Ionia, Kalamazoo, Kent, Lapeer, Leelanau, Manistee, Mason, Mecosta, Midland, Montcalm, Newaygo, Oakland, Oceana, Ogemaw, Sanilac, Shiawassee, Van Buren, Wayne.

**Notes.** A primitively eusocial ground-nester, commonly found in south-facing banks or horizontal ground near streams and rivers (Batra 1964, 1966). A well-studied species of halictid bee; for a list of references see Gibbs (2010) and Moure & Hurd (1987).

Subgenus Evylaeus Robertson

**Taxonomy:** Gibbs *et al.* (2013).

Lasioglossum (Evylaeus) cinctipes (Provancher 1888)

**County records:** Antrim, Barry, Cass, Cheboygan, Clare, Clinton, Dickinson, Emmet, Genesee, Grand Traverse, Huron, Ingham, Iosco, Kalamazoo, Kalkaska, Keweenaw, Lapeer, Leelanau, Livingston, Marquette, Montcalm, Oceana, Ogemaw, Ontonagon, Ottawa, Van Buren, Wexford.

**Notes.** A eusocial ground-nester (Atwood 1933; Knerer & Plateaux-Quénu 1966; Packer *et al.* 1989a; b).

Subgenus Hemihalictus Cockerell

**Revision:** Gibbs *et al.* (2013).

**Biology.** All species are expected to be solitary ground-nesters, but most have never been studied. Prior to Gibbs *et al.* (2013), the subgenus was monotypic, including only *L. lustrans*.

Lasioglossum (Hemihalictus) birkmanni (Crawford 1906)

**County records:** Allegan, Berrien, Cheboygan, Ingham, Jackson, Kalamazoo, Muskegon, Oceana, Shiawassee, Van Buren.
**Notes.** The application of this name has undergone a recent change (Gibbs et al. 2013). Recent examination of the lectotype of *Halicus quadrimaculatus* Robertson 1890 (described as *4-maculatus*; Robertson’s name was preoccupied by *Hylaeus quadrimaculatus* Schenck, 1853 [=*Lasiglossum interruptum* (Panzer, 1798) of Europe] so was replaced by *Halictus macoupinensis* Robertson 1895), designated by Cresson (1928), revealed that that name *macoupinensis* has been used incorrectly by most authors. The type series was composite, and records of *L. macoupinense* in earlier literature, including some of the type series, do not match the lectotype and are instead referable to *L. birkmanni*. The name *L. macoupinense* is still in use, but study of the lectotype shows it to be a senior synonym of the bee widely known (e.g., Mitchell 1960; Hurd 1979; Moure & Hurd 1987) as *Evylaeus divergens* (Lovell) (see below).

Observed nesting in the ground in Alabama (see Gibbs et al. 2013).

*Lasioglossum* (*Hemihalictus*) *fedorense* (Crawford 1906)

**County records:** St. Joseph.

**Notes.** *Lasioglossum fedorense* has been collected previously from the Indiana Dunes National Lakeshore (Grundel et al. 2011), which at its closest point is less than 10 km from the Michigan border. *Lasioglossum fedorense* prefers sandy habitats (Gibbs et al. 2013), which are abundant in the western part of the LP. The single specimen female examined is from Tamarack Lake only 6 km from the Indiana border.

**Material examined.** *St. Joseph Co.:* Tamarack Lake, 14 Jun. 1986 (1 ♀ UMMZ).

*Lasioglossum* (*Hemihalictus*) *foxii* (Robertson 1895)

**County records:** Allegan, Antrim, Barry, Benzie, Berrien, Cheboygan, Clinton, Crawford, Dickinson, Ingham, Kalamazoo, Kalkaska, Lake, Leelanau, Livingston, Manistee, Montcalm, Montmorency, Oceana, Oscoda, Otsego, Ottawa, Van Buren, Washtenaw.

**Notes.** *Lasioglossum foxii* is known to nest in aggregations (Knerer & Atwood 1962).

*Lasioglossum* (*Hemihalictus*) *inconditum* (Cockerell 1916)

**County records:** Alger, Chippewa, Dickinson, Iron, Keweenaw, Marquette, Schoolcraft.

**Notes.** A ground-nesting species that is presumably solitary (Gibbs et al. 2013). Until recently, North American material of this species was identified as *L. rufitarse* (Zetterstedti 1838), a Palaearctic species.

*Lasioglossum* (*Hemihalictus*) *lustrans* (Cockerell 1897)

**County records:** Alger, Clare, Clinton, Delta, Dickinson, Kalamazoo, Kalkaska, Kent, Lake, Leelanau, Muskegon, Newaygo, Osceola, Ottawa, St. Joseph, Van Buren.

**Notes.** This solitary species is best known from the southeastern and south-central United States, but it extends north locally to Michigan’s Upper Peninsula. It is relatively common along the east coast of Lake Michigan where it visits a variety of yellow composite flowers. Southern populations of *L. lustrans* have been reported to be very narrow oligoleges of *Pyrrhopappus* (Asteraceae), only occasionally visiting other members of the tribe Cichorieae (Daly 1961; Michener 1947b). Northern populations, however, occur outside the range of *Pyrrhopappus* (Estes & Thorp 1975) and regularly visit a broader array of species in the tribe. Arduser (2010) and Grundel et al. (2011) both report *L. lustrans* visiting *Krigia* species in the north. *Lasiglossum lustrans* has also been observed visiting other genera of Cichorieae in Michigan, including *Crepis* and *Taraxacum* (J.G. pers. obs.).

*Lasioglossum lustrans* is recognizable by the absence of vein 1rs-m through most of its range, but a small proportion of northern specimens from Wisconsin and Michigan have this vein present (Gibbs 2010a; Gibbs et al. 2013).
Lasioglossum (Hemihalictus) macoupinense (Robertson 1895)

County records: Alger, Allegan, Antrim, Barry, Cheboygan, Clare, Clinton, Delta, Dickinson, Emmet, Gratiot, Huron, Ingham, Iron, Jackson, Kalamazoo, Mackinac, Manistee, Midland, Montcalm, Oakland, Oceana, Osceola, Ottawa, St. Clair, Van Buren, Wayne.

Notes. The female lectotype of Halictus quadrimaculatus (see Cresson 1928) in the ANSP belongs to the species most often referred to as L. divergens in the literature (often in combination with either Halictus or Evylaeus) (Gibbs et al. 2013) although the name macoupinensis (a replacement name for H. quadrimaculatus) has been most often used to refer to L. birkmanni (see above).

Lasioglossum (Hemihalictus) nelumbonis (Robertson 1890)

County records: Allegan, Barry, Calhoun, Dickinson, Ionia, Jackson, Kalamazoo, Lapeer, Livingston, Midland, Osceola, St. Joseph, Van Buren.

Notes. Lasioglossum nelumbonis is associated with wetlands and has been recorded as an oligolege of Nymphaeaceae (Gibbs et al. 2013; Lippok et al. 2000).

Lasioglossum (Hemihalictus) pectorale (Smith 1853)


Notes. A common and abundant species.

Lasioglossum (Hemihalictus) swenki (Crawford 1906)

County records: Kalamazoo, Ottawa.

Notes. This primarily North Central species apparently prefers sandy areas (e.g., Grundel et al. 2010). Gibbs et al. (2013) first reported the occurrence of this species from a single location near Lake Michigan. A closely related species, L. fedorensis, is newly recorded from Michigan (see above).


Subgenus Lasioglossum Curtis s. s.

Revision: McGinley (1986).

Behavior: All members of Lasioglossum s. s. are expected to be solitary, ground-nesters (Gibbs et al. 2012b; Pesenko et al. 2000).

Lasioglossum (Lasioglossum) acuminatum McGinley 1986 (forbesii group)

County records: Alger, Allegan, Antrim, Barry, Berrien, Cheboygan, Crawford, Delta, Dickinson, Emmet, Hillsdale, Huron, Ingham, Kalkaska, Lake, Leelanau, Mackinac, Manistee, Marquette, Mecosta, Menominee, Midland, Missaukee, Montmorency, Muskegon, Newaygo, Oakland, Oceana, Ogemaw, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Schoolcraft, Tuscola, Van Buren, Wexford.
**Lasioglossum (Lasioglossum) athabascense** (Sandhouse 1933)

County records: Allegan, Antrim, Cheboygan, Chippewa, Dickinson, Emmet, Houghton, Keweenaw, Mackinac, Marquette, Ontonagon, Wayne.

**Lasioglossum (Lasioglossum) coriaceum** (Smith 1853)


**Lasioglossum (Lasioglossum) forbesii** (Robertson 1890) (**forbesii** group)

County records: Allegan, Berrien, Clinton, Ingham, Ottawa, Tuscola.  
Notes. The rarest member of the subgenus in the state. However, before McGinley’s (1986) revision, this name was applied broadly to multiple species, e.g., *L. paraforbesii* McGinley, now recognized as distinct.

**Lasioglossum (Lasioglossum) fuscipenne** (Smith 1853)

County records: Allegan, Barry, Cheboygan, Kalamazoo, Muskegon, Oakland, Ottawa, Van Buren.

**Lasioglossum (Lasioglossum) paraforbesii** McGinley 1986 (**forbesii** group)

County records: Allegan, Barry, Berrien, Cass, Cheboygan, Chippewa, Clinton, Eaton, Grand Traverse, Huron, Ingham, Jackson, Kalamazoo, Kalkaska, Lake, Leelanau, Lenawee, Mackinac, Mecosta, Midland, Montcalm, Newaygo, Oakland, Oceana, Oscoda, Tuscola, Van Buren.

**Subgenus Leuchalictus** Warncke

Revision: McGinley (1986).  
Biology. Both representatives of the subgenus in North America are believed to be accidental introductions (Ebmer 2011; Giles & Ascher 2006; Zayed *et al.* 2007). The record of a third member of the subgenus, *L. dynastes* (Bingham) in Ohio (Ebmer 2011) is incorrect and due to a poorly labeled specimens. The collector, an Ohio resident, actually found the specimens in the Himalayan Region of India: Ranichauri, District of Tehri Garhwal, State of Uttarakhand (R. Williams, pers. comm.). Both *L. (Leuchalictus)* below are solitary, ground-nesters (Pesenko *et al.* 2000).

**Lasioglossum (Leuchalictus) leucozonium** (Schrank 1781)

County records: Alger, Allegan, Antrim, Barry, Berrien, Calhoun, Cass, Chippewa, Clare, Clinton, Dickinson, Eaton, Genesee, Grand Traverse, Gratiot, Houghton, Huron, Ingham, Iosco, Iron, Jackson, Kalamazoo, Kalkaska, Keweenaw, Lake, Lapeer, Leelanau, Livingston, Luce, Mackinac, Marquette, Montcalm, Muskegon, Newaygo,
Notes. A very common exotic species (Zayed et al. 2007). It is a solitary ground-nester (Atwood 1933; Knerer 1969; Knerer & Atwood 1966; Pesenko et al. 2000).

*Lasioglossum (Leuchalictus) zonulum* (Smith 1848)


Notes. An exotic species (Giles & Ascher 2006). Closely related to *L. leucozonium*, with similar nesting habits (Atwood 1933; Pesenko et al. 2000).

Subgenus *Sphecodogastra* Ashmead

Revision: Gibbs et al. (2013).

Biology. A biologically diverse subgenus including social and solitary nesters. Most members of the subgenus sensu Gibbs et al. (2013) are polylectic, but the type species and its relatives, i.e. *Sphecodogastra* sensu stricto, are Onagraceae specialists (McGinley 2003).

*Lasioglossum (Sphecodogastra) comagenense* (Knerer & Atwood 1964) (*fulvicorne* group)

County records: Antrim, Dickinson, Gogebic, Keweenaw, Marquette.


*Lasioglossum (Sphecodogastra) oenotherae* (Stevens 1920) (*lusorium* group)

County records: Ingham, Kent, Livingston, Washtenaw.

Notes. The nesting biology of Ontario populations have been studied in detail (Knerer & Mackay 1969). Records of this species are largely absent from the Midwest, although the species occurs widely from the Central Plains to Maritime Canada (Gibbs et al. 2013; McGinley 2003). Multiple attempts by JG were made to capture female *L. oenotherae* in Ingham County from *Oenothera* spp. (Onagraceae) in the early and late hours of the day without success, but two males were obtained from other flowers during the middle of the day when females would not typically be active (McGinley 2003).


*Lasioglossum (Sphecodogastra) quebecense* (Crawford 1907) (*fulvicorne* group)

County records: Allegan, Cass, Cheboygan, Clare, Crawford, Dickinson, Ingham, Keweenaw, Leelanau, Mackinac, Marquette, Montmorency, Osceola, Oscoda, Ottawa, Schoolcraft, Van Buren, Wexford.

Notes. *Lasioglossum quebecense* has been recorded as frequent visitor of *Vaccinium* (Boulanger et al. 1967) and has potential value as pollinator of spring crops.
Lasioglossum (Sphecodogastra) seillean Gibbs & Packer 2013 (fulvicorne group)

County records: Alger, Keweenaw.

Notes. A boreal species first described in Gibbs et al. (2013). Michigan specimens are all females, but identification is most reliable by examination of male genitalia due to close similarity to L. quebecense.

Lasioglossum (Sphecodogastra) texanum (Cresson 1872) (texanum group)

County records: Clinton, Ingham, Kalamazoo, Kent, Livingston.

Notes. A solitary Oenothera (Onagraceae) specialist that flies at moonlight (Kerfoot 1967a; b; McGinley 2003). Lasioglossum texanum is rarely encountered in the state.

Lasioglossum (Sphecodogastra) truncatum (Robertson 1901) (calceatum group)

County records: Grand Traverse, Lake, Leelanau.

Genus Sphecodes Latreille

Taxonomy: Mitchell (1960). Sphecodes is in particular need of revision.

Biology. All members of the genus are cleptoparasites or social parasites, usually of other Halictinae but with exceptions, see below. Definitive host records are few and information on host specificity is generally lacking.

Sphecodes antennariae Robertson 1891 (mandibularis group)

County records: Kalamazoo, Washtenaw.

Sphecodes aroniae Mitchell 1960 (ranunculi group) (New state record)

County records: Midland, Muskegon.

Notes. Sphecodes aroniae is very similar to S. ranunculi, which was previously known from the state, and the former has been under-recorded in published studies (Goldstein & Ascher 2016). Females recorded below were distinguished from S. ranunculi (Robertson) by the flat distinct genal carina and the male by the greatly expanded angular mesotibia. Both sexes are also recognizable by the flat procoxa.


Sphecodes atlantis Mitchell 1956 (mandibularis group)

County records: Allegan, Berrien, Clare, Ingham, Leelanau, Mecosta, Midland, Muskegon, Otsego, Washtenaw.

Notes. A known cleptoparasite of Lasioglossum pilosum (see Michener 1978).

Sphecodes autumnalis Mitchell 1956 (mandibularis group)

County records: Alger, Gladwin, Midland, Shiawassee.
Notes. A cleptoparasite of Perdita octomaculata (see Michener 1978).

Sphecodes banksii Lovell 1909 (mandibularis group)

County records: Allegan, Ottawa.

Notes. Local in occurrence and perhaps sand associated, possibly a cleptoparasite of L. vierecki.

Sphecodes clematidis Robertson 1897 (dichrous group)

County records: Ingham, Ionia, Otsego, Shiawassee.

Sphecodes confertus Say 1837 (confertus group)

County records: Allegan, Cheboygan, Clinton, Ingham, Livingston, Muskegon, Oceana, Ottawa, Shiawassee, Van Buren, Wayne.

Sphecodes coronus Mitchell 1956 (mandibularis group)

= Sphecodes carolinus Mitchell, 1956
Holotype. ♀ USA, North Carolina, Grandfather Mt., 24 Jun. 1954, on Rubus, T.B. Mitchell (NMNH: 76237).

County records: Alger, Arenac, Charlevoix, Dickinson, Iosco, Keweenaw, Muskegon.

Notes. The synonymy of these two names has not been well established in the literature, although S. coronus has been used to include both sexes in faunal studies (Goldstein & Ascher 2016) and DNA barcode data support the synonymy (Sheffield et al. 2009; Sheffield & Perron 2014).

Sphecodes cressonii (Robertson 1903) (mandibularis group)

County records: Allegan, Barry, Berrien, Calhoun, Clinton, Keweenaw, Muskegon, Montcalm, Ottawa, Washtenaw.

Sphecodes davisii Robertson 1897 (mandibularis group)

Holotype. ♂ USA, Michigan (?) (Michigan Agricultural College), 17 Apr. 1886 (INHS 179717)
= Sphecodes persimilis Lovell & Cockerell 1907

County records: Alger, Antrim, Calhoun, Ingham, Kent, Leelanau, Livingston, Oakland, Ottawa, Tuscola, Van Buren.

Notes. This is a common and widespread species, originally described from a single male specimen. It is considered a senior synonym of S. persimilis, which was described from the female. Mitchell (1960) pointed out the possible synonymy and Abrams & Eickwort (1980) considered this probable. Mike Arduser and JSA have each applied this synonymy, but its establishment was relatively obscure since it was not done as part of a published revision but rather has appeared online and implicitly in faunal checklists (Arduser 2010; Ascher et al. 2014; Goldstein & Ascher 2016). Sphecodes davisii is a cleptoparasite of Agapostemon virescens (Fabricius) and A. sericeus ( Förster) (Abrams & Eickwort 1980).
Sphecodes dichrous Smith 1853 (dichrous group)

Syntype. ♀ ♂ USA, E. Doubleday (NHM).
= Sphecodes knetschi Cockerell 1898 (New synonymy)


County records: Clinton, Ingham, Jackson, Livingston, Muskegon, Washtenaw.
Notes. Mitchell (1960) records this species under both names. Although the synonymy, first recognized by Mike Arduser, has been applied implicitly, it has not been published formally.

Sphecodes fattigi Mitchell 1956 (mandibularis group)

= Sphecodes prostygius Mitchell, 1960 (New synonymy)

Holotype. ♀ USA, New Hampshire, Meredith Center, 3 Aug. 1957, Solidago, R. A Morse (CUIC).

County records: Alger, Clinton, Lake, Missaukee, Van Buren.
Notes. This unpublished synonymy by M. Arduser has been applied in databases and implicitly in other studies but has not been formally stated.

Sphecodes heraclei heraclei Robertson 1897 (dichrous group)

County records: Ionia, Livingston.
Notes. Recorded by Evans (1986) from the E.S. George Reserve, Livingston County, and recently recollected by T. Wood (pers. comm.) at the Portland State Game Area, Ionia County.

Sphecodes illinoensis (Robertson 1903) (mandibularis group)

County records: Allegan, Leelanau, Livingston, Oceana, Ottawa, Roscommon, Van Buren, Washtenaw.

Sphecodes johnsonii Lovell 1909 (mandibularis group)

County records: Cheboygan, Clinton, Ingham, Van Buren.

Sphecodes levis Lovell & Cockerell 1907 (mandibularis group)

County records: Van Buren.
Notes. Mitchell (1960) record. Two female specimens from Van Buren Co. at JBWM. This species has been recorded as a cleptoparasite of Lasioglossum quebecense (see Michener 1978).

Sphecodes mandibularis Cresson 1872 (mandibularis group)

Lectotype. ♀ USA, Texas, Bosque Co.: G.W. Belfrage (ANSP: 2133). Designated by Cresson (1916).
= Sphecodes stygius Robertson 1893

County records: Allegan, Antrim, Barry, Benzie, Charlevoix, Clinton, Kalamazoo, Leelanau, Livingston, Montcalm, Van Buren.

Notes. The synonymy of these two names, proposed by M. Arduser, has not been well established in the literature, although S. mandibularis has been used in faunal studies for the species (Wolf & Ascher 2009, Ascher et al. 2014, Goldstein & Ascher 2016). Mitchell (1960) treated the species as S. stygius rather than S. mandibularis because the female lectotype of the latter from Bosque County, Texas was extralimital.

**Sphecodes minor Robertson 1898 (dichrous group)**

County records: Barry, Ingham, Shiawassee.

Notes. Recorded as a cleptoparasite of Lasioglossum cinctipes, with two separate broods that attack nests in spring and summer during the solitary and social phases of the host (Knerer & Atwood 1967).

**Sphecodes pimpinellae Robertson 1900 (mandibularis group)**

Holotype. ♀ USA, Illinois, Carlinville, C. Robertson (INHS) = Sphecodes wheeleri Mitchell, 1956 (New synonymy)

Holotype. ♀ USA, North Carolina, Marion, 18 Jun. 1941, Leucanthemum, T. B. Mitchell (NMNH).

County records: Berrien, Jackson.

Notes. Sphecodes pimpinellae, a cleptoparasite of Augochlorella (Ordway 1964), is newly recorded from southern Michigan (Lettow et al. in review). The synonymy, first suggested by Ordway (1964) and endorsed in an unpublished study by Mike Arduser, is provisionally accepted here but cannot be considered well established due to incomplete understanding of observed morphological variation. The names S. pimpinellae and S. wheeleri have been applied to females with and without a subapical tooth on the mandible, respectively. Sphecodes pimpinellae has been infrequently recorded across the east and Midwest, while S. wheeleri was described from a few areas in New York, Connecticut and North Carolina (Mitchell 1956). The Michigan female specimen lacks the subapical tooth, so should the synonymy be rejected it would be S. wheeleri.


**Sphecodes prosphorus Lovell & Cockerell 1907 (dichrous group)**

County records: Crawford, Ionia, Presque Isle.

**Sphecodes pycnanthemi Robertson 1897 (mandibularis group) (New state record)**

County records: Hillsdale.

Notes. Sphecodes pycnanthemi is a poorly known species, described from Carlinville, Illinois. It has also been recorded from Indiana (Jean 2010). A New York specimen was compared directly to the lectotype. A recently collected specimen from Michigan matches the New York material.


Additional material examined. NEW YORK: Tompkins Co.: Ithaca, Six-mile Creek, N42.432 W76.484, 19 May 2012, J. Gibbs (JBWM—New state record).

**Sphecodes ranunculi Robertson 1897 (ranunculi group)**

County records: Alger, Ingham, Livingston, Muskegon, Shiawassee, Van Buren.
**Sphecodes townesi** Mitchell 1956 (*mandibularis* group)

**County records:** Ingham, Iosco.

**Nominae**

**Dieunomiini**

**Genus Dieunomia** Cockerell

**Revision:** Blair (1935).

**Subgenus Dieunomia** Cockerell **s. s.**

**Dieunomia** (*Dieunomia*) **heteropoda** *heteropoda* (Say 1824)

**County records:** Allegan, Berrien, Kalamazoo, Ottawa, Van Buren.

**Notes.** *Dieunomia heteropoda* was recently documented from the southwestern portion of the state based on specimens collected since 2003 (Gibbs *et al.* 2014). These records are near the northeastern edge of its range. Although the large size and dark color of this bee makes it easy to recognize, the earliest known record in the state is only from 2003, suggesting that there has been a genuine range expansion. However, Montgomery (1957) recorded it from Starke County in northwest Indiana. *Dieunomia heteropoda* can be collected on large Asteraceae, such as *Helianthus*, *Coreopsis*, *Rudbeckia* and *Centaurea*. Females have also been observed collecting nectar from *Polygonum* (Polygonaceae). Nests and mating behavior have been described from western states (Cane 1991; Cross & Bohart 1960; Wcislo 1993; Wcislo & Buchmann 1995).


Rophitinae

**Genus Dufourea** Lepeletier

**Taxonomy:** Mitchell (1960); Dumesh & Sheffield (2012); Gibbs *et al.* (2014).

**Behavior.** *Dufourea* are solitary ground-nesters that primarily specialize on particular floral hosts.

**Dufourea harveyi** (Cresson 1878)

**County records:** Kalamazoo.

**Notes.** *Dufourea harveyi*, a specialist on *Potentilla*, was recently resurrected from synonymy with *D. fimbriata fimbriata* (Cresson) by Gibbs *et al.* (2014). Three specimens deposited at MSUC collected between 1960 and 2009 were recently documented from Barry, Jackson and Kalamazoo Counties in a review of Michigan *Dufourea* (Gibbs *et al.* 2014). The species had not previously been recorded from the eastern United States, although a specimen...
from northern Ontario had been reported (Dumesh & Sheffield 2012; as *D. fimbriata*). *Dufourea fimbriata* is fully confirmed only from its type locality of Colorado and from California where subspecies *sierrae* (Michener) occurs. The four species of *Dufourea* known from Michigan were reviewed by Gibbs et al. (2014).

**Dufourea maura** (Cresson 1878)

**County records:** Keweenaw.

**Notes.** Specialist on *Campanula* (Campanulaceae). Only known in the Eastern United States from Isle Royale (Arduser 1986).

**Dufourea monardae** (Viereck 1924)

**County records:** Calhoun, Dickinson, Huron, Ingham, Ionia, Kalamazoo, Livingston, Oakland, Oceana.

**Notes.** Specialist on Lamiaceae, in particular *Monarda fistulosa* L.

**Dufourea novaeangliae** (Robertson 1897)

**County records:** Allegan, Ingham, Wexford.

**Notes.** Solitary, ground-nester and a specialist on *Pontederia cordata* L. (Pontederiaceae) studied in detail in New York (Eickwort et al. 1986).

**MEGACHILIDAE**

**Megachilinae**

**Anthidiini**

**Genus Anthidiellum Cockerell**

**Subgenus Loyolanthidium Urban**

**Taxonomy:** Mitchell (1962); Urban (2001).

**Biology.** Nests of resin are made on the outer surface of plants or rocks (Baker et al. 1985; Grigarick & Stange 1968).

**Anthidiellum (Loyolanthidium) notatum notatum** (Latreille 1809) (New state record)

**County records:** Berrien, Cass, Ingham, Livingston.

**Notes.** This species has not been recorded previously from Michigan although it was expected to be found here based on its wide distribution including southern Ontario (J.G. pers. obs.) and northern Indiana (Grundel et al. 2011). Several specimens were collected recently in the southern LP and a single historical specimen has been identified. Recent collections from two sites in different counties include males of two subspecies: *A. notatum notatum* and *A. notatum boreale* (Robertson) (see below). *Anthidiellum boreale* is distinguished from the nominal subspecies (widespread in the Eastern United States) by the truncated paraocular maculations, absence of axillary maculations and presence of a medial longitudinal carina on T6 and T7 of males (Mitchell 1962). Nest from North Carolina described by Baker et al. (1985).

THE BEES OF MICHIGAN

Anthidiellum (Loyolanthidium) notatum boreale (Robertson 1902) (New state record)

County records: Cass, Ingham.

Notes. The holotype male is from Carlinville, Illinois (INHS). Mitchell (1962) lists Illinois in the distribution of both subspecies known from Michigan. The collection of males together at the same site suggests the subspecies are syntopic. Additional taxonomic study is needed to determine if A. n. boreale warrants subspecific or specific status. Urban (2001) described and reviewed the subgenus (as a genus), but did not examine any specimens of A. n. boreale, nor did she indicate its current taxonomic status, whereas she elevated the western A. gilense (Cockerell 1897) and A. robertsoni (Cockerell 1904) to specific rank.


Genus Anthidium Fabricius

Revision: Gonzalez & Griswold (2013).

Behavior. Wool-carder bees use plant hairs to make nests in pre-existing cavities or the ground.

Subgenus Anthidium Fabricius s. s.

Anthidium (Anthidium) manicatum manicatum (Linnaeus 1758)

County records: Allegan, Bay, Ingham, Jackson, Kent, Leelanau, Lenawee, Mecosta, Newaygo, Oakland, Ottawa, Saginaw, Van Buren, Washtenaw, Wayne.

Notes. Exotic. First recorded in North America from New York (Jaycox 1967), this cavity-nesting species has spread rapidly across North America (Gibbs & Sheffield 2009). See also O’Brien et al. (2013).

Anthidium (Anthidium) psoraleae Robertson 1902

County records: Barry, Berrien, Lake, Livingston, Washtenaw.

Notes. This species is found in the central USA between the Rockies and Mississippi River, from southern Ontario south to Oklahoma. It has been collected in southern Michigan, including Barry, Berrien, Livingston and Washtenaw Counties (Gonzalez & Griswold 2013; O’Brien et al. 2013). New site records are provided here that extend its range northward to Lake County.


Anthidium (Anthidium) tenuiflorae Cockerell 1907 (New state record and new for Eastern USA)

(Fig. 17A)

County records: Keweenaw (Isle Royale).
Notes. Gonzalez & Griswold (2013) report this primarily western species from as far east as Minnesota in the US and Saskatchewan in Canada. The Minnesota records are from near Basswood Lake, which is less than 200 km west of Isle Royale, Michigan where the bee was collected in 1957 and also recently by S. Wilson (pers. comm.). A single bee from Manitoba has been examined from Garson Quarry Station, 1 July 1996 (JBWM) suggesting that it should also occur in western Ontario, Canada. Notes on the nest were made by Hicks (1926) in Colorado.


**Subgenus Proanthidium Friese**

*Anthidium (Proanthidium) oblongatum oblongatum* (Illiger 1806)

**County records:** Allegan, Barry, Berrien, Clinton, Ingham, Ionia, Kent, Ottawa, Van Buren, Washtenaw, Wayne.


**Genus Dianthidium Cockerell**

**Subgenus Dianthidium Cockerell s. s.**

**Taxonomy:** Schwarz 1926; Mitchell (1962).

**Biology:** O’Brien (2007).

*Dianthidium (Dianthidium) simile* (Cresson 1864)

**County records:** Berrien, Cass, Charlevoix, Cheboygan, Grand Traverse, Huron, Iosco, Kalkaska, Lake, Leelanau, Mackinac, Manistee, Mason, Mecosta, Midland, Montcalm, Montmorency, Oceana, Oscoda, Otsego, Ottawa, Presque Isle, Shiawassee.

**Notes.** A resin bee with underground nests, studied in detail in Michigan by O’Brien (2007).
Genus Stelis Panzer

Taxonomy: Parker & Bohart (1979); Mitchell (1962).

Biology: Stelis are all cleptoparasites of megachiline bees.

Subgenus Dolichostelis Parker & Bohart


Stelis (Dolichostelis) louisae Cockerell 1911

County records: Cass, Clinton, Ingham, Kalamazoo, Washtenaw, Wayne.

Notes. Stelis louisae is a cleptoparasite of Megachile (Chelostomoides) including M. campanulae (Robertson) (Baker et al. 1985; Parker et al. 1987).

Subgenus Stelis Panzer s. s.

Stelis (Stelis) coarctatus Crawford 1916 (coarctatus group)


County records: Cheboygan, Kalamazoo, Livingston, Mason, Missaukee.

Notes. Mitchell (1962) did not include S. coarctatus in his treatment of the eastern species. The holotype female, deposited at NMNH, is from Kansas. The holotype female of S. vernalis, also deposited at NMNH, is from North Carolina. This species has been recorded as a cleptoparasite of Heriades carinata Cresson (see Sheffield et al. 2008). It was reared from Heriades carinata nests in Michigan by Matthews (1965 as vernalis), but also from Hoplitis (Proteriades) shoshone (Parker) in Nevada (Parker 1976), suggesting a broad host range.

Stelis (Stelis) foederalis Smith 1854 (foederalis group)

= Stelis michiganensis Mitchell, 1962: 45. (Michigan holotype; Fig. 18). New synonymy (by F. Parker and T. Griswold).


County records: Baraga, Delta, Dickinson, Kalkaska, Keweenaw, Luce, Mackinac, Marquette, Montmorency, Schoolcraft.

Notes. Recorded as a cleptoparasite of Osmia atriventris Cresson and Hoplitis spoliata (Provancher) (see Fye 1965; Medler 1967b as Chelynia).

Stelis (Stelis) labiata (Provancher 1888) (subemarginata group)

County records: Dickinson, Iron.

Notes. Recorded as acleptoparasite of Hoplitis species, including H. producta (Cresson) and H. spoliata (Medler 1961, 1967b; Medler & Lussenhop 1968).
**Stelis (Stelis) lateralis** Cresson 1864 *(lateralis group)*

**County records:** Antrim, Cass, Cheboygan, Dickinson, Eaton, Emmet, Gratiot, Isabella, Jackson, Saginaw, St. Joseph, Waseca.

**Notes.** Recorded as a cleptoparasite of *Hoplitis*, including *H. pilosifrons* (Cresson), *H. producta* and *H. spoliata* (Graenicher 1905; Hicks 1926; Medler 1961, 1967b; Michener 1955; Rau 1928), recorded in earlier studies as *sexmaculata* Ashmead.

**Stelis (Stelis) nitida** Cresson 1878 *(foederalis group)*

**County records:** Baraga, Keweenaw, Schoolcraft.

**Stelis (Stelis) subemarginata** Cresson 1878 *(subemarginata group)* *(New state record)* *(Fig. 17B)*

**County records:** Keweenaw.

**Notes.** A single specimen record confirmed by S. Droge and examination of photographs. Fye (1965) recorded this species from Black Sturgeon Lake, Ontario; approximately 125 km north of Isle Royale as a cleptoparasite of *Hoplitis spoliata* (see also Sheffield *et al.* 2008). Graenicher (1935) recorded it from a nest of *Osmia similima* Smith from Milwaukee, Wisconsin on the shore of Lake Michigan, but his identification might apply to *Stelis labiata* (Medler & Lussenhop 1968).

Recorded as a cleptoparasite of *H. spoliata* and *O. similima*.

**Material examined** *(photograph). Keweenaw Co.:* Isle Royale National Park, 48.1252 -88.5111, 14 Jul. 2013, S. Wilson *(1 ♀ PWRC).*

![Figure 18](http://www.nmnh.si.edu/).

**Genus Trachusa Panzer**

**Subgenus Heteranthidium Cockerell**

**Taxonomy:** Mitchell (1962); Snelling (1966a); Brooks & Griswold (1988).
**Trachusa (Heteranthidium) zebrata** (Cresson 1872) *(zebrata group)*

**County records:** Kalamazoo, Lake, Livingston.

**Notes.** A prairie associated species, uncommonly observed in Michigan.

**Megachilini**

**Genus Coelioxys Latreille**

**Taxonomy:** Mitchell (1962, 1980); Baker (1975); Rocha Filho & Packer (2016).


**Subgenus Boreocoelioxys Mitchell**

**Revision:** Baker (1975).

**Coelioxys (Boreocoelioxys) moestus** Cresson 1864

**County records:** Arenac, Calhoun, Cheboygan, Dickinson, Huron, Iron, Kalamazoo, Keweenaw, Marquette, Mecosta, Midland, Montcalm, Oscoda, Washtenaw.

**Notes.** Hosts include *Megachile frigida* Smith and *M. texana* Cresson (Pengelly 1955), *M. centuncularis* (L.) (Medler 1959; Sheffield *et al.* 2008), *M. lapponica* Thomson (Peck & Bolton 1946), *M. relativa* Cresson (Medler & Koerber 1958; Medler & Lussenhop 1968; Sheffield *et al.* 2008; Strickler & Scriber 1994), and possibly *M. rotundata* (Fab.) (Hobbs 1968) (see *C. funerarius* Smith entry below), *M. melanophaea* Smith (Pengelly 1955) and *M. pusilla* (Baker 1975).

**Coelioxys (Boreocoelioxys) octodentatus** Say 1824

**County records:** Berrien, Cheboygan, Clinton, Huron, Ingham, Kalamazoo, Kalkaska, Lenawee, Livingston, Midland, Oakland, Shiawassee, Van Buren, Washtenaw, Wayne.

**Notes.** Hosts include *Megachile brevis* Say (Baker 1971; Hicks 1926; Michener 1953; Pengelly 1955), *M. mendica* Cresson (Medler 1965), *M. centuncularis* (Medler & Lussenhop 1968; Pengelly 1955), *M. perihierta* Cockerell and *M. rotundata* (Baker 1975), and *M. texana* and possibly *M. frigida* and *M. melanophaea* (Pengelly 1955).

**Coelioxys (Boreocoelioxys) porterae** Cockerell 1900

**County records:** Alger, Alpena, Cheboygan, Clinton, Delta, Emmet, Hillsdale, Huron, Iron, Kalamazoo, Keweenaw, Mackinac, Marquette, Mecosta, Midland, Muskegon, St. Joseph.

**Notes.** Hosts include *Megachile frigida* (Baker 1975) and *M. relativa* (Mitchell 1962; Sheffield *et al.* 2008).

**Coelioxys (Boreocoelioxys) rufitarsis** Smith 1854

**County records:** Alger, Bay, Cheboygan, Clinton, Crawford, Dickinson, Gladwin, Huron, Ingham, Isabella, Jackson, Kent, Keweenaw, Livingston, Mackinac, Menominee, Midland, Oakland, Ogemaw, Ontonagon, Oscoda, Otsego, Saginaw, Sanilac, Shiawassee, Washtenaw, Wayne.
Notes. Host records include *Megachile latimanus* Say and *M. melanophaea* (Graenicher 1905, 1935; Pengelly 1955), *M. montivaga* Cresson (Hicks 1926), *M. perihirta* (Baker 1975), and *M. texana* (Pengelly 1955).

Two spellings were used by Smith (1854) in the original publication describing this species, *Coelioxys rufitarsus* in the heading of the species description (pg. 271) and *C. rufitarsis* in the appendix (pg. 460). No subsequent uses of either spelling by Smith are known to us. Dalla Torre (1896) cited only the spelling *C. rufitarsis*, incorrectly attributing this to page 271 in Smith (1854) and incorrectly attributing use of this spelling to Cresson (1864) and Provancher (1882), whereas those authors had used *rufitarsus*. Robertson (1897), Lovell & Cockerell (1907), and Hurd (1979) all referenced the original spelling, but adopted *C. rufitarsis*, although none noted the source of this spelling, i.e. they did not cite the page number in question from Smith’s appendix. Crawford (1914) and Hobbs (1956) used both spellings apparently in error. Thus, none of these authors satisfies the requirements of first reviser (see ICZN article 24.2.1). Moure et al. (2007), however, cited both original spellings correctly and adopted *rufitarsis*, establishing this spelling as valid. The spelling *rufitarsis* is in prevailing usage (see ICZN article 33.2.3.1), i.e. has been used by a substantial majority of authors (Baker 1975; Beaulne 1942; Bizecki Robson 2013; Fried & Dillon 2012; Cockerell 1900, 1925; Colla et al. 2009; Crawford 1914; Dalla Torre 1896; Donovan & VanEngelsdorp 2010; Gardner & Spivak 2014; Genaro 2001; Graenicher 1927a; Grixiti & Packer 2006; Hobbs 1956; Hurd 1979; Jean 2010; Kuhlman & Burrows 2017; Leavengood & Serrano 2005; Linsley 1951; MacKay & Knerer 1979; Mitchell 1962; Neff & Simpson 1991; Onufenko et al. 2015; Pearson 1933; Peck & Bolton 1946; Richards et al. 2011; Robertson 1929; Rocha Filho & Packer 2016; Rozen & Kamel 2006; Scott et al. 2011; Shapiro et al. 2014; Sheffield et al. 2009; Stephen & Rao 2007; Wagner et al. 2014; Wojcik et al. 2008; Wolf & Ascher 2009). While only a limited number of authors have used *rufitarsus* (Blake et al. 2010; Cockerell 1903b; Crawford 1914; Cresson 1864; Hobbs 1956; Ivanochko 1979; Michener 2007; Mitchell 1973; Montgomery 1957; Pengelly 1955; Provancher 1882; Sladen 1915; Thomson et al. 1982; Woodcock et al. 2014).

*Coelioxys* (*Boreocoelioxys*) *sayi* Robertson 1897

**County records:** Allegan, Barry, Benzie, Berrien, Branch, Calhoun, Cass, Gratiot, Hillsdale, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Lenawee, Midland, Missaukee, Monroe, Montcalm, Muskegon, Newaygo, Osceola, Ottawa, Shiawassee, St. Joseph, Van Buren, Washtenaw, Wayne.

Notes. Recorded as a cleptoparasite of *Megachile brevis* (Baker 1975) and *M. mendica* (Medler 1965).

Subgenus *Coelioxys* Latreille


*Coelioxys* (*Coelioxys*) *sodalis* Cresson 1878

**County records:** Alger, Cheboygan, Delta, Dickinson, Ingham, Kalamazoo, Keweenaw, Manistee, Marquette, Midland, Wayne.

Notes. Hosts include *Megachile melanophaea* (Graenicher 1927a, 1935; Pengelly 1955), *M. mucida* (Gibbs 2017), *M. frigida* and *M. texana* (Pengelly 1955), and possibly *M. rotundata* (Hobbs 1968). *Coelioxys sodalis* is now considered the only Nearctic member of the subgenus *Coelioxys* (Rocha Filho & Packer 2016).

Subgenus *Cyrtocoelioxys* Mitchell

**Key:** Baker (1975).
Coelioxys (Cyrtocoelioxys) modestus Smith 1854

County records: Berrien, Ingham, Kalamazoo, Livingston, Menominee, Montmorency, St. Joseph, Washtenaw, Wayne.

Notes. Hosts include resin collecting species in the subgenus Megachile (Chelostomoides), including Megachile campanulae (Krombein 1967; O’Neill & O’Neill 2016). Records from leafcutting species, such as M. centuncularis (Graenicher 1927b), and M. relativa (Fye 1965), may be due to confusion with C. moestus (Krombein 1967).

Subgenus Paracoelioxys Gribodo

Revision: Baker (1975) as subgenus Schizocoelioxys Mitchell.

Coelioxys (Paracoelioxys) funerarius Smith 1854

County records: Charlevoix, Cheboygan, Dickinson, Iron, Keweenaw, Lake, Marquette, Sanilac.

Notes. Hosts include Megachile frigida (Mitchell 1962), M. inermis Provancher (Medler 1958; Sheffield et al. 2008), M. latimanus (Graenicher 1927a), M. relativa (Fye 1965; Medler & Koerber 1958; Medler & Lussenhop 1968; Sheffield et al. 2008), and possibly M. rotundata (Hobbs 1968), although the known host M. relativa was also present in that study. In Michigan, both M. relativa and M. inermis are known hosts based on trap nest data (Packer et al. 1995; Strickler & Scriber 1994).

Subgenus Synocoelioxys Mitchell


Coelioxys (Synocoelioxys) alternatus Say 1837


Notes. Recorded as a cleptoparasite of Megachile pugnata say (Medler 1964a), an association frequently seen in Michigan (JG, pers. obs).

Subgenus Xerocoelioxys Latreille s. s.

Revision: Baker (1975); Rocha-Filho & Packer (2016).

Coelioxys (Xerocoelioxys) immaculatus Cockerell 1912 (New state record)

County records: Livingston, Oceana.

Notes. This cleptoparasite of Megachile, including M. addenda Cresson in New Jersey (Cane et al. 1996), has been collected once in Michigan and in adjacent areas of Indiana (Grundel et al. 2011; Jean 2010).

**Genus *Megachile* Latreille**

**Taxonomy:** Mitchell (1934, 1935a; b, 1936a; c, 1962); Parker (1978); Ivanochko (1979); Sheffield *et al.* (2011b)

**Biology.** Solitary leaf-cutting bees, including both ground and cavity-nesters. Summarized in Sheffield *et al.* (2011b), Ivanochko (1979) and Hobbs & Lilly (1954).

**Subgenus *Acentron* Mitchell**

**Taxonomy:** Mitchell (1934).

*Megachile* (*Acentron*) *albitarsis* Cresson 1872

**County records:** Livingston.

**Subgenus *Callomegachile* Michener**

*Megachile* (*Callomegachile*) *sculpturalis* Smith 1853

**County records:** Cheboygan, Ingham, Jackson, Kent, Monroe, Oakland, Osceola, Washtenaw, Wayne.

**Notes.** *Megachile scultupuralis*, a distinctive exotic species of East Asian origin, has recently spread across the Northeast and Midwest regions of the country (Hinojosa-Díaz 2008; Magnum & Brooks 1997). It was first recorded from Michigan in 2008 from Wayne and Cheboygan Counties in the southeast and north of the LP, respectively (O’Brien & Craves 2008). The species, known to have been present in the state from at least 2006 (see below; the first Illinois specimen was also collected that year, see Tonietto & Ascher 2009), is active in mid-summer. It is known to nest in active *Xylocopa virginica* burrows in dead wood (Laport & Minckley 2012; Roulston & Malfi 2012) and has been observed in Michigan removing nesting materials of other *Megachile* species from trap nests (JG pers. obs.).


**Subgenus *Chelostomoides* Robertson**

**Revision:** Mitchell (1937c).

*Megachile* (*Chelostomoides*) *campanulae* (Robertson 1903) (*exilis* group)

**County records:** Allegan, Barry, Berrien, Cheboygan, Clinton, Ingham, Jackson, Kalamazoo, Livingston, Marquette, Midland, Missaukee, Montmorency, Oakland, Oscoda, Presque Isle, St. Joseph, Van Buren, Washtenaw, Wayne.

**Notes.** A resin-collecting species that nests in stems. Nests described from Kansas, New York (Krombein 1967), and Wisconsin (Medler 1966; Medler & Lussenhop 1968).
**Megachile (Chelostomoides) rugifrons** (Smith 1854) (*rugifrons* group)

**County records:** Clinton, Livingston, Midland.

**Subgenus Eutricharaea Thomson**

**Taxonomy:** Parker (1978); Mitchell (1980).

**Megachile (Eutricharaea) apicalis** Spinola 1808 (New state record)

(Fig. 19A)

**County records:** Ingham.

**Notes.** A single female specimen was collected adjacent to a railway line in 2013. After repeated attempts to recollect the species at the same locality, an additional female and male were found in 2014. *Megachile apicalis* prefers *Centaurea* (Asteraceae) (Müller & Bansac 2004), which was abundant at the collection site. The female of the species is similar to the alfalfa leafcutter bee, *M. rotundata*, but can be distinguished by the apical projection of the clypeus and the darker scopal hairs on S4 in addition to S5 (Parker 1978; Sheffield et al. 2011b). *Megachile rotundata* is commonly observed in the same area. A continuing expansion of its range is likely, similar to that seen in other cavity nesting megachilid bees (Gibbs & Sheffield 2009; Hinojosa-Díaz 2008). In other US localities, this species can be very abundant and aggressively competes for nesting sites (Barthell & Thorp 1995; Stephen 2003; Thorp 1996). Further range extensions of this species might be facilitated by the spread of the invasive plant *Centaurea stoebe* L. (Spotted Knapweed) (Richardson et al. 2000).

**Material examined.** Ingham Co.: Michigan State University, south campus, N42.721 W84.473, 9 Jun. 2013 (1 ♀ MSUC); Michigan State University, south campus, N42.721 W84.473, 23 Aug. 2014 (1 ♀ 1 ♂ JBWM).

**FIGURE 19.** Megachilid bees from Michigan (not to scale). A) *Megachile (Eutricharaea) apicalis* Spinola female, face. B) *Ashmeadiella (Ashmeadiella) bucconis bucconis* (Say) male, oblique habitus.

**Megachile (Eutricharaea) pusilla** Pérez 1884 (New state record)

**County records:** Clinton, Ingham.

**Notes.** *Megachile pusilla* is an exotic species that has evidently been present in central Michigan since at least
1956, but it has been infrequently collected. Its close similarity to the abundant *M. rotundata*, differing from the latter by the narrower shape of the vertex and gena dorsally and fainter T2 fovea, may partially explain why it is not commonly recognized. The identity of North American populations were only recently clarified (Soltani et al. 2017). Previously, these bees were identified as *M. concinna* Smith, but this species *sensu stricto* is now unknown from the continental United States, although there are North American records from the Greater and Lesser Antilles. Cavity nesting was described from Arizona and Tennessee as *M. concinna* (Butler & Ritchie 1965; Butler & Wargo 1963; Krombein 1967).


*Megachile (Eutricharaea) rotundata* (Fabricius 1787)

**County records:** Alger, Barry, Cass, Houghton, Ingham, Kalamazoo, Kalkaska, Kent, Lake, Leelanau, Mecosta, Oakland, Washtenaw, Wayne, Wexford.

**Notes.** Exotic. The nesting biology has been well studied as *M. rotundata* is actively managed for alfalfa pollination (Hurd 1979; Pitts-Singer & Cane 2011). It was found in abundance in trap-nests placed on MSU campus, East Lansing, Michigan (JG, pers. obs.).

**Subgenus Leptorachis** Mitchell

**Taxonomy:** Mitchell (1934).

*Megachile (Leptorachis) petulans* Cresson 1878 (New state record)

**County records:** Kalamazoo, Newaygo, Van Buren.

**Notes.** *Megachile petulans* is known from a few locations in the southern tier of counties. It has previously been recorded from the neighboring states of Indiana and Ohio (Mitchell 1962).


**Subgenus Litomegachile** Mitchell

**Taxonomy:** Mitchell (1935a); Bzdyk (2012).

*Megachile (Litomegachile) brevis* Say 1837

**County records:** Allegan, Alpena, Barry, Branch, Calhoun, Cass, Cheboygan, Gratiot, Hillsdale, Ingham, Isabella, Kalamazoo, Leelanau, Livingston, Mason, Newaygo, Oakland, Oceana, Otsego, Ottawa, Saginaw, Shiawassee, St. Joseph, Van Buren.

**Notes.** The nesting biology of *M. brevis* in Kansas has been studied in detail (Michener 1953). Additional studies of this cavity and stem-nester are available from Kansas (Baker et al. 1985), Missouri (Rau 1934), Wisconsin (Medler & Lussenhop 1968), and Oregon (Rockwood 1951). The latter may pertain to *M. onobrychidis* Cockerell, which was formerly considered a subspecies of *M. brevis* (see Sheffield et al. 2011; Bzdyk 2012).
**Megachile (Litomegachile) mendica** Cresson 1878

**County records:** Alger, Allegan, Barry, Berrien, Cass, Charlevoix, Cheboygan, Clinton, Delta, Eaton, Emmet, Gladwin, Gratiot, Hillsdale, Huron, Ingham, Ionia, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Leelanau, Lenawee, Livingston, Manistee, Mecosta, Midland, Missaukee, Monroe, Montcalm, Muskegon, Newaygo, Oakland, Oceana, Osceola, Ottawa, Roscommon, Saginaw, Shiawassee, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Trap-nests described from Wisconsin (Medler 1965; Medler & Lussenhop 1968), Kansas and North Carolina (Baker *et al.* 1985), and New York, Maryland, North Carolina and Florida (Krombein 1967). Nesting in an old log in Missouri reported by Rau (1922). There is a published record of *M. mendica* nesting in the ground in Texas (Williams *et al.* 1986), but this cannot be confirmed. The presumed depository at Texas A&M does not have any material matching the paper (K. Wright, *in litt.*).

**Megachile (Litomegachile) texana** Cresson 1878

**County records:** Barry, Cass, Charlevoix, Cheboygan, Clinton, Dickinson, Gladwin, Grand Traverse, Ingham, Iosco, Iron, Isabella, Kalkaska, Kent, Leelanau, Livingston, Mackinac, Manistee, Marquette, Midland, Missaukee, Oakland, Oceana, Otsego, Ottawa, Shiawassee, Van Buren, Washtenaw, Wayne.

**Notes.** Several biological notes on this ground-nesting species are available (Hurd 1979), including from Missouri (Rau 1922), Colorado (Hicks 1926), New York (Eickwort *et al.* 1981), North Carolina (Krombein 1953) and Florida (Krombein 1970). Shallow nests, a few inches long, were also observed in flat sandy soil in Michigan (Gibbs 2017). One was adjacent to a highbush blueberry field in Van Buren County and a second was in a clearing at Rose Lake, Shiawassee County.

**Subgenus Megachile Latreille s. s.**

**Revision:** Mitchell (1935b as Delomegachile).

**Megachile (Megachile) centuncularis** (Linnaeus 1758)

**County records:** Allegan, Barry, Berrien, Cass, Cheboygan, Genesee, Huron, Ingham, Kalamazoo, Kalkaska, Kent, Livingston, Mackinac, Marquette, Mason, Midland, Newaygo, Oakland, Ottawa, St. Joseph, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Possibly exotic. Holarctic distribution that apparently does not extend into northwestern Canada and Alaska. Cavity-nests in North America have been described repeatedly (Hurd 1979), from California (Michelbacher & Hurd 1954), New York (Krombein 1967), Massachusetts (Packard 1869), Pennsylvania (Gentry 1874), Colorado (Hicks 1926), and Wisconsin (Medler 1959; Medler & Lussenhop 1968).

**Megachile (Megachile) inermis** Provancher 1888

**County records:** Alger, Alpena, Antrim, Arenac, Baraga, Bay, Benzie, Cheboygan, Chippewa, Clare, Crawford, Delta, Dickinson, Emmet, Gladwin, Gogebic, Grand Traverse, Iosco, Iron, Jackson, Kalkaska, Keweenaw, Lake, Leelanau, Livingston, Luce, Mackinac, Manistee, Marquette, Menominee, Midland, Missaukee, Montmorency, Oakland, Oceana, Ontonagon, Oscoda, Otsego, Presque Isle, Saginaw, Schoolcraft, Shiawassee, Van Buren.

**Notes.** Cavity-nests described from Manitoba and Sastkatchewan (Peck & Bolton 1946; Stephen 1955, 1956), Wisconsin (Medler 1958; Medler & Lussenhop 1968), and Ontario (Fye 1965).
Megachile (Megachile) lapponica Thomson 1872 (New state record)

County records: Keweenaw.

Notes. This record comes from a specimen identified by S. Droge. Due to a paucity of records of this boreal species from the Eastern United States and its similarity to *M. relativa*, additional collections and molecular confirmation would be desirable. North American populations of this bee were called *M. nivalis* Friese until Sheffield *et al.* (2011) placed this in synonymy with *M. lapponica*, described from Sweden and now considered a naturally Holarctic species.

Nests in logs in Saskatchewan (Peck & Bolton 1946).


Megachile (Megachile) montivaga Cresson 1878

County records: Allegan, Baraga, Barry, Berrien, Cass, Dickinson, Jackson, Kalamazoo, Kent, Keweenaw, Livingston, Marquette, Mecosta, Menominee, Ontonagon, Schoolcraft, Van Buren.

Notes. *Megachile montivaga* nests in plant stems, including *Cirsium* (Orr *et al.* 2015), *Helianthus* (Hicks 1926), *Rhus* (Rau 1934), and *Verbasum* (Hicks 1926), and uses flower petals for nest construction, a trait correlated with reduced cutting edges of its mandibles. Trap-nesting described from Kansas (Baker *et al.* 1985) and Missouri (1934).

Megachile (Megachile) relativa Cresson 1878

County records: Alcona, Alger, Alpena, Antrim, Baraga, Barry, Benzie, Cheboygan, Crawford, Delta, Dickinson, Emmet, Gogebic, Ingham, Iosco, Iron, Jackson, Kalamazoo, Kent, Keweenaw, Leelanau, Luce, Mackinac, Manistee, Marquette, Mecosta, Menominee, Midland, Montmorency, Oakland, Ogemaw, Ontonagon, Osceola, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Schoolcraft, Wexford.

Notes. Stem-nesting described from Ontario (Fye 1965) and Wisconsin (Medler & Koerber 1958; Medler & Lussenhop 1968).

Subgenus Megachiloides Mitchell

Revision: Mitchell (1936b).

Megachile (Megachiloides) dakotensis Mitchell 1926 (New state record)

County records: Kalkaska, Wexford.

Notes. This relatively large prairie-associated species is primarily known in Michigan from a relatively long series from a single location. Given these locations are in the north-central part of the Lower Peninsula, it seems likely that this species is far more widespread in the state. It has been recorded without specific locality data from both Illinois and Wisconsin (Mitchell 1962; Wolf & Ascher 2009).


Subgenus Sayapis Titus

Revision: Mitchell (1937b).
**Megachile (Sayapis) frugalis frugalis** Cresson 1872

**County records:** Allegan, Berrien, Ionia, Kalamazoo, Kent, Livingston, Ottawa, Washtenaw.

**Megachile (Sayapis) inimica** Cresson 1872 sayi Cresson 1878

**County records:** Kalamazoo.

**Notes.** Trap-nests described from Arizona (Krombein 1967) and Wisconsin (Medler & Lussenhop 1968).

**Megachile (Sayapis) pugnata pugnata** Say 1837

**County records:** Allegan, Barry, Berrien, Cass, Cheboygan, Clinton, Dickinson, Eaton, Emmet, Gladwin, Gogebic, Gratiot, Ingham, Iron, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lake, Lapeer, Livingston, Macomb, Mecosta, Midland, Monroe, Montmorency, Oakland, Otsego, Ottawa, Roscommon, Saginaw, St. Joseph, Van Buren, Washtenaw, Wayne.

**Notes.** Specialist on Asteraceae. This cavity-nester has been studied in Wisconsin (Medler 1964a; Medler & Lussenhop 1968). In Utah, it has been explored for its potential as a managed pollinator of commercial sunflower (Tepedino & Frohlich 1982). *Megachile pugnata* is commonly found in trap-nests placed in both MSU campus, East Lansing, Michigan and prairie restorations in the LP (JG, pers. obs.).

**Subgenus Xanthosarus Robertson**

**Revision:** Mitchell (1936a).

**Megachile (Xanthosarus) addenda** Cresson 1878

**County records:** Allegan, Barry, Benzie, Berrien, Eaton, Grand Traverse, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Livingston, Mason, Newaygo, Ottawa, St. Joseph, Van Buren, Wexford.

**Notes.** Nesting biology and potential as a wild pollinator of cranberry in New Jersey discussed by Cane et al. (1996).

**Megachile (Xanthosarus) frigida frigida** Smith 1853

**County records:** Alger, Baraga, Charlevoix, Cheboygan, Delta, Dickinson, Emmet, Ingham, Iosco, Iron, Keweenaw, Lake, Mackinac, Manistee, Marquette, Mason, Midland, Washtenaw.

**Notes.** A nest in a poplar log was described from Manitoba (Stephen 1956). Graenicher (1905) records this species nesting in logs as *M. addenda* (Medler & Lussenhop 1968).

**Megachile (Xanthosarus) gemula gemula** Cresson 1878

**County records:** Alcona, Alger, Allegan, Alpena, Baraga, Barry, Berrien, Cheboygan, Clare, Clinton, Delta, Dickinson, Emmet, Gladwin, Gogebic, Grand Traverse, Iron, Kalamazoo, Kalkaska, Kent, Keweenaw, Leelanau, Mackinac, Manistee, Marquette, Midland, Missaukee, Montmorency, Ontonagon, Osceola, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Schoolcraft, Shiawassee, St. Joseph, Van Buren.
Notes. Trap nesting in bored stems described from Ontario (Fye 1965) and Wisconsin (Medler & Lussenhop 1968).

*Megachile (Xanthosarus) latimanus* Say 1823

**County records:** Alger, Allegan, Alpena, Arenac, Baraga, Barry, Bay, Berrien, Branch, Cheboygan, Clinton, Crawford, Delta, Dickinson, Eaton, Emmet, Genesee, Gladwin, Gratiot, Hillsdale, Houghton, Huron, Ingham, Iosco, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Lake, Lapeer, Leelanau, Livingston, Mackinac, Macomb, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Montcalm, Montmorency, Newaygo, Oakland, Oceana, Ogemaw, Osceola, Oscoda, Otsego, Ottawa, Presque Isle, Roscommon, Saginaw, Shiawassee, St. Clair, St. Joseph, Van Buren, Washtenaw, Wayne, Wexford.

Notes. Ground-nests described from Wisconsin (Graenicher 1905).

*Megachile (Xanthosarus) melanophaea melanophaea* Smith 1853

**County records:** Alger, Baraga, Cheboygan, Clinton, Delta, Dickinson, Emmet, Gogebic, Huron, Iron, Kalkaska, Kent, Keweenaw, Luce, Mackinac, Mason, Midland, Montmorency, Oceana, Ontonagon, Osceola, Oscoda, Otsego, Ottawa, Roscommon, Washtenaw, Wexford.

Notes. Ground-nester (Graenicher 1905).

*Megachile (Xanthosarus) mucida* Cresson 1878

**County records:** Berrien, Ingham, Ionia, Muskegon, Van Buren.

Notes. *Megachile mucida* is poorly represented in historical collections, especially from the northern portion of its range, but it is now quite common in late spring in the Lansing area of Michigan. Its adult emergence was among the earliest of *Megachile* species in the area and its coloration is distinctive, except with respect to separation from its close relatives *M. gemula* and *M. melanophaea*. From those, *M. mucida* can be distinguished by characters of the female mandible and of the male tarsi (Mitchell 1962) and subtle differences in the distribution of pale hairs. Gibbs (2017) provided details on its distribution in Michigan and described its nesting habits.

*Megachile (Xanthosarus) perihirta* Cockerell 1898

**County records:** Mackinac, Schoolcraft.

Notes. A widespread western species but poorly documented in the Eastern United States. The occurrence in Michigan was confirmed from a male specimen deposited at the UMMZ. The biology of this ground-nesting species has been studied in Alberta (Hobbs 1956; Hobbs & Lilly 1954; Sladen 1918).

Osmiini

**Genus Ashmeadiella** Cockerell

**Revision:** Michener (1939).

**Subgenus Ashmeadiella** Cockerell s. s.

*Ashmeadiella (Ashmeadiella) bucconis bucconis* (Say 1837) (New state record)

(Fig. 19B)
County records: Otsego.

Notes. Most species of *Ashmeadiella* are western, but *bucconis* was described from “Indiana” and it has also been recorded from Illinois and Wisconsin (Jean 2010; Michener 1939; Mitchell 1962). Nests of the subspecies *A. b. denticulata* (Cresson) were described from Arizona by Krombein (1967). Leaf pulp is used in cell partitions.


Genus *Chelostoma* Latreille

Subgenus *Prochelostoma* Robertson

Taxonomy: Eickwort (1980); Buck et al. (2005).

*Chelostoma* (*Prochelostoma*) *philadelphi* (Robertson 1891)

County records: Allegan, Livingston, St. Joseph, Washtenaw, Wayne.

Notes. A native species oligolecic on *Philadelphus* (Saxifragaceae). Two non-native *Chelostoma* are likely to occur in the state (see Appendix 1). Nests in Virginia described by Krombein (Krombein 1959, 1967). Mud is used in cell partitions.

Genus *Heriades* Spinola

Subgenus *Neotrypetes* Robertson

Taxonomy: Michener (1938); Mitchell (1962).

Biology: Solitary stem-nesters that use resin in nest construction (Krombein 1967; Matthews 1965).

*Heriades* (*Neotrypetes*) *carinata* Cresson 1864


Notes. Nesting biology described from Missouri (Rau 1922), New York and North Carolina (Krombein 1967), Wisconsin (Medler & Lussenhop 1968), and Oregon and Michigan (Matthews 1965).

*Heriades* (*Neotrypetes*) *leavitti* Crawford 1913

County records: Cheboygan, Huron, Ingham, Kalamazoo, Lake, Livingston, Missaukee, Saginaw, Shiawassee, Van Buren.

Notes. Nest from Florida described by Krombein (1967).

*Heriades* (*Neotrypetes*) *variolosa variolosa* (Cresson 1872)

County records: Cheboygan, Montmorency, Oscoda, Otsego, Ottawa, Saginaw.

Notes. Nest from Minnesota described by Fischer (1955).
Genus *Hoplitis* Klug

**Taxonomy:** Michener (1947a); Mitchell (1962); Sedivy *et al.* (2013).

**Biology.** Solitary stem-nesters. Cell partitions are made of leaf pulp and sometimes pebbles are incorporated.

**Subgenus *Alcidamea* Cresspm

*Hoplitis* (*Alcidamea*) *albifrons albifrons* (Kirby 1837) (*tuberculata* group)

**County records:** Alger, Baraga, Barry, Cheboygan, Dickinson, Iron, Keweenaw, Livingston, Marquette, Schoolcraft.

**Notes.** Nest in Ontario described by Fye (1965).

*Hoplitis* (*Alcidamea*) *pilosifrons* (Cresson 1864) (*producta* group)

**County records:** Allegan, Arenac, Barry, Benzie, Berrien, Calhoun, Cass, Cheboygan, Clinton, Dickinson, Gratiot, Huron, Ingham, Ionia, Isabella, Jackson, Kalamazoo, Lake, Leelanau, Livingston, Manistee, Mason, Midland, Montcalm, Montmorency, Oakland, Oceana, Osceola, Ottawa, Saginaw, Sanilac, Shiawassee, St. Clair, St. Joseph, Tuscola, Van Buren, Washtenaw, Wexford.

**Notes.** A stem-nesting leaf-cutter bee, based on nests from Kansas (Michener 1955).

*Hoplitis* (*Alcidamea*) *producta producta* (Cresson 1864) (*producta* group)

**County records:** Allegan, Antrim, Barry, Benzie, Berrien, Branch, Cass, Charlevoix, Cheboygan, Chippewa, Clare, Clinton, Crawford, Delta, Dickinson, Eaton, Genesee, Gladwin, Gratiot, Hillsdale, Houghton, Ingham, Iron, Isabella, Jackson, Kalamazoo, Kalkaska, Kent, Keweenaw, Lapeer, Leelanau, Lenawee, Livingston, Luce, Macomb, Manistee, Marquette, Mason, Mecosta, Menominee, Midland, Missaukee, Monroe, Montmorency, Newaygo, Oakland, Oceana, Osceola, Oscoda, Ottawa, Roscommon, Saginaw, Schoolcraft, Shiawassee, St. Clair, St. Joseph, Tuscola, Van Buren, Washtenaw, Wayne, Wexford.

**Notes.** Nests described from Colorado (Hicks 1926), Missouri (Rau 1928), and Wisconsin (Graenicher 1905; Medler 1961; Medler & Lussenhop 1968).

*Hoplitis* (*Alcidamea*) *spoliata* (Provancher 1888) (*tuberculata* group)

**County records:** Alcona, Allegan, Alpena, Antrim, Barry, Bay, Berrien, Cass, Cheboygan, Dickinson, Eaton, Grand Traverse, Gratiot, Houghton, Huron, Iosco, Jackson, Kalamazoo, Kent, Keweenaw, Lake, Lapeer, Livingston, Marquette, Mecosta, Menominee, Osceola, Otsego, Roscommon, Saginaw, Van Buren, Washtenaw, Wexford.

**Notes.** Nests described from Colorado (Hicks 1926), Ontario (Fye 1965), Wisconsin (Medler 1967b; Medler & Lussenhop 1968), and Kansas (Baker *et al.* 1985).

*Hoplitis* (*Alcidamea*) *truncata truncata* (Cresson 1878) (*truncata* group)

**County records:** Calhoun, Cass, Barry, Berrien, Cheboygan, Dickinson, Huron, Ingham, Jackson, Kalamazoo, Montmorency, Oscoda, Schoolcraft, Shiawassee, Washtenaw.
Genus *Osmia* Panzer

**Taxonomy:** Sandhouse (1939); Mitchell (1962); Rust (1974).

**Biology.** Typically solitary cavity-nesters or ground-nesting. Reviewed by Cane et al. (2007) and Rust (1974). Cell partitions are typically made of leaf pulp, but mud may also be used.

Subgenus *Cephalosmia* Sladen

**Revision:** Rust (1974).

*Osmia* (*Cephalosmia*) *subaustralis* Cockerell 1900

**County records:** Alger, Alpena, Cheboygan, Kalkaska, Montmorency, Newaygo, Oscoda, Otsego, Wexford.

**Notes.** A nest in a beetle burrow in an old log from Utah is described by Rust (1974).

Subgenus *Diceratostia* Robertson

**Revision:** Michener (1949).

*Osmia* (*Diceratostia*) *conjuncta* Cresson 1864

**County records:** Allegan, Antrim, Barry, Berrien, Cheboygan, Clare, Clinton, Hillsdale, Huron, Ingham, Kalamazoo, Leelanau, Mackinac, Macomb, Mason, Midland, Missaukee, Oakland, Otsego, Presque Isle, Shiawassee, Van Buren.

**Notes.** Nests from Missouri were found in abandoned snail shells (Rau 1937).

Subgenus *Helicosmia* Thomson

**Revision:** Rust (1974 as *Chalcosmia*).

*Osmia* (*Helicosmia*) *caerulescens* (Linnaeus 1758)

**County records:** Calhoun, Cheboygan, Clinton, Ingham, Iosco, Jackson, Kalamazoo, Kent, Leelanau, Livingston, Manistee, Midland, Monroe, Montcalm, Oceana, Presque Isle, Sanilac, Schoolcraft, Shiawassee, Van Buren, Washtenaw, Wayne.

**Notes.** Probably exotic, based on lack of records from Alaska and, until recently, from western Canada and the Pacific Northwest (now well established in, e.g., the Seattle vicinity, as shown by records on http://bugguide.net) but historically was restricted to Eastern North America. A relatively early Idaho record was considered “probably adventive” by Hurd (1979). Cavity-nesting described from New York (Krombein 1967) and Wisconsin (Medler 1967a). Its potential as an alfalfa pollinator has been studied in France (Tasei & Picart 1972).

*Osmia* (*Helicosmia*) *georgica* Cresson 1878

**County records:** Allegan, Jackson, Kent, Livingston, Midland, Ottawa, Sanilac, St. Joseph, Washtenaw.

**Notes.** Specialist on Asteraceae. Cavity-nesting described from Connecticut (Hartman et al. 1944) and Tennessee (Hawkins 1975; Krombein 1967).
Osmia (Helicosmia) texana Cresson 1872

County records: Gratiot, Ingham, Kalamazoo, Livingston, Macomb, Shiawassee.

Notes. Nests in cavities including multiple reports of this species in old Anthophora nests from Colorado, Alberta, and Utah (Hicks 1926; Hobbs et al. 1961; Rust 1974).

Subgenus Melanosmia Schmiedeknecht

Taxonomy: Rightmyer et al. (2010).

Osmia (Melanosmia) albiventris Cresson 1864

County records: Cheboygan, Kalamazoo, Keweenaw, Livingston, Marquette, Montmorency, Shiawassee, St. Clair, St. Joseph.

Notes. Trap-nests described from Wisconsin (Medler 1967a; Medler & Lussenhop 1968), Georgia and South Carolina (Jenkins & Matthews 2004).

Osmia (Melanosmia) atriventris Cresson 1864

County records: Alger, Alpena, Allegan, Antrim, Barry, Berrien, Charlevoix, Cheboygan, Emmet, Grand Traverse, Ingham, Jackson, Keweenaw, Lake, Lapeer, Leelanau, Livingston, Marquette, Midland, Muskegon, Oceana, Ottawa, Saginaw, Shiawassee, Van Buren, Washtenaw.

Notes. Cavity-nesting described in Ontario (Fye 1965) and South Carolina (Horn & Hanula 2004).

Osmia (Melanosmia) bucephala Cresson 1864

County records: Alger, Allegan, Barry, Berrien, Cheboygan, Dickinson, Ingham, Kalamazoo, Kent, Keweenaw, Luce, Marquette, Midland, Montmorency, Oscoda, Schoolcraft, Van Buren.

Notes. Nests from Maryland and Washington, D.C. described by Krombein (1967) and Packard (1867), respectively. Unique among Osmia for its use of wood fibers in cell construction; partitions are made of leaf pulp.

Osmia (Melanosmia) collinsiae Robertson 1905

County records: Alpena, Lapeer, Montmorency, Oscoda, Wexford.

Osmia (Melanosmia) distincta Cresson 1864

County records: Allegan, Barry, Berrien, Clinton, Eaton, Hillsdale, Ingham, Isabella, Kent, Livingston, Muskegon, Oakland, Ottawa, Shiawassee, Van Buren.

Notes. Specialist on Penstemon (Scrophulariaceae).

Osmia (Melanosmia) felti Cockerell 1911 (Newly confirmed state record)

County records: Keweenaw, Marquette.
Notes. Osmia felti was recorded from southwest Michigan based on a single female identified by JSA (Tuell et al. 2009). The specimen, deposited at MSUC: RI, was reexamined by JG and determined to be O. virga Sandhouse. However, O. felti is confirmed to occur in the UP based on specimens below.


Osmia (Melanosmia) inermis (Zetterstedt 1838) (inermis group)

County records: Alger, Marquette, Montmorency, Oscoda.
Notes. Holarctic (Müller 2016; Rightmyer 2010). Nests under stones (Cane et al. 2007). Sheffield et al. (2015) demonstrated the use of artificial terracotta nests to encourage this species for pollination of lowbush blueberry.

Osmia (Melanosmia) inspergens Lovell & Cockerell 1907

County records: Kalkaska, Keweenaw, Montmorency, Oscoda, Saginaw, Schoolcraft.

Osmia (Melanosmia) laticeps Thomson 1872 (inermis group)

County records: Alger, Marquette.
Notes. A specialist on Vaccinium (Rightmyer et al. 2010).

Osmia (Melanosmia) nigriventris (Zetterstedt 1838) (nigriventris group)

County records: Marquette.
Notes. Holarctic (Müller 2016; Rightmyer et al. 2010). Nests in wood (Cane et al. 2007).

Osmia (Melanosmia) proxima Cresson 1864

Notes. Nests described by Fye (1965) and Medler (1967a) from Ontario and Wisconsin, respectively.

Osmia (Melanosmia) pumila Cresson 1864

County records: Allegan, Barry, Berrien, Cass, Ingham, Ionia, Jackson, Kent, Lapeer, Livingston, Ottawa, Presque Isle, Saginaw, St. Clair, Tuscola, Van Buren, Washtenaw.
Notes. Nest described Maryland (Krombein 1967), New York (Goodell 2003), and Wisconsin (Medler 1967a; Medler & Lussenhop 1968).

Osmia (Melanosmia) simillima Smith 1853

County records: Alger, Allegan, Barry, Bay, Berrien, Branch, Calhoun, Cheboygan, Clinton, Dickinson, Emmet, Gladwin, Huron, Ingham, Ionia, Kalamazoo, Keweenaw, Lake, Lapeer, Leelanau, Livingston, Manistee, Mecosta, Midland, Missaukee, Montcalm, Ottawa, Roscommon, Saginaw, Shiawassee, St. Clair, Van Buren.
Notes. Recorded nesting in oak galls, possibly from Massachusetts (Packard 1867). Scott (1993) describes this
species nesting communally in buried wood at a sandy site at Pictured Lakes National Lakeshore, Michigan. A nest in driftwood on the west shore of Lake Michigan was reported by Graenicher (1905).

**Osmia (Melanosmia) subarctica** Cockerell 1912 (New status)

*Osmia (Nothosomia) michiganensis* Mitchell, 1962: 92 (New synonymy; Michigan holotype; Fig. 20)

**Holotype.** ♀ USA: Michigan: Grand Traverse Co.: 27 May 1950, R.R. Dreisbach (USNM ENT 00536966) (on indefinite loan from NCSU).

**County records:** Dickinson, Grand Traverse.

**Notes.** *Osmia subarctica* is poorly known due to its northern range and past taxonomic confusion. *Osmia subarctica* was treated as a synonym of *O. tersula* Cockerell by Sandhouse (Sandhouse 1939) based on the identical locality information ("Hudson's Bay, 44-17", types deposited at the Natural History Museum, London) and apparent large impunctate margins of the metasomal terga shared by both species and this synonymy was followed by Hurd (1979). However, upon closer inspection of the holotype of *O. subarctica* by MGR, there are actually fine punctures that narrow the true impunctate margin of the terga. More importantly, the punctures of the clypeus and the curvature of the hind tibial spur are both different from what is found in females of *O. tersula*. In *O. subarctica*, the interspaces between the punctures of the clypeus are raised and the punctures themselves are elongated, giving the entire clypeus a wrinkled look, while in *O. tersula* the interspaces are flat and the punctures are round. In *O. subarctica*, the hind tibial spur is moderately thick, but strongly curved on its apical fifth, while in *O. tersula* the hind tibial spur is slightly thinner and the much less strongly curved apically. Mitchell (1962) described *O. michiganensis* based on a single male specimen and there are few subsequent records. Earlier specimens recognized by Mike Arduser as *O. michiganensis* are not *O. subarctica* (M. Arduser, in litt.), but rather belong to *O. aff. trevoris*, which follows below. A published record of *O. michiganensis* from Jackson Co., Michigan (Fiedler et al. 2012) was a misidentified *O. atriventris*. The first report of this species outside of Michigan is from the Apostle Islands in far northern Wisconsin, by S. Droge (in litt. 2010).

**Osmia (Melanosmia) tarsata** Provancher 1888

*Osmia tarsata* Provancher 1888: 328.


*Osmia hendersoni* Cockerell 1907: 365. New synonymy.

**Holotype.** ♀ USA: Colorado: Arapahoe Peak, 1 Sep. 1906, S. A. Rohwer (NMNH 27891).

**County records:** Alger, Chippewa.

**Notes.** This distinctive species occurs in the UP. Its taxonomy has been confused in the past, having been treated as a synonym of *O. bucephala* by Sandhouse (1939), but resurrected by Mitchell (1962) based on examination of the type material. In the same work, Mitchell recorded the female from Michigan as *Osmia integra* Cresson, a misidentification, because *integra* as now understood has a more western distribution. Sheffield & Perron (2014) recently synonymized *O. kenoyeri* with *O. tarsata*, which expands its known range of *O. tarsata* considerably. A series of males and females at PWRC was identified by S. Droge (as *O. kenoyeri*). Mike Arduser (in litt.) reports this species nesting in stable sand dunes and outwash plains at Grand Sable Dunes, Pictured Rocks National Lakeshore. Nests excavated in 1987 had seven to nine globular cells composed of masticated *Fragaria* leaves attached to roots at the base of little bluestem grasses.

**Material examined.** *Alger Co.:* Pictured Rocks, N46.6635 W86.0111, 9 Jun. 2011, (2 ♀ PWRC); Pictured Rocks, N46.6616 W86.0252, 20 May 2011, (4 ♀ 13 ♂ PWRC), 14 Jul. 2011, (1 ♀ PWRC); *Chippewa Co.:* (no locality) 7 Jun. 1959, (1 ♀ MSUC); Paradise Bog T49N R7W, Sec. 15, on bearberry, 22 May 1993, (1 ♀ MSUC).

*Osmia (Melanosmia) tersula* Cockerell 1912

**County records:** Chippewa, Delta, Dickinson, Keweenaw, Marquette, Montmorency, Ontonagon, Oscoda, Otsego, Roscommon, Wexford.

**Notes.** Trap-nests from Wisconsin described by Medler (1967a).

*Osmia (Melanosmia) aff. trevoris* Cockerell 1897

**County records:** Alger, Allegan, Chippewa, Kalkaska, Keweenaw, Marquette, Missaukee, Montcalm, Montmorency, Oscoda, Schoolcraft.

**Notes.** Females of *O. aff. trevoris* can be recognized by the following combination of characters: clypeal margin with small triangular notch medially, clypeal setae brown, mandibular carinae parallel and scopa dark brown (M. Arduser, unpublished data). Males would run to couplet 27 in Mitchell (1962), being similar to both *O. collinsiae* Robertson and especially *O. subarctica* (see above). The species was compared to *O. inurbana* Cresson and *O. trevoris* by MGR, likely synonymous names based on male and female types, and widely collected in western North America. Material from Michigan, Indiana, and Ohio need further study to resolve the taxonomic status of these specimens.

**Material examined. Kalkaska Co.:** (no locality), 1 Jun. 1966, ex. window pane trap, L.F. Wilson (2 ♀ MSUC); **Montcalm Co.:** Flat River Game Area, 14 May 1955, R.L. Fischer (1 ♀ MSUC); **Montmorency Co.:** (no locality), 5 Jul. 1966 ex. window pane trap, P.C. Kennedy (2 ♀ MSUC); (no locality), 18 Jul. 1966 ex. window pane trap (1 ♀ MSUC); **Oscoda Co.:** (no locality), 14 Jun. 1966 ex. window pane trap, L.F. Wilson (3 ♀ MSUC).

*Osmia (Melanosmia) virga* Sandhouse 1939

**County records:** Allegan, Berrien, Clinton, Crawford, Muskegon, Osceola, Ottawa, Van Buren.

**Notes.** A potentially valuable native pollinator of blueberry due to its preference for *Vaccinium*. Mitchell (1962) recognized only the male, contributing to this species being overlooked or confused with *O. felti* (see Giles & Ascher 2006; Goldstein & Ascher 2016).
Subgenus *Osmia* Panzer s. s.

Revision: Rust (1974).

*Osmia (Osmia) cornifrons* (Radoszkowski 1887)

**County records:** Allegan, Berrien, Grand Traverse, Ingham, Ionia, Kalamazoo, Kent, Leelanau, Oakland, Oceana, Ottawa, Van Buren, Washtenaw.

**Notes.** This non-native species was intentionally introduced to North America from Japan for pollination studies in both Utah and Maryland, in 1965 and 1977, respectively (Batra 1979; Rust 1974), and became established in the Mid-Atlantic states following the latter. It was shipped to Leelanau County, Michigan from Indiana in 2005 for pollination trials on cherry with subsequent imports from Pennsylvania (Rothwell 2006; JG, pers. obs.). It is a potentially valuable economic pollinator of cherry and apple (Batra 1979, 2007). The species is now well established in Michigan in both urban settings and semi-natural areas near urban centers. It can be collected in large numbers in the spring.

*Osmia (Osmia) lignaria lignaria* Say 1837

**County records:** Alger, Allegan, Berrien, Clinton, Delta, Dickinson, Genesee, Gogebic, Grand Traverse, Ingham, Ionia, Iron, Kalamazoo, Kent, Keweenaw, Livingston, Marquette, Montcalm, Oakland, Ontonagon, Ottawa, Roscommon, Shiawassee, Van Buren, Washtenaw, Wayne.

**Note.** Nests have been described by Rau (1937), Krombein (1967), Medler (1967a) and others. The western subspecies *O. l. propinqua* Cresson in particular, has been used as a managed crop pollinator (Bosch *et al.* 2000; Bosch & Kemp 2001, 2002).

*Osmia (Osmia) taurus* Smith 1873 (New state record)

(Fig. 21)

**County records:** Kalamazoo.

**Notes.** This exotic species, native to East Asia and widespread in Japan, is closely related to *O. cornifrons* (above). Although it was first detected many years after the introduction of *O. cornifrons* (Buchmann & Ascher 2005; Ebmer 2011), it seems plausible that it was introduced accidentally at the same time. The species has spread along the eastern states from New York to Georgia largely along the Appalachian Mountains. A single male was collected from a semi-natural area near a low-density population center and agricultural lands. A series of *O. cornifrons* were collected at the same site. The species were distinguished using a published key (Yasumatsu & Hirashima 1950). The spread of *O. taurus* into the Midwest has not been well-documented, except from photographs identified online from Indiana (http://bugguide.net/node/view/913803) and Ohio (http://bugguide.net/node/view/1220268), and a recent dissertation on bees from Cleveland (Prajzner 2016). The first Michigan record of *O. taurus* could easily have been overlooked due to the abundance of *O. cornifrons* at this site, which look very similar. *Osmia cornifrons*, being readily distinguishable with the naked eye from species other than *O. taurus*, were of little interest to the collector at the time. This example illustrates one benefit of collecting insects in series even when the identity is presumed to be known.

**Material examined.** Kalamazoo Co.: Kellogg Bird Sanctuary, N42.394 W85.385, 16 Apr. 2016, J. Gibbs & Y. Nozoe (1 ♂ MSUC).
MELITTIDAE

Mellitinae

Genus *Macropis* Panzer

**Taxonomy:** Michez & Patiny (2005); Mitchell (1960)

**Biology.** Solitary oil-collecting specialists on *Lysimachia* (see Cane et al. 1983).

Subgenus *Macropis* Panzer s. s.

*Macropis* (*Macropis*) *nuda* (Provancher 1882)

**County records:** Allegan, Alpena, Arenac, Berrien, Cheboygan, Dickinson, Gladwin, Hillsdale, Huron, Ingham, Iosco, Isabella, Lapeer, Mackinac, Midland, Newaygo, Osceola, Otsego, Saginaw, Van Buren.

**Notes.** To our knowledge, only a single male of this oil-collacting bee has been collected in Michigan since 1959, although recent collections have been made locally in other states (Wagner & Ascher 2008) and in eastern Canadian provinces (Sheffield et al. 2004; Wagner & Ascher 2008). The bee has been collected historically across the entire LP, and its host plant is present widely in the state (Voss & Reznicek 2012). *Macropis nuda* was among the species in the northeast modeled to be in decline based on historical records (Bartomeus et al. 2013a). The possibility of a decline is supported by lack or extreme scarcity of this and other *Macropis* species in recent bee surveys made using bowl traps in portions of the mid-Atlantic region where it was once common such as the vicinity of Washington, DC (S. Droege, pers. comm.). The lack of recent Michigan records of this species and of an associated cleptoparasite (*Epeoloides pilosulus*, last collected in 1944; see entry above) may be due in part to insufficient collection effort focused on this species. *Macropis* specializes on *Lysimachia* (Cane et al. 1983; Michez & Patiny 2005), a plant that grows in moist, often shaded ground (Voss & Reznicek 2012). Localities with *L. ciliata* present, sometimes in abundance near extensive riparian zones, were visited by JG in Ingham, Clinton, and Benzie Counties, in some cases on numerous occasions, specifically to collect *Macropis*, but without success.

**Material examined.** Allegan Co.: Allegan, 2 Jul. 1936 (1 ♀ MSUC); Hillsdale Co.: Pittsford SGA, 41.866, -84.522, 8 Jul. 2017 (1 ♂ TJWC); Ingham Co.: East Lansing, 20 Jul. 1937 (1 ♀ MSUC); Mackinac Co.: (no locality) 11 Aug. 1959 (1 ♂ MSUC); Midland Co.: (no locality) 5 Jul. 1938 (1 ♀ 1 ♂ MSUC); Osceola Co.: 3 Aug. 1940 (1 ♂ MSUC); Otsego Co.: 5 Jul. 1940 (1 ♂ MSUC); Saginaw Co.: (no locality) 14 Jul. 1940 (1 ♂ MSUC).
Acknowledgements

We thank Julianna Wilson for providing information on collection localities, Sam Droge for providing access to Michigan specimen information in his database and sharing opinions on Nomada (any mistakes in our treatment of this genus are our own), Mike Arduser (Missouri Department of Conservation) and Thomas Wood (MSU) for valuable comments on the manuscript, and Barry O’Connor and Mark O’Brien for allowing visits to UMMZ. Thomas Wood provided a number of valuable records collected in 2017. Thanks also to Ann Fraser who allowed examination of KCIC material, and Anthony Cognato and Gary Parsons for providing uninhibited access to MSUC. Hadel Go (AMNH) provided images of Protandrena cockerelli from other localities. Loans of material were generously made by V. Scott (UMMC), J. Leather (OSAC), T.L. Griswold, H. Ikerd (BBSL), V. Lee, N. Penny, W. Pulawski, R. Zuparko (CAS), Rob Jean (Environmental Solutions & Innovations, Inc.), D. Dmitriev, C. Favret, J. Zahniser (INHS) and S. Brady, D. Furth and B. Harris (NMNH). Post-doctoral support for JG was made available by funding from the United States Department of Agriculture-National Institute for Food and Agriculture, Specialty Crop Research Initiative: Developing Sustainable Pollination Strategies for U.S. Specialty Crops (2012-51181-20105) and by Project GREEEN.

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THE BEES OF MICHIGAN

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APPENDIX I. Species expected to occur in Michigan based on known ranges

The following species are expected to occur in Michigan based on their occurrence in multiple neighboring states or provinces, but have not yet been reported in the state.

ANDRENIDAE

*Andrena (Trachandrena) quintilis* Robertson 1898
*Andrena quintilis* is widespread in the Northcentral Region, and occurs in Illinois and Wisconsin. It could possibly occur in the southwest LP or western UP.

*Pseudopanurgus parvus* (Robertson 1892)
Widely distributed in eastern North America the Great Plains, making Michigan a probable location of occurrence.

*Pseudopanurgus pauper* (Cresson 1878)
A specialist on *Ceanothus*, with a range including New England and west to Minnesota.

APIDAE

*Melecta pacifica* Cresson 1878 *atlantica* Linsley 1948
A widespread species that occurs in Illinois and Ohio. This species could potentially reach southern Michigan.

*Nomada affabilis affabilis* Cresson 1878 (*superba* group)
The range of *N. affabilis* includes adjacent states to the south and west of Michigan. It is likely a cleptoparasite of *Eucera* species, so occurrence in the southeast portion of the state is possible.

*Nomada ceanothi* Cockerell 1907 (*ruficornis* group)
This species has been recorded in Wisconsin and Ontario, making Michigan a likely locality. Due to taxonomic challenges in the genus, this species may have been overlooked.

*Nomada xanthura* Cockerell 1908

*Xeromelecta interrupta* (Cresson 1872)
A cleptoparasite of *Anthophora abrupta*, with a range including Illinois, Indiana, and Wisconsin. The range of *X. interrupta* could include southwestern Michigan.

COLLETIDAE

*Hylaeus (Hylaeus) communis* Nylander
This European species was recently reported from North America based on specimens from southern Québec, Canada (Martins et al. 2017). As reported by the discoverers of the North American population this species has generalist foraging and habitat preferences. Due to its adaptability it is likely to spread to Michigan and elsewhere in eastern North America.

*Hylaeus (Paraprospopsis) pictipes* Nylander
This species is newly recorded from North America (Gibbs & Dathe 2017). It was first identified in 2015 from Ontario, but has since been recorded in Pennsylvana and Ohio. It has likely been in Ohio since at least 2011 (S. Droge, pers. comm.)

*Hylaeus (Spatulariella) punctatus* (Brullé)
This introduced species of European origin occurs in both Chicago, Illinois near the southwestern corner of Michigan (Ksiazek et al. 2014) and approximately 700 km east by northeast in Toronto, Ontario (Sheffield et al. 2011a). Furthermore, it is now known to occur widely in North America including Colorado (Scott et al., 2011; see also http://bugguide.net/node/view/337636) and California (where first detected in North America). Thus, it is probable that the species also occurs in urban areas of Michigan, but no specimens are yet known to us. A series of *Hylaeus* recently collected from Detroit by M.C. Simao (University of Michigan) were examined, but no *H. punctatus* were found among them.

HALICTIDAE

*Augochloropsis (Paraugochloropsis) sumptuosa* (Smith 1853)
The range of *A. sumptuosa* includes much of the eastern United States and extends north into Wisconsin (Wolf & Ascher 2009). The southeastern corner of Michigan is a possible area of occurrence.

*Lasioglossum (Dialictus) katherinae* Gibbs 2011
The range of this species includes Iowa, Wisconsin and Maine and extends south to Georgia (Zarrillo *et al.* 2016). This species is rare in collections with the exception of a sandplain site in the Montague Plains Wildlife Management Area, Franklin County, Massachusetts (Zarrillo *et al.* 2016).

*Lasioglossum (Hemihalictus) pectinatum* (Robertson 1890)
*Lasioglossum pectinatum* is uncommonly collected, likely due to its specialization on *Physalis*, a plant with rather obscure flowers (Gibbs *et al.* 2013; Voss & Reznicek 2012). It occurs in the northeastern United States and west to southeastern Minnesota (JG, unpublished). Additional effort to collect from the host plant would help clarify the range of this uncommon bee.

*Sphecodes solonis* Graenicher 1911
This northern species occurs in New England, New York, Minnesota, Wisconsin and much of Canada, suggesting that it likely occurs in the UP.

**MEGACHILIDAE**

*Coelioxys (Boreocoelioxys) banksi* Crawford 1914
There are no known specimens for Michigan, however it has been recorded in Wisconsin, southern Ohio and southern Ontario (Baker 1975), and more recently from Illinois (Tonietto and Ascher, 2009), which strongly suggests it occurs in the state. *Coelioxys banksi* has been reared from *M. relativa* nests using trap-nests (Medler & Koerber 1958).

*Coelioxys (Glyptocoelioxys) germanus* Cresson 1878
Ascher *et al.* (2014) speculated that *C. germanus* was a cleptoparasite of *M. petulans*, based on the subgeneric range limits and matching flight seasons. The new record of *M. petulans* for Michigan raises the possibility that *C. germanus* is also present; it is currently known from adjacent states to the south.

*Paranthidium (Paranthidium) jugatorium jugatorium* (Say)
The genus *Paranthidium* has not been recorded from Michigan. This distinctive resin bee is oligolectic on Asteraceae, with a preference for *Helianthus*. It may occur in southern Michigan, based on its widespread distribution that includes Minnesota, Wisconsin, Indiana, Ohio and New York State.
APPENDIX 2. Species excluded from the Michigan list of bees

Several validly described bee species have been previously recorded from Michigan, but reported occurrence in the state is based on doubtful or erroneous identifications or otherwise cannot be confirmed. We enumerate these excluded species below.

ANDRENIDAE

*Andrena (Callandrena sensu lato) helianthiformis* Viereck and Cockerell, 1914
Two specimens collected from *Helianthus strumosis* L. were recorded from Ingham County (Tuell *et al.* 2008). These specimens, deposited at MSUC: RI, were re-examined by JG and determined to be *A. helianthi*.

*Andrena (Melandrena) sayi* Robertson 1891
Mitchell (160) record. JG found a short series (MSUC) with a Mitchell determination label to be *A. commoda*. The closest record from Bouseman and LaBerge (1979) is from Carroll County, Indiana.

*Andrena (Parandrena) nida* Mitchell 1960
This species, associated with sandbar willow, *Salix exigua* Nutt. (JSA, unpublished), is recorded from Michigan by a single male paratype from Newaygo County deposited at MSUC. The specimen, cited as *nida* in the revision (LaBerge and Ribble, 1972), was reexamined by JG and compared to another male *A. nida* paratype from Vicksburg, Mississippi. The Michigan paratype is actually *A. andrenoides* based on the punctuation of the clypeus and sculpturing of the metapostnotum. The mandible is entirely dark, but the Michigan paratype is also stylopized, which might explain why this character does not match a typical *A. andrenoides*.

Material examined. Newaygo Co.: (no locality), 13 May 1956, R. & K. Dreisbach (1 paratype ♂ MSUC).


*Andrena (Scrapteropsis) fenningeri* Viereck 1922
This species was recorded from Michigan by Mitchell (1960). Several males identified by him are deposited at MSUC, but Mitchell incorrectly associated the males of this species and described the males of *A. fenningeri* separately as *A. verna* Mitchell (LaBerge 1971). As a result, Mitchell’s records seem unreliable. A specimen from Crawford Co., incorrectly labeled as a paratype of *A. verna* is at MSUC, but it is not conspecific with *A. verna* paratypes from other states. Mitchell (1960) did not include any Michigan material in his description of *A. verna*. *Andrena fenningeri* reaches northern Indiana, so it may eventually be found in southwest Michigan.

*Perdita (Perdita) drymariae* Timberlake 1960
Two female paratypes from Baraga County are deposited at MSUC. These specimens are so disjunct from the remaining members of the species in New Mexico and Mexico, that these undoubtedly represent a case of mislabeled specimens (Timberlake 1968). The paratypes do not match any of the other *Perdita* species from Michigan, and key easily to *P. drymariae* in Mitchell (1960). *Perdita drymariae* belongs to the *sphaeralceae* species group. No members of the *sphaeralceae* species group occur east of the Mississippi River (Hurd 1979).

APIDAE

*Anthophora (Lopanthophora) ursina* Cresson 1869
Fiedler *et al.* (2012) recorded this species from the MSU MacCready Reserve in Jackson County. Voucher material from this study (MSUC: DL) was re-examined and the specimen in question was determined to be a male *Melissodes desponsus*.

*Eucera (Synhalonia) belfragei* (Cresson 1872)
Recorded by Mitchell (1962). This species is poorly documented outside of Texas. The nearest fully confirmed record with details available is from Parke County in western Indiana (Timberlake 1969).

*Melissodes (Melissodes) comptoides* Robertson 1898
County records: none. Recorded by Mitchell (1962). This species occurs in the Great Plains and the southeastern states. The type locality is Carlinville in Southern Illinois, but an INHS record determined by LaBerge is north of Chicago suggesting that occurrence as far north as Michigan is plausible. The species is included based on Mitchell’s record and its probable occurrence in southwest Michigan.

*Nomada florilega* Lovell and Cockerell 1905 (*ruficornis* group)
County records: Livingston, Cheboygan.

Notes. Recorded by Mitchell (1962), and a specimen (MSUC) with his determination label does match his key, but this species has not been recognized routinely by currently active workers and its status requires clarification. An OSUC specimen identified by P. H. Timberlake has not been examined.
**Nomada subrutila** Lovell and Cockerell 1905 (*ruficornis* group)

**County records:** Livingston.

**Notes.** A record by Evans (1986) is unverified. A Mitchell determined specimen from Washtenaw County appears to be *N. luteoloides*.

**Nomada texana** Cresson 1872 (*vegana* group)

This species has been reported to occur in Michigan (Mitchell 1962), but no specific locality or specimens were indicated. A recent study of *N. texana* and related species suggests this species has a western and southern distribution, although it does reach as close to Michigan as northern Indiana (Droege et al. 2010). We know of no material from Michigan. Specimens identified as *N. texana* at MSUC were found to be either *N. fervida* Smith or *N. tiftonensis* Cockerell.

**HALICTIDAE**

**Augochlorella neglectula** Cockerell 1897

This species was recorded by Dreisbach (1945), but the species reaches its northern limits in southwestern USA (Coelho 2004; Ordway 1966a).

**Lasioglossum (Dialictus) nymphae** (Smith 1853)

Recorded from Michigan by Mitchell (1960) and Tuell et al. (2009) based on misidentified individuals of *L. pictum*. In the literature, *L. nymphae* has been recorded as far as Minnesota (Moure & Hurd 1987), but it is a southeastern species, which extends north only along the east coast (Gibbs 2011).

**Lasioglossum (Dialictus) simplex** (Robertson 1901)

Apparently a social parasite of *L. versatum* (Michener 1966, 1978), but see Gibbs (2011). No Michigan specimens have been examined, but it is was recorded from Michigan by Mitchell (1960). Due to identification issues this record is deemed questionable, but the type locality in Carlinville, Illinois and the widespread distribution of its putative host, make its occurrence in the state plausible.

**MEGACHILIDAE**

**Osmia (Diceratosmia) subfasciata** Cresson, 1872

*Osmia subfasciata* is a primarily southern species, ranging north to the southern tier of Indiana counties (Jean 2010). Eight males of *O. subfasciata* were recorded from Michigan by Tuell et al. (2009). Only one of these specimens could be found at MSUC and was determined by JG to be a male *O. conjuncta*. The same study reported 6 females and 3 males of *O. conjuncta* and a number of undetermined *Osmia*. Thirty-nine additional *O. conjuncta* males were found among this material. Both *O. conjuncta* and *O. subfasciata* have distinctive lateral emarginations of metasomal tergum 6, so it seems most likely that all records of *O. subfasciata* from Michigan were misidentified *O. conjuncta*. 
<table>
<thead>
<tr>
<th>Name</th>
<th>Authority</th>
<th>Depository</th>
<th>Collector</th>
<th>Current status</th>
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<tbody>
<tr>
<td>Andrena (Thysandrena) crenata</td>
<td>Mitchell, 1960: 221</td>
<td>NMNH (HT)</td>
<td>R.R. Dreisbach</td>
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<td>Andrena (Euandrena) marginata</td>
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<td>Andrena (Leucandrena) bifurcata</td>
<td>Mitchell, 1960: 212</td>
<td>NMNH (HT)</td>
<td>R. &amp; K. Dreisbach</td>
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<td>Andrena (Simandrena) G. Graenicher, 1904; new synonymy</td>
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<td>Bombus ternarius var. expallidus</td>
<td>Cockerell, 1916: 9</td>
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<td>Bombus (Pyrobombus) ternarius</td>
<td>Say 1837; syn. by Mitchell (1962).</td>
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* Type locality is uncertain, but Michigan seems probable.
### SUPPLEMENTARY TABLE 2. Checklist of the bees of Michigan

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<th>Subgenus</th>
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**NOMADINAE**

**Ammobatoidini**

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**HYLAEINAE**

| Hylaeus | (Cephalylaeus) | basalis          | (Smith 1853) |
| Hylaeus | (Hylaeus)     | annulatus        | (Linnaeus 1758) |
| Hylaeus | (Hylaeus)     | fedorica         | (Cockerell 1909) |
| Hylaeus | (Hylaeus)     | leptocephalus    | (Morawitz 1871["1870"]) |
| Hylaeus | (Hylaeus)     | mesillae cressonii | (Cockerell 1896) / (Cockerell 1907) |
| Hylaeus | (Hylaeus)     | rudbeckiae       | (Cockerell & Casad 1895) |
| Hylaeus | (Hylaeus)     | saniculae        | (Robertson 1896) |
| Hylaeus | (Hylaeus)     | verticalis       | (Cresson 1869) |
| Hylaeus | (Metziella)   | sparsus          | (Cresson 1869) |
| Hylaeus | (Paraprosopis) | floridanus       | (Robertson 1893) |
| Hylaeus | (Proapis)     | affinis          | (Smith 1853) |
| Hylaeus | (Proapis)     | gaigei           | (Cockerell 1916) |
| Hylaeus | (Proapis)     | illinoisensis    | (Robertson 1896) |
| Hylaeus | (Proapis)     | modestus modestus| Say 1837 |
| Hylaeus | (Proapis)     | nelumbonis       | (Robertson 1890) |
| Hylaeus | (Spatulariella) | hyalinatus      | Smith 1842 |

**HALICTIDAE**

**HALICTINAE**

**Augochlorini**

| Augochlora | (Augochlora) | pura pura | (Say 1837) |
| Augochlorella |         | aurata    | (Smith 1853) |
| Augochlorella |        | persimilis| (Viereck 1910) |
| Augochloropsis | (Paraugochloropsis) | metallica fulgida | (Fabricius 1793) / (Smith 1853) |

**Halictini**

| Agapostemon | (Agapostemon) | sericeus | (Förster 1771) |
| Agapostemon | (Agapostemon) | splendens| (Lepeletier 1841) |
| Agapostemon | (Agapostemon) | texanus  | Cresson 1872    |
| Agapostemon | (Agapostemon) | virescens| (Fabricius 1775) |
| Halictus    | (Nealictus)   | parallelus| Say 1837        |

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### SUPPLEMENTARY TABLE 2. (Continued)

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### Supplementary Table 2. (Continued)

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