Newsletter of the Michigan Entomological Society

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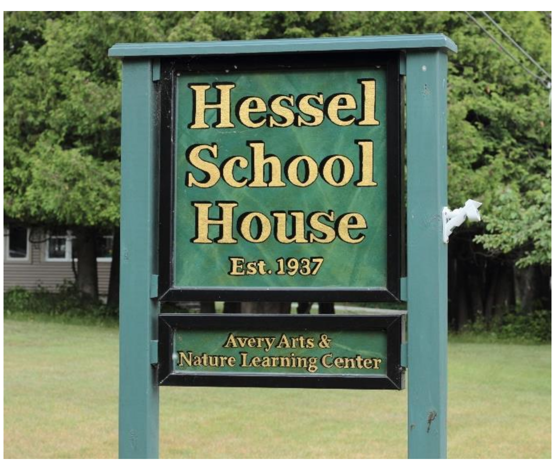

67th Annual MES Meeting a Success!

Despite the ongoing Covid-19 pandemic, the intrepid membership of the Michigan Entomological Society managed to conduct a face-to-face annual meeting last June at the Hessel School House in the beautiful Upper Peninsula. President-Elect Mark VanderWerp put together a nice program of speakers and facilitated a good meeting for those in attendance and the members which joined in via a Zoom teleconference connection.

The Hessel School House.

Dinner at the Les Cheneaux Culinary School.

MES 2021 Annual Meeting Minutes
June 26, 2021
67th Annual Meeting
In Person at Hessel Schoolhouse and Via a Zoom Teleconference

Present: Not quite sure… Board members: Duke Elsner, Dave Houghton, Adrienne O'Brien, Angie Pytel, Bob Haack, Crystal Dailey, Julie Craves, Mark VanderWerp, Brian Scholtens

Reports:

Treasurer: Angie Pytel – 1. The society has too much money sitting in the account – we need to spend it down. 2. There are still issues with renewing the tax-exempt status. Angie asked permission to hire a tax advisor. The board approved.

Secretary: Adrienne O'Brien – Membership is at 196, slightly lower than last year.
Newsletter: No report

Social Media: Crystal Dailey – Facebook is getting 4 times as many likes as last year with more followers. Some posts have gone viral. Crystal answers a lot of general entomology questions, as well as ID's. She is hoping to expand to other outlets as time permits.

Journal: Alicia Bray – Production Editor – some snafus, but OK now; Spring/Summer issue should be out in July or August. New journal business: questions have come up about citations for personal communication. We ask for documentation but Alicia has received some pushback from authors. The question is: should we continue to require documentation? The Governing Board supports the documentation requirement – it should be easy to confirm a conversation via email.

Old Business: none

New Business:

Elections
We were unable to put together a full ballot before the meeting. See related article in this Newsletter

New Committees

Youth Education and Outreach: Adrienne had some thoughts about attracting children and teens to Entomology. We need to build up more interest in a way that will attract young people. Crystal had some great ideas for digital outreach – including prizes for video contests or photos. Crystal Dailey, Duke Elsner and Adrienne O'Brien are on this committee and will be looking for ideas and other committee members.

Scholarship: Since we have some extra funds, Angie Pytel suggested that we set up a scholarship fund for students. The awards could pay for expenses related to attendance of the MES annual meeting, or, to cover supplies for a study. Angie Pytel, David Houghton and Bob Haack will serve on that committee. Anyone else who is interested or has ideas should contact one of them.

Other Reports:

Beetles of Michigan
Bill Ruesink, Bob Haack and Gary Parsons have been working on a compilation of the Beetles of Michigan. Literature reviews have found some uncertain records and the MSU collection has specimens that are not cited in literature. They are working to get the info on a separate website and are looking for photos. It will be a checklist, rather than records of abundance or within-state distribution.

Meeting Adjourned

Thank you to Mark VanderWerp for planning this meeting during uncertain times.

A Smooth Transition of Power

With president Duke Elsner authorizing the transaction via Zoom (visible on the screen in the background) past-president David Houghton passes the presidency and the MES gavel to Mark VanderWerp on June 26, 2021.

MES Election Results (sort of)

You may have noticed that you have not been notified of an upcoming election, nor have ballots been sent to members. We had only one nominee for each of the four positions that needed to be filled in 2021. There is a provision in the MES Constitution for just such an occasion:

Article VI. Voting Procedure

Section 4. If only one nominee accepts candidacy for a vacancy the Board shall declare that candidate winner without a vote. Therefore, our "election" results are:

President-Elect Brian Scholtens
Member at Large (2 year term): Bob Haack
Member at Large (2 year term): Ralph Gorton
Member at Large (1 year term—finishing out Brian Scholten's term): Bill Ruesink

New Governing Board Member Biographies

Brian Scholtens was born and raised in Iowa, where he attended Central College, receiving a B.A. in biology in 1983. He attended the University of Michigan, receiving his Ph.D. in 1990 in Ecology and Evolutionary Biology studying with Dr. Warren Herb Wagner and Dr. Brian Hazlett. He moved to Mt. Pleasant, SC in 1992 to become an assistant professor at the College of Charleston in the Biology Department. He is currently a professor in the department and teaches Entomology, Ecology and Evolutionary Biology, and Introductory Biology. Brian also teaches Entomology or Ecology each summer at the University of Michigan Biological Station in northern Michigan and has offered courses in butterflies and moths at Humboldt Field Research Institute in Maine. His research has focused on the conservation biology of threatened and endangered insects and biodiversity surveys. He co-coordinated the Lepidoptera part of the All Taxa Biodiversity Inventory in Great Smoky Mountain National Park, working particularly with the butterflies and Pyraloidea, and has more recently completed a moth survey (with Joe Culin, Clemson University, and John Snyder, Furman University) of Congaree National Park near Columbia, SC, and is participating in a survey of Sapelo Island, Georgia.

Bob Haack grew up in Wisconsin and completed a BS in Forestry (1974, Univ Wis), MS in Entomology (1980, Univ Wis) and PhD in Entomology (1984, Univ Florida). Between his BS and MS studies, Bob spent three years in Guatemala working as a Peace Corps Volunteer in a forestry program. Bob came to Michigan in 1984, first working as a post-doc in the Entomology Department at MSU, and then joining the USDA Forest Service Insect Unit (which is on the MSU campus) as a Research Entomologist in 1986. Bob worked primarily on bark beetles and wood borers during his career, especially exotic species such as the pine shoot beetle, Asian longhorned beetle, and emerald ash borer, as well as helped develop treatments and standards for wood packaging materials used in international trade like pallets and crating to reduce the risk that they will carry live pests. While with the USDA, Bob also served as an adjunct professor in the MSU Departments of Entomology and Forestry. Bob retired in 2015 and moved north to Central Lake, MI, where he remains involved in many insect-related activities. Bob has participated in MES since 1985, attending nearly every Annual Meeting, serving as the MES Newsletter Editor during 1988-2016 and MES President during 2016-17, and was elected as a MES Honorary Life Member in 2017.

Ralph Gorton. Professor Emeritus Gorton has BS and MS degrees in entomology from Michigan State University. His graduate research focused on the epidemiology of mosquito-borne La Crosse Encephalitis virus in Michigan. He taught molecular biology, microbiology, cell biology and entomology at Lansing Community College for 37 years. He is now retired from teaching and is the Adjunct Curator of spiders for the A. J. Cook Arthropod Research Center, Department of Entomology, at MSU. He also serves on the MSU Institutional Biosafety Committee that oversees recombinant DNA research at MSU.

Bill Ruesink. MES member continuously for over 50 years. M.S. & Ph.D. in entomology from Michigan State University. Spent 31 years as a research entomologist and administrator at the Illinois Natural History Survey and University of Illinois. Past Chairman of Section C of the Entomological Society of America. Currently leading an effort to compile a list of all beetles known to occur in Michigan (main collaborators are Bob Haack & Gary Parsons).

Great Lakes Entomologist Lead Scientific Editor Position Available

Thank you to our Lead Scientific editor of the Great Lakes Entomologist, Kristi Bugajski! She is stepping down after successfully piloting the journal since 2016 and overseeing its transition to an online publication. So now we're looking for a new energized candidate to take the reins… the following is a brief synopsis of the job responsibilities:

The main job of the scientific editor is to evaluate submitted manuscripts for publication. This involves soliciting qualified reviewers, evaluating their reviews and making publication decisions. Two to three reviewers are required for each manuscript, which sometimes involves sending out six to ten requests. The lead scientific editor needs to be organized to keep track of where the manuscripts are in the review process. The manuscripts are submitted using an online system, so the lead scientific editor needs to be able to manage the online system, and help reviewers use it. The lead scientific editor also needs to be a critical scientist and be able to make good scientific judgment in selecting reviewers and evaluating their reviews to make publication decisions. This job averages around five hours per week, but the workload is not consistently spread out.

If any members are interested in this opportunity please contact Mark VanderWerp (mvande@rosepest.com). Kristi has generously agreed to provide training on the online Valpo scholar system to the successful candidate.

Abstracts from the 67th Annual Meeting of the Michigan Entomological Society

Hessel, MI, June 25-27

Keynote Presentation

Big brother is watching: exploring wild insect behavior with digital surveillance technology

Matthew J. Grieshop
Michigan State University Department of Entomology, East Lansing, MI
grieshop@msu.edu

The advent of low-cost digital security surveillance equipment provides new opportunities for recording wild insect behavior in the field. The systems used in this presentation consist of either single or multi-channel digital video recorder (DVR), active night vision cameras, a deep cycle marine battery, and a weatherproof housing. The major advantages of these systems over previous generations of video equipment include: reduced expense, improved deployment times, faster frames per second, and higher video resolution.

Three applications for this system are highlighted: determining instantaneous trapping efficiency of a wing and micro trap for codling moth, *Cydia pomonella* (L.), and dogwood borer, *Synanthedon scitula* (Harris), evaluating the potential of an attract and kill system for the brown marmorated stink bug, *Halyomorpha halys* (Stål), and assessing the effects of ground cover on predation of Japanese beetle, *Popillia japonica* (Newman) eggs and cranberry fruit worm, *Acrobasis vacinii* (Riley), hibernaculae in blueberries.

Both codling moth and dogwood borer were recorded responding to both traps but the two species responded differently to the two traps with codling moth being caught slightly more often in the wing trap compared to the micro trap (18-28% and 22-23%, respectively). In contrast, dogwood borer was much more frequently captured in the microtrap compared to the wing trap (51% and 9%, respectively).

Brown marmorated stink bugs were attracted to both a Trece and AgBio commercial lure in our attract and kill device with 27% and 33% of orientations resulting in contacts, respectively. The Trece and AgBio lures provided average contact times of 36 and 62 seconds, respectively, far longer than the 5 seconds needed to deliver a lethal dose.

We identified ants as the most frequent predators with notable activity from arachnids and cricket while interactions between coleopterans and prey were surprisingly infrequent. In contrast, Coleoptera was frequently present in pitfalls while ants, gryllids and arachnids were not. Ants were observed under both day and night conditions while other predators were primarily nocturnal. Ground covers did not significantly affect predator activity in blueberries but there was a numerical reduction in ant activity on woodchips and weed barrier compared to grass and bare ground. The predator complex observed in blueberry video footage differed considerably from pitfall captures at the same site.

Digital videography of insects responding to traps and attract and kill devices is a useful approach for understanding the efficacy of these devices and for insect predators is a very useful tool for identification of key taxa responsible for the removal of sentinel prey and documenting their behavior.

both increased with that of plants.

These results demonstrate that plant assemblages affect both the number and specific type of forest insects, even of forests in very close proximity and with nearly identical weather conditions.

Plant Assemblages Influence Insect Assemblages: Results from an experimental forest in northern lower Michigan

David C. Houghton
Department of Biology, Hillsdale College, 33 East College Street, Hillsdale, MI, USA.
dhoughton@hillsdale.edu

To evaluate the effects of plants on insects, the 2 assemblage types were assessed during summer 2019 and 2020 in 2 different forest habitats of northern Lower Michigan. The first habitat was a hardwood forest typical of secondary succession in the region. The second was a hydric forest located ~15 m from the hardwood forest and developed when lake sediment was deposited into a 10 ha area in the early 2000s. Reflecting this sediment, soil of the hydric forest had higher water content and organic matter, and was dominated by the plant genera *Solidago*, *Rubus*, and *Salix*, whereas the hardwood forest had greater inorganic sediment and was dominated by *Pteridium*, *Carex*, and *Acer.* Insects were sampled using pitfall trapping, sweep netting, and flight intercept trapping, with each method capturing a distinct assemblage.

Insect assemblages of the two forests were distinct from each other using any of the 3 methods, with abundance of *Pteridium* and *Salix* generally associating with changes in insect composition. Insect richness and diversity

Monarch Stories in Pictures

Dr. Matthew Douglas
Grand Rapids Community College, Grand Rapids, MI
mdouglas@grcc.edu

Late instar phenotypes of *Danaus plexippus* from North America and *Danus erippus* from South America show that the South American monarchs lack white banding and yet are supposedly aposematic.

Danaus erippus and *Danaus plexippus* show similar migratory wing shapes and approximate wing shape when forewings are overlapping hindwings as observed during migratory flight. Monarchs released in open areas with little obstruction of the sky exhibit the unique circling behavior that may couple several navigating systems, including sun compassing, antennal cues, ultraviolet light perception, amongst others.

Monarchs with blackened antennae fail to exhibit circling migratory behavior, probably because they block the reception of ultraviolet light.

Specular reflection of sunlight over the waters of Lake Michigan late in the day often cause butterflies to dip into the water. These late-hour migrations may cause thousands of deaths and the drowned monarchs often wash up on the eastern shores of Lake Michigan.

Migrating monarchs reared in an enclosed cage approximately 10 feet in diameter and 8 feet high line up in the cage, facing the SW direction for migration flight.

Intergenerational mating of old males and newly emerged females on Beaver Island show the extent of intergenerational mating that is responsible for late migrations in October from the island.

Star thistle is a major nectar resource for monarchs on Beaver Island during the fall migration.

Discovering the Gelechiidae: Supplements to the Michigan Microlepidoptera List

Brian Scholtens
College of Charleston and the University of Michigan Biological Station
ScholtensB@cofc.edu

A great deal of past work on Lepidoptera in the state of Michigan has focused on the moths referred to as Macrolepidoptera. Only a handful of workers have paid significant attention to the Microlepidoptera, and as a result we know a great deal less about that part of the fauna. In an attempt to complete a full faunal list of Lepidoptera for the area surrounding the University of Michigan Biological Station (UMBS), I used COVID as an opportunity to dissect most of the Gelechiidae I had accumulated from Michigan (and other areas), particularly focusing on Emmet and Cheboygan Cos. In Michigan.

I dissected 187 individuals, resulting in 162 species level determinations, 22 genus level determinations, and 3 still unknown genera. This resulted in adding 40 species to our known list from the UMBS region and 36 species to the most recently updated Michigan state list of Lepidoptera. My goal is to cover the remaining families of Microlepidoptera from the UMBS region, focusing next on the Blastobasidae and Coleophoridae.

Death in My Basement: How Time-lapse Photography Changed the Practices of a Large Pest Management Company

Mark VanderWerp, BCE,
Rose Pest Solutions, Troy, MI
mvande@rosepest.com

Human bed bugs, *Cimex lectularius*, are ectoparasitic true bugs that specialize on extracting bloodmeals from human hosts. Populations have been resurgent in North America since the late 1990s, with Michigan populations noticeably rising in the early 2000s. From 2007 to 2017 the frequency of bed bug reports to a large Midwest pest management company increased by 4,675.5% (based on the total production value in dollars of bed bug work done)! While the exact reasons for the success of modern bed bugs is still under debate, it has largely been attributed to their high levels of insecticide resistance to many common classes of insecticides (including pyrethroids and neonicotinoids). All common modes of insecticide resistance have been documented in *C. lectularius* from a number of publications over the last 20 years including increased cuticular thickness, enhanced metabolism (P450), and decreased target site sensitivity (kdr).

A variety of chemical and non-chemical control techniques are available to manage these pests including interception devices (pitfall traps), mattress encasements, heat/steam treatment, entomopathogenic fungi, and conventional insecticides. However, likely due to low cost, wide availability, and convenience/familiarity of use, liquid residual insecticides are still the predominant method of choice in many pest management companies. While conventional insecticides, especially liquid residuals, have a place in the overall IPM toolkit for managing bed bugs, they are overused and underperform in comparison to other control techniques because of widespread insecticide resistance. The author attempted to change this preference at Rose Pest Solutions by capturing time-lapse photography of resistant bed bugs on various treated pieces of filter paper and using the resulting videos as a training tool. The active ingredients tested (product trade names in parenthesis) were:

- Cyfluthrin + imidacloprid (Temprid FX)
- Cyfluthrin + imidacloprid + pyriproxyfen + piperonyl butoxide (Temprid FX + Nyguard + Exponent)
- Silica aerogel (CimeXa dust)
- Silica aerogel + pyrethrins (Tri-Die Dust)
- Untreated Control

Sets of 10 recently fed adult and late instar bugs, were placed on each treatment (liquids applied at maximum label rates, dusts applied as a fine surface covering) and held for a week while being continuously photographed. After a week bugs were transferred to clean paper and held for an additional week to allow for recovery. Mortality, after two weeks, for the liquid residuals was poor with Temprid FX causing 0% mortality (same as the control) while Temprid, mixed with an IGR and synergist caused 27%. Both of the desiccant dusts caused 100% mortality.

The training was produced as a series of three short (10 minutes or less) videos, uploaded to an online learning platform, that was assigned to all employees in May of 2020. The training covered a brief overview of pesticide resistance, showed which materials were currently being used across the company, as well as which materials had the greatest efficacy against a resistant strain of bugs. Employees could see the span of a week compressed into a minute-long video through the use of time-lapse photography and watch which treatments caused mortality and which ones did not. Historically, training classes relied on telling technicians or their supervisors, in a classroom setting, which materials to use based on university research findings. Ultimately, this novel training approach was more impactful. When comparing bed bug product usage over a seven-month period (June – December) from 2019 to 2020 the use of liquid residuals fell by 37.0% (from 6751 to 4255 applications) while the use of desiccant dusts rose by 87.4% (from 1930 to 3617 applications). An unintended consequence of the training was that the use of insect growth regulators (IGRs) increased by 556% (from 66 to 367 applications)! This can be summed up in the old adage, "seeing is believing." In the author's experience, many pest management professionals are not strongly swayed by expert opinion or university research findings, but when they can be shown live bugs sitting on a treatment for a week and not dying it can affect a preference change.

Old-time communications in the Hessel area.

Fig. 1. Map showing portions of Michigan's northern Lower Peninsula (MI-LP) and eastern Upper Peninsula (MI-UP). Letter codes refer to Saint Ignace (SI), Hessel (H), Cedarville (C), DeTour Village (D) and Drummond Island (DI). Numbers refer to approximate locations of the Birge Preserve (1) and the Gerstacker Preserve (2).

Importance of Midges to Migrating Birds Along Northern Lake Huron

Robert A. Haack,[1] David N. Ewert,[2] and Patrick L. Hudson[3]
[1]USDA Forest Service, Northern Research Station, Lansing, MI (emeritus; robert.haack@usda.gov), [2]The Nature Conservancy, Lansing MI (emeritus; dnewert@gmail.com), [3]US Geological Survey, Great Lakes Science Center, Ann Arbor, MI (emeritus; patrick_hudson@sbcglobal.net)

The northern Lake Huron shoreline in Michigan's Upper Peninsula has a largely east-west orientation, extending from St. Ignace eastward to DeTour Village and then to neighboring Drummond Island (Fig. 1). Given this orientation, this shoreline intercepts large numbers of spring migrating birds after they fly across Lake Huron. These birds need to rest and refuel. For many of the insectivorous passerines or perching birds such as warblers (Fig. 2), vireos, and thrushes, they often arrive before the hardwood trees have fully leafed-out and thus there are relatively few terrestrial insects available, such as caterpillars. Nevertheless, many aquatic insects, especially midges (Diptera: Chironomidae; Fig. 3), emerge in large numbers along the shores of Lake Huron and other lakes and streams in early spring and can serve as prey items for many migrating birds.

In studies conducted in both North America and Europe, gut analyses of various warbler species indicate that midges comprise a large percent (often >50%) of the bird's diet during migration (Laursen 1978), as well as during the breeding season for both parents and young (Biermann & Sealy 1982, Busby & Sealy 1979). Moreover, MacDade et al. (2011), using stable-carbon-isotope analysis of exhaled CO_2 from migrating birds captured in mist nets along Lake Erie, found that aquatic prey (e.g., midges) were a major component of their diet, especially for the earliest migrants. The above studies generally indicated that midges were taken as prey in proportion to their abundance.

The Nature Conservancy (TNC) recognized the importance of the "Northern Shore of Lake Huron" to migrating birds following a study indicating that midges were an important food resource to migrants, especially during spring migration.

As a result, protection of stopover sites for migrants was incorporated into the conservation program of the Northern Shore of Lake Huron, which was a designated TNC "Last Great Place." Such a designation is used for larger landscapes that surround core preserves where the TNC and similar organizations work with local

Fig. 2. American Redstart. One of the many warblers that feed on midges (Smith et al. 2004). Photo credit: Dan Pancamo

Fig. 3. *Chironomus plumosus* adult male. This species is Holarctic in distribution and occurs in Michigan. Males form large swarms in spring and summer. Photo credit: © entomart.

communities to balance economic growth with environmental protection. One of the first preserves in the area was the Birge Preserve (1992), west of Hessel, which is a Little Traverse Conservancy preserve (Fig. 1). The Birge Preserve and adjoining preserve land protect about 2 miles of Lake Huron shoreline. The Gerstacker Preserve (1993), located east of Cedarville, was TNC's first preserve in the area, and now protects about 5 miles of shoreline (Fig. 1). Many more preserves have been added in recent years.

Midges are a diverse family of flies, mostly 1-10 mm long, and are native to all continents, including Antarctica (Armitage et al. 1995, Ferrington 2008). Midges have been found at elevations over 5600 m in the Himalayas and at depths greater than 1000 m in Lake Baikal in Russia, as well as at latitudes from about 68° South to 82° North. Most midges develop in fresh water, but some develop in salt water, soil, under tree bark, tree holes, decaying vegetation, and even dung. In many aquatic habitats, larval midges are the most numerous insect taxa present, often reaching densities of 1000s per square meter of lake or river bottom. Adult midges are very mosquito-like in appearance, with males having plumose antennae (Fig. 3). Larval midges are elongate, having a well sclerotized head that is distinctly separated from the thorax, a pair of prolegs (sometimes called parapods) on the prothorax and another pair near the end of the abdomen. Adult midges often swarm in huge numbers near shorelines (Armitage et al. 1995, Gibson 1945, Ferrington 2008, Wilson 1969).

Bright (2020) lists 24 families of Michigan Diptera where all or some of their members have aquatic larval stages. Of these 24 fly families, which includes over 1000 species, the Chironomidae are the largest, having 305 recognized species in Michigan. In addition, Bright (2020) states that another 247 midge species are present in nearby U.S. states, many of which may also occur in Michigan. BugGuide (https://bugguide.net/) reports that there are about 1050 midge species recognized in North America and about 7300 worldwide. However, midge researchers predict that there are over 2000 midge species in North America and 20,000 worldwide (Coffman & Ferrington 1996).

Most midge species complete 1 to 2 generations per year, but some can take multiple years to complete a single generation (up to 7 years has been reported) while others can complete 5 or more generations in a single year (Armitage et al. 1995, Winnell and White 1985). Typically, in aquatic habitats, eggs are laid in batches on the surface of the water or on substrates near the water's edge. After hatching, many larvae settle in the substrate at the bottom of water bodies at various distances from shore while others are free-living. Midge larvae have four instars and feed on a variety of substrates. Some are detritovores, some feed on algae, some develop inside submerged woody material, and others are predators. After pupation, midge pupae move to the water surface, where adult eclosion takes place. In temperate areas, adult emergence can occur in all seasons of the year, even winter for some species. Adult flight often peaks at dusk or dawn. Males often emerge first and can form large mating swarms. Depending on the midge species, swarming can occur over water, near shoreline, or over certain structures, as well as at different heights. As females enter these swarms, mating and oviposition soon follow.

Many midge species occur along the northern shoreline of Lake Huron. The main species that develop in Lake Huron and are abundant during spring bird migration are listed in Table 1. Some of these midges develop nearshore in rubble substrate (e.g., the *Hydrobaenus*, *Orthocladius*, and *Parakiefferiella* species), while others develop offshore primarily in sand/silt substrates (e.g., the *Heterotrissocladius* and *Monodiamesa* species). For several weeks, the *Heterotrissocladius* species dominate the adult midge populations found along the northern Lake Huron shoreline (PL Hudson, unpublished data).

Ewert et al. (2011) and Hudson & Chriscinske (1998) studied inland distribution of migrating birds and midges in the 1990s at several sites along Michigan's northern Lake Huron shoreline. The plot layout was similar in both studies, with survey stations established along transects in forested areas at distances of 5 (i.e., the forest edge), 400, 800 (half mile), 1600 (1 mile), and 3200 m (2 miles) from shoreline. Estimates of both bird and midge densities were made on multiple dates from late April to early June in 1993 and 1994 and midge densities only in 1997. Findings were similar in both studies with densities of both migrating birds and midges being highest at the shoreline sites, and then falling with distance inland. For the birds, the pattern of favoring the shoreline was most pronounced for bird species that breed only north of the study area and thus were using the shoreline primarily as a stopover location before they continued to migrate northward (Ewert et al. 2011). In Hudson & Chriscinske's (1998) study, they found that midge densities increased from a low on 30 April (the first sampling date), to a peak on 21 May, and then fell slightly on 4 June. Hudson & Chriscinske (1998) also reported that midges comprised 82-84% of the arthropods collected over all four sampling periods with various types of aerial traps placed at all survey sites. Several other studies have documented the importance of midges to migrating insectivorous birds after they reach the northern Lake Huron shoreline in spring (Smith et al. 1998, 2004, 2007).

Similarly, in Iceland, Dreyer et al. (2015) noted that midge densities drop dramatically with distance from a lake's shoreline. Moreover, in a related study, Dreyer et al. (2012) reported that many other arthropods (e.g., predators such as spiders, harvestmen, and staphylinids beetles; and detritivores such as Collembola) respond positively to midge abundance and demonstrate similar declines in abundance with distance from the shoreline.

In summary, maintaining large tracts of forested land along the northern shore of Lake Huron, and likely elsewhere around the northern Great Lakes, is important for many migrating insectivorous birds, especially in spring, given their importance as stopover sites where birds can refuel on aquatic insects that emerge in vast numbers (Ewert et al. 2011, 2015). In spring, migrating birds may be food-limited, but emerging aquatic insects, especially midges, can serve as an important food resource that provides birds the needed energy to reach their final breeding grounds (Ewert & Hamas 1995).

Table 1. Common midges along the northern Lake Huron shoreline near Cedarville and Hessel based on field observation made in the 1990s, including species, adult length, and location of larval development in Lake Huron (Hudson & Chriscinske 1998, and PL Hudson, unpublished data).

Species	**Typical adult length (mm)**	**Location of larval development**
Late April-Early May Emergence Period		
Hydrobaenus johannseni (Sublette)	6.1	nearshore
Heterotrissocladius oliveri Saether	4.9-5.7	offshore
May Emergence Period		
Orthocladius nigritus Malloch	5.4	nearshore
Heterotrissocladius changi Saether	4.6-5.2	offshore
Hydrosmittia ruttneri (Strenzke & Thienemann)*	2.7-4.0	nearshore
Parakiefferiella bathophila (Kieffer)	2.7-3.4	nearshore
Middle May-Early June Emergence Period		
Stictochironomus n. sp.	6.5-8.1	nearshore
Monodiamesa tuberculata Saether	6.0-8.3	offshore
Micropsectra nr. notescens (Walker)	4.8-5.1	nearshore
Tanytarsus norvegicus (Kieffer)	4.7-5.0	nearshore
Paratanytarsus tenuis (Meigen)	4.5-5.0	nearshore
Stempellina bausei (Kieffer)	3.9-4.0	nearshore

* The species *Hydrosmittia ruttneri* (Strenzke & Thienemann) was recently changed from *Pseudosmittia ruttneri* Strenzke & Thienemann by Ferrington and Saether (2011).

Chironomids in spider web at Lake Erie Metropark in southeast Lower Michigan. Photo by Pat Hudson.

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Beetle species in the MSU-ARC not previously reported from Michigan: Contribution #1

William G. Ruesink[1] and Gary L. Parsons[2]
[1]6400 Arrowhead Way, Williamsburg, MI 49690 (wruesink@ruesink.org)
[2]Department of Entomology, Michigan State University, East Lansing, MI 48824 (parsonsg@msu.edu)

In conjunction with the preparation of a list of the beetles known to occur in Michigan, we are going through the A.J. Cook Arthropod Research Collection at Michigan State University (MSU) and checking identifications of holdings for which we have found no published record. This is an ongoing project and the list here only represents a few of the families that we have checked so far.
Most of these are not recent introductions, but have actually been in the MSU collection for years. However, in the 500+ literature sources that we have so far examined, these have apparently never been recorded from Michigan, and represent **new state records**. Many of these species have been recorded from some or most of the states and Canadian provinces surrounding Michigan, so it is somewhat unusual that they have not been previously recorded from Michigan. We also had species in the collection that were identified in the past for which Michigan records had to be dubious or incorrect according to recent catalogs and lists. Thus, we have been checking these species in the collection for their validity. To be sure, we have found many species that had been misidentified. We have been correcting the identifications of those to the best of our abilities, some of which have also added new species names to the collection and to our Michigan beetle list.

Here we record 66 species from 11 families. Identifications for all of these have been verified by WGR unless noted otherwise. Similar lists for additional families will be included in future issues of this Newsletter. And within a few months we expect to post online the complete list of species known from Michigan for the 11 families covered here, to be followed by the remaining beetle families as we work our way through the MSU collection. Watch the Newsletter for an announcement of how to access that list. We anticipate that when all families are completed, the list will include about 5,000 Michigan species.

Anthicidae (6 species; plus 1 genus not previously reported from Michigan)
Ischyropalpus nitidulus (LeConte): 2 specimens, Lapeer Co. (1965); IDs by Bonadona.
Sapintus pubescens (LaFerté-Sénectère): 2 specimens, Missaukee Co. (1939) & Detroit, Wayne Co. (no date but probably 1800's).
Stricticollis tobias Marseul: 1 specimen, Gull Lake Biol. Sta., Kalamazoo Co. (1959), ID by F. Werner.
Retocomus wildii (LeConte): 1 specimen, Oakland Co. (1931), coll. Andrews & ID Andrews; ID accepted with some doubt.
Macratria confusa LeConte: 8 specimens, Marquette Co. (1920), Midland Co. (1958) & Oakland Co. (1924, 1925, 1933).
Macratria murina (Fabricius): 16 specimens, Ingham Co. (1948, 1954), Macomb Co. (1967, 1969), Midland Co. (1940, 1941, 1948, 1950) & Montcalm Co. (1950).
Tomoderus sp.: 1 specimen, Detroit, Wayne Co. (no date but probably1800's) - previously identified as *T. interruptus* but possibly misidentified - need male genitalia to determine.

Anthribidae (2 species)
Euparius paganus Gyllenhal: 16 specimens, Clinton Co. (2000, 2001), Ingham Co. (1908), & Kalamazoo Co. (1960, 1963, 1964, 1967).
Eurymycter tricarinatus (Pierce): 6 specimens, Ingham Co. (1947, 1955), Oakland Co. (1942) & Shiawassee Co. (1984).

Bostrichidae (2 species)

Dinoderus minutus (Fabricius): 11 specimens in 1 series from bamboo, E. Lansing, Ingham Co. (1975); presumed adventive and not established in the wild.

Stephanopachys rugosus (Olivier): 13 specimens in 3 series, Ingham Co. (1950) & Wayne Co. (1915, 1942).

Brachyceridae (2 species)

Brachybamus electus Germar: 32 specimens in 3 series, Barry Co. (1959) & Huron Co. (1908); IDed by Schreibner, Board, & Sleeper.

Lissorhoptrus simplex (Say): 1 specimen, E.S. George Reserve, Pinckney, Livingston Co (1947).

Brentidae (2 species)

Perapion punctinasum (Smith): 2 specimens, Lake Co. (1945) & Mecosta Co. (1942); ID by Green.

Rhopalapion longirostre (Olivier): 74 specimens, Berrien Co. (1974), Grand Traverse Co. (2001), Ingham Co. (1956, 1957), Ionia Co. (1959), Kalamazoo Co. (1974), Macomb Co. (1970), Monroe Co. (1964) & Roscommon Co. (1955) – hollyhock weevil.

Buprestidae (4 species)

Agrilus nigricans Gory: 10 specimens, 8 in a series, Oakland Co. (1947), IDed by Wellso as the syn. *auricomus*; other two from Bay Co. (1939) & Galesburg, Kalamazoo Co. (1925).

Agrilus olivaceoniger Fisher: 3 specimens, Gratiot Co. (1942) & Midland Co. (1931, 1934); 2 IDed by Knull.

Dicerca obscura (Fabricius): 1 specimen, Oakland Co. (1923); ID by Wellso.

Dicerca spreta (Gory): 2 specimens, Bloomfield, Oakland Co. (1912) & Detroit, Wayne Co. (1909).

Byrrhidae (1 species)

Curimopsis echinata (LeConte): 7 very old specimens from 2 locations, Whitefish Pt., Chippewa Co. (1914) & Marquette Co. (no date).

Cantharidae (17 species)

Cantharis rufa Linnaeus: 4 specimens, Antrim Co. (2002) & Schoolcraft Co. (1994).

Rhagonycha antennata (Green): 6 specimens, Alcona Co. (1948), Cass Co. (1959), Livingston Co. (1944), Shiawassee Co. (1943) & St. Joseph Co. (1959); 3 IDed by Green, IDs accepted but not verified.

Rhagonycha cloughi (Miskimen): 5 specimens, E. Lansing, Ingham Co. (1937, 1940) & Ionia Co. (1959); IDs by J.W. Green accepted but not verified.

Rhagonycha greeni (Fall): 1 Dreisbach specimen, Kent Co. (1951).

Rhagonycha nigrohumeralis (Green): 1 specimen, Gull Lake Biol. Sta., Kalamazoo Co. (1960), coll. by R.L. Fischer.

Rhagonycha tenuis (Green): 3 specimens, Port Hope, Huron Co. (1963), coll. by J.P. Donahue.

Rhagonycha sylvatica (Green): 1 specimen, E.S. George Reserve, Pinckney, Livingston Co. (1947).

Rhagonycha tantilla (LeConte): 2 Dreisbach specimens, Sanilac Co. (1959) & Shiawassee Co. (1959).

Rhagonycha umbrina (Green): 2 specimens, Berrien Co. (1919) & E. Lansing, Ingham Co. (1940).

Rhagonycha walshi (LeConte): 56 specimens, Charity Islands, Arenac Co. (1910), Berrien Co. (1974), Delta Co. (1958), Dickenson Co. (1983), Genessee Co. (1938), Huron Co. (1963) & Midland Co. (1934, 1939, 1944, 1945, 1951).

Podabrus appendiculatus Fall: 1 specimen, Berrien Co. (1974).

Podabrus basilaris (Say): 9 specimens, Barry Co. (1968), Berrien Co. (1964), Clinton Co. (1965), Monroe Co. (1962, 1965) & Shiawassee Co. (1980).

Podabrus punctulatus LeConte: 74 specimens, Allegan Co. (1959, 1987), Bay Co. (1951), Berrien Co. (1960, 1969, 1974), Branch Co. (1965), Clinton Co. (2001, 2002, 2005), Ingham Co. (1891, 1899, 1948, 1959), Ionia Co. (1959), Macomb Co. (1963, 1969), Marquette Co. (1957), Midland Co. (1940, 1958) & Ottawa Co. (1980).

Malthinus occipitalis LeConte: 4 specimens, Crawford Co. (1954), Lake Co. (1974), Manistee Co. (1974) & Monroe Co. (1965); IDs by W. Wittmer.

Malthodes frisoni Fender: 4 specimens, Lenawee Co. (1952), Saginaw Co. (1952) & Shiawassee Co. (1952); 3 IDed by Green.

Malthodes medioccidens Fender: 1 specimen, Midland Co. (1936); ID by G. Parsons

Polemius laticornis (Say): 16 specimens, Berrien Co. (1919) & Clinton Co. (2000, 2001); IDs by Green & Parsons.

Cerambycidae (3 species)

Xylotrechus integer (Haldeman): 1 specimen collected by Dreisbach, Otsego Co. (1939); ID by Knull.

Styloleptus biustus (LeConte): 1 specimen, Oakland Co. (1925) by Andrews; ID by A.W. Andrews.

Oberea affinis Leng & Hamilton: 12 specimens, Allegan Co. (1959), Quincy, Branch Co. (1942), Clare Co. (1935), Grand Traverse Co.(1960), Ag. Coll. Mi., Ingham Co. (1891, 1893, 1909), Iosco Co.(1938), Lenawee Co. (1959), Midland Co.(1938), Otsego Co. (1938), Sanilac Co. 1947) & St. Joseph Co. (1942); 6 IDed by J.N. Knull.

Chrysomelidae (25 species)

Agroiconota bivittata (Say): 5 specimens, Hastings, Barry Co. (1956), Flint, Genesee Co. (1943), E. Lansing, Ingham Co. (1948), Grass Lake, Jackson Co. (1912) & Midland Co. (1943).

Cassida flaveola Thunberg: 1 specimen, Oakland Co. (1925), coll. by Andrews

Calligrapha amator Brown: 3 specimens, Midland Co. (1936) & Oakland Co. (1911, 1936); ID by J. Wilcox, accepted without further study.

Entomoscelis americana Brown: 16 specimens, Grand Traverse Co. (2002), Isabella Co. (2010) & Mackinac Co. (2001); ID by G.L. Parsons.

Gastrophysa cyanea Melsheimer: ca. 55 specimens, Allegan Co. (1959), Barry Co. (1959), Berrien Co. (1963, 1968), Branch Co. (1959), Cass Co. (1959), Gull Lake, Kalamazoo Co. (1957, 1959, 1962, 1963, 1965) & St. Joseph Co. (1959).

Gonioctena notmani (Schaeffer): 1 specimen, Whitefish Point, Chippewa Co. (1913); ID by J.A. Wilcox.

Prasocuris boreella Schaeffer: 8 specimens, Gladwin Co. (1959), Gratiot Co. (1942, 1946), Iron Co. (1964), Kalkaska Co. (1950), Lake Co. (1940) & Montcalm Co. (1954); IDed by Wilcox.

Lilioceris lilii (Scopoli), Chrysomelidae. Photo by Mark VanderWerp

Lilioceris lilii (Scopoli): 11 specimens in a single series, Chippewa Co. (2016); ID by G.L. Parsons.

Cryptocephalus leucomelas Suffrian: 1 specimen, Branch Co. (1953); IDed by J.A. Wilcox.

Cryptocephalus mutabilis Melsheimer: 18 specimens from Barry Co. (1955), Ingham Co. (1938, 1948), Iosco Co. (1938), Kalamazoo Co.(1956), Mason Co. (1937), Midland Co. (1936, 1960), Newago Co. (1953), Oakland Co. (1920), Osceola Co. (1940) & Wayne Co. (1912).

Pachybrachis morosus Haldeman: 2 specimens, Allegan Co. (1959) & Newaygo Co. (1947); ID by R.J. Barney.

Donacia tuberculata Lacordaire: 2 specimens, Berrien Co. (1960); ID by E.J.F. Marx, verified by I.S. Askevold, accepted without further study.

Fidia rileyorum Strother: 1 specimen, Oakland Co. (1924), previously IDed as *F. longipes.*

Colaspis costipennis Crotch: 4 specimens, Fennville, Allegan Co. (1926), Iosco Co. (1938), Oakland Co. (1904) and Detroit, Wayne Co. (no date but probably 1800's); 2 IDed by L.G. Gentner.

Tymnes tricolor (Fabricius): 1 specimen, Monroe Co. (1906).

Metachroma interruptum (Say): 3 specimens, Charity Islands, Arenac Co. (1910).

Metachroma quercatum (Fabricius): 2 specimens, Newago Co. (1953); coll. by Dreisbach & IDed by Wilcox.

Glyptina atriventris Horn: 1 specimen, Isabella Co. (1945); coll. by Driesbach & IDed by J.A. Wilcox.

Glyptina bicolor Horn: 2 specimens, St Joseph Co. (1941); coll. by Driesbach & IDed by J.A. Wilcox.

Glyptina brunnea Horn: 4 specimens, Midland Co. (1940, 1943, 1945); coll. by Driesbach & IDed by J.A. Wilcox.

Glyptina spuria LeConte: ca. 30 specimens, Ag. Coll. MI, Ingham Co. (1891, 1921, 1922), Jackson Co. (1947, 1951), Midland Co. (1940, 19432, 1947, 1949, 1952) & Saginaw Co. (1952).

Longitarsus erro Horn: 4 specimens, Gladwin Co. (1941) & Midland Co. (1941); coll. by Driesbach & IDed by J.A. Wilcox; we think they may be extralimital or an undescribed sp.

Mantura floridana Crotch: 16 specimens, Ag. Coll. MI, Ingham Co. (1890, 1899, 1921), Midland Co. (1946, 1947), Oakland Co. (1923, 1938) & Detroit, Wayne Co. (no date but probably 1800's).

Systena marginalis (Illiger): 9 specimens, Ingham Co. (1891, 1941), Jackson Co. (1953), Lenawee Co. (1953), Oakland Co. (1913, 1924, 1930) & Van Buren Co. (1946); IDed by E.H. Smith.

Scelolyperus meracus (Say): 6 specimens, Antrim Co. (1949) & Midland Co. (1942, 1945); 2 IDed by Wilcox & the others appear to be the same, but Clark (1996) says aedeagi must be examined for positive ID; we accept this ID with some reservation.

Megalopodidae (2 species)

Zeugophora consanguinea Crotch: 12 specimens, Allegan Co. (1927), Ingham Co. (1891, 1892), Mackinac Co. (1957), Oakland Co. (1922) & Detroit, Wayne Co. (1909, no date but probably 1800's).

Zeugophora puberula Crotch: 2 specimens, E.S. George Reserve, Pinckney, Livingston Co. (1947) & Newago Co. (1953); 1 IDed by Wilcox.

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Coral hairstreak. Photo by Duke Elsner