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2011 Field Trips: Check out the field trip schedules at:

Southeast Michigan Butterfly Association
www.sembabutterfly.com

West Michigan Butterfly Association
www.glsga.org/wmba.htm

57th Annual MES Meeting: 24-25 June 2011

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The Pierce Cedar Creek Institute for Environmental Education (www.cedarcreekinstitute.org) will be the venue for our 2011 MES Annual meeting on June 24th and 25th. Located in scenic Barry County, and just south of Hastings, MI, the facility is described as a mix between a nature center and a biological field station. The Institute encompasses approximately 661 acres and includes a variety of upland and wetland habitats. The land itself has been virtually untouched for the last 50 years, thanks to its previous owner/naturalist, Dr. H. Lewis Batts.

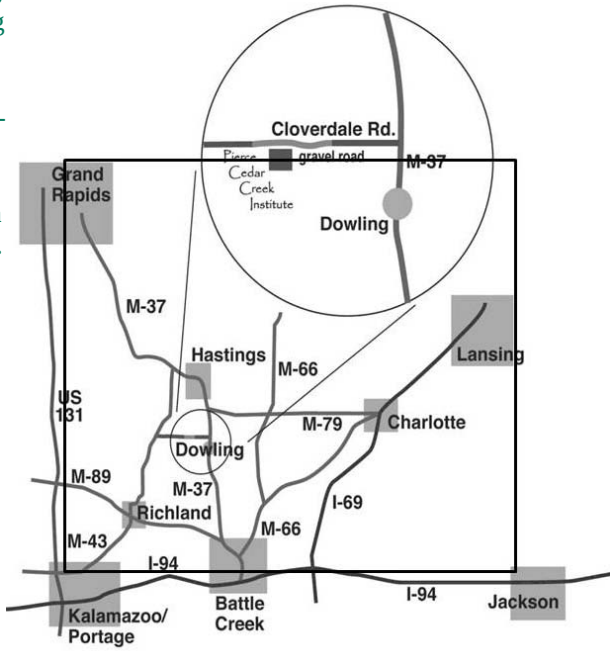
Geologically, the land has a number of glacial features. There are several kettle-hole wetlands, including a 13-acre lake (Brewster Lake). Miles of trails wind through the property for exploring its features.

Please plan to attend. All members have been mailed registration forms. Similar forms can be downloaded from the MES website. Try to submit all your paperwork by 1 June or soon thereafter so we can get a head count.

Lodging will be divided among the three housing facilities at Pierce Cedar Creek Institute. Most rooms are double occupancy, but a few single occupancy rooms are available on a first come first served basis.

Dr. Daniel Herms, Associate Chair of The Ohio State University Entomology Department and former MES president, will be our keynote speaker. The title of Dan's talk is *Phenology and plant - insect interactions in a changing climate* which will be interesting as well as applicable to current concerns regarding effects of climate change on insect populations.

Directions were mailed to all members. They are also on the MES website <michentsoc.org>.



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Current Annual Dues Schedule

Student (through High School) $12.00
Active $25.00
Institutional $45.00
Sustaining $35.00
Life $500.00

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Notice: 2011 Eagle Hill field seminars in Maine. Several workshops have an entomological focus: Applied Aquatic Entomology: The EPT Taxa: Ephemeroptera, Plecoptera, and Trichoptera (June 19 – 25); Scientific Illustration of Butterflies, Moths, and Other Insects (June 26 - July 2); Lepidoptera of the Northeast (July 3-9); Ants of New England (July 10-16); Spiders: Identification, Diversity, Ecology, and Biology (July 31 - Aug 6); and Parasitoid/ Predatoid Hymenoptera (Aug 14 – 20). For more information, see <http://www.eaglehill.us/>.

Martinoptera

A Case for Insects

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One of my earliest recollections of bugs in containers involves coffee cake; Entenmann's coffee cake, the kind that came in the long white box with a nifty clear window. Snuggly ensconced inside, complete with a smorgasbord of milkweed leaves, were several bewildered monarch caterpillars. Through the eyes of a seven-year-old, it appeared to me that they had given up on thousands of years of phylogenetic tradition and were eagerly lapping up what had remained of the raspberry filling. If you've ever tasted the sap of the Asclepiadaceae family, I'm sure you couldn't blame them.

Next to the Entenmann's raspberry coffee cake box sat a Hill's Brother's coffee can teaming with three Black Swallowtail caterpillars and a host of wilted Bishop's Weed leaves (*Aegopodium podagraria*) carefully laid out on damp paper towels.

Now there was a pair. All that was missing was a few silk moth larvae inside of a Bugle tobacco can. It would have been a breakfast of bugs, coffee cake, cigarettes and coffee. Surveying my livestock, craving a cup of Joe and a smoke, I felt much older than seven.

After the monarch butterflies emerged from their gold encrusted chrysalises and the black swallowtails emerged from their twig-shaped sarcophaguses, my first insect containers were once again reduced to household trash.

I had kept one Monarch and one Black Swallowtail to start my collection. After a ham-fisted attempt at spreading both specimens the critical question arose, "Where do I keep these rare beauties?"

I was into Red Ball Jet sneakers at the time and my mother always hung on to the boxes. In a role-reversal of the previous month, I now turned common household trash into premium insect cases. In time, my shoeboxes were joined by a single White Owl Invincibles cigar box, which I still have. Originally re-purposed as a box for my marbles, my father had drilled a hole in the middle of the lid so I could store all of my marbles without bothering to open the box. The marbles, however, were discarded and forgotten the second I discovered bugs.

By age eight, my collection had swelled to over four-dozen specimens. My cigar and shoeboxes had reached storage capacity and I had boldly thrown my hat into the high stakes competition of the Lowell 4-H Fair, scheduled for late that summer. Cleary a move towards professionalism was in order. My grandfather Ted came to my aid when for my eighth birthday he made me my first real bug case. It was unstained plywood with a Masonite bottom and grooves cut into the upper edge on three sides for a single sheet of glass to slide in. At 18 inches by 24 inches, it seemed enormous, the real estate impossibly large to fill up, making my former collection storage system look decid-

edly pedestrian and slightly embarrassing. Complete with a sheet of glass and Styrofoam in the bottom I was now professionally fitted out. This, however, is where my fledgling bug collecting endeavors became a far more dangerous game than any of the collecting shenanigans of my later years. My new bug case proved to be more hazardous to my health than all of my collecting time spent in topical jungles, unstable political regimes and off-the-map destinations.

The single sheet of glass would not slide into the grooves as planned. Instead the glass would get all squeehawed, break off a corner and I would cut my finger and bleed all over the bugs. It was a struggle that almost made me dig out the old marbles.

Two broken sheets of glass and several gallons of blood later, my father solved my problem with a sheet of thin Plexiglas. It was still difficult to slide in, but I was pleased with the improvement because it didn't maim me or break. On the down side it was always fully charged with static electricity and attracted all manner of dog hair, bug parts and Styrofoam bits. It also had a bad habit of drooping in the middle, coming to rest on the pinheads of the specimens below.

The next challenge with my new bug case was dermestid beetles. In those days, mothballs were the answer to specimen preservation, but presented unique challenges. Experience soon taught me that mothballs left to roam freely inside the case were not a good idea. Every time I would move the case, they would start to roll around the like some sort of insect specimen smashing pin ball game. I can still hear them crashing into the side, beautifully bouncing off of the bumper of Stag Beetle, shearing off mandibles and legs along the way, ricocheting off several pins and knocking labels out of kilter, before picking up speed in the row between the praying mantis and the cicada, rocketing under the underwings moths and finally shooting the moon and shattering my Luna Moth antenna to smithereens. This was not a game for the faint at heart.

If the mothballs were left to rest directly on the Styrofoam, they would eat a huge hole into the Styrofoam and rest comfortably in a little nest of their own making. It was almost as if the odd, smelly little balls were full of alien, acid blood that ate through anything from the human world. As cool as this was to watch, it was not what I wanted the 4-H judges to see. This was Entomology I, not some cheesy chemistry demonstration.

The answer to fixing "Bug Smasher" pinball and melting foam alien blood was found in the 4-H insect collection bulletin. It called for taking insect pins, heating them up, red hot over a stove or other source of open flame, then pushing the red hot pin into the paradichlorobenzene mothball (yet another fun and safe chemical for eight year olds to monkey around with on the kitchen stove). This was the same bulletin that recommended cyanide as a killing agent. As much as I pleaded for cyanide, my parents wisely thought the better of it. The idea was that the mothball would melt around the pin and then you could safely anchor them above the Styrofoam.

This never happened as promised. Instead the pins would get red hot, lose their temper and poke out the side of the mothball and into your hand. Like the glass this resulted in more blood on the bugs. After more than a few runs with mothballs breaking, pins bending, and hands bleeding and losing my temper, I decided that the melted foam was not so bad. At least they didn't roll around.

I continued to manage with the sliding glass type drawers through high school and into college. After I got married my stacks of blood-soaked bug drawers, smelling of mothballs, had to be dealt with. I stepped up to the challenge and committed to giving my life's savings to a little company out in California called Bio-Quip. It was going to be Cornell drawers for me, Cornell all the way.

In an effort to keep Bio-Quip from getting all of my money, I decided to order Cornell Drawer Kits instead of fully assembled drawers. The kit arrives in a box with everything you need to make six drawers. Well, almost everything. They do not include two important items: glass and the zillion dollar metal cabinets to house the finished drawers in.

I spent every waking minute for five or six years assembling Bio-Quip Cornell Drawer Kits. I have a cardboard sign above my office door that reads, "Will work for Cornell Drawers." Finally, I decided to save money, cut Bio-Quip out all together, and make my own drawers from scratch. After I figured in time, materials and capital expenditures for such small ticket items as a belt sander, router table, commercial table saw, spray booth, air nailers and a complete shop dust collection system, my first hand-crafted drawer came in at around $2,800.00. I wonder if Red Ball Jets are still available?

Since I was now in the habit of crafting my very own expensive drawers, I decided to go one step further. I landed on the idea of making each drawer out of the food or host plant for each family of lepidopterans that were to be placed in the drawer.

The first few were elegant and quite beautiful: cherry drawers were followed by birch, several species of ash and then the gambit of oaks. The pines were easy, as were the poplar and even the sassafras. Things started to get difficult with willow, moose maple and tag alder, and then went steadily downhill when I hit the sumac and crab apple feeders. Now I'm at the absolute bottom, trying to figure out how to make Cornell drawers out of various forbes, umbel roots and assorted members of the rose family. Things have come full circle it seems, and I once again find myself looking for my long lost marbles and the White Owl cigar box.

2011 Elections. Many thanks to the MES Members who were willing to run for office in 2011. David Houghton is running for President-Elect; and Martin Andree, David Cuthrell, and Sarah Smith are running for Governing Board Member-at-Large. **Please vote.** Also consider nominating yourself or others in 2012.

Authors Needed for MES *Entomology Notes*

In 1972 the first MES *Entomology Note* was published on the topic of antlions and tiger beetles. Since then, another 30 or so have appeared. The topic usually includes details on collecting techniques, rearing methods, and even insect-related games. I'm sure that each of us has entomological knowledge or skills that others would find valuable. So please consider drafting a *Note*. I'll be happy to work with you to prepare the final layout. *Notes* are usually 2 pages in length. Most *Notes* can be downloaded at the MES website.

Robert Haack, Newsletter Editor

Michigan Odonata Survey - Highlights of the 2010 Season

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In case you were wondering -- yes, the Michigan Odonata Survey (MOS) is still accumulating specimen data and last season was a productive one. The 2010 specimens have been catalogued, and the database brought up to date. However, one thing that has been apparent to us is that the database needs to be checked for inconsistencies. There are currently about 26,800 entries in the MOS database, which is very likely the largest data set for any state. These records have been exported into Excel and Julie Craves and I are working with that file to correct errors and standardize some of the field contents. Once we are done, the corrected version will replace the current data set and will be available on the web like it has been.

Julie has been diligently addressing old records for Wayne County, and she and Darrin O'Brien have been amazing me with new finds in a supposedly very urban environment. This winter, nearly 500 specimen records were added to the database, and thanks to the efforts of Julie and Darrin, Jeff Sommer, Stephen Ross, Carl Freeman, Alison VanKeuren, Burt Cebulski, Bob Marr, Phil Myers, and myself, county records and additional records of scarcer species have been added to the collection at the UMMZ.

At the March 2011 Breaking Diapause meeting, I finally was able to examine relabeled specimens from the John Perona collection at MSU. The Perona collection is comprised of specimens from the Calumet region of the Keweenaw Peninsula, and although the specimens are pinned, they are in good condition, and I already see some potential new UP records for a few species. I hope to have all those specimens identified fairly soon.

A few highlights from 2010

I did a lot more collecting in Washtenaw County last summer, and one benefit of the increased number of preserves and greenbelts is that these areas afforded me the opportunity to collect in areas that used to be private land. While many of the preserves I visited did not have appreciable wetland habitats, they were often adjacent to wetlands, and the upland wooded/brushy areas are used by the adults as feeding/resting areas.

Last summer seemed to be one of the best on record for large, localized swarms of dragonflies. Large numbers of *Aeshna*, *Anax*, *Pantala*, and *Tramea* were seen by many people. It could be that the wet spring allowed for lots of oviposition sites for the vagrant species.

Aeshnidae

2010 seemed to be a great year for *Aeshna*, with *A. constricta* Say being the species most commonly collected, followed by *A. tuberculifera* Walker. The swarms I saw of mixed species of dragonflies contained *Aeshna constricta* and *Anax junius* (Drury).

Calopterygidae

Hetaerina titia (Drury), the Smoky Rubyspot, is turning up in more areas. Jeff Sommer collected it on the Tittabawassee River in Saginaw Co. Darrin and Julie collected it along the Rouge River in Hines Park, for a new locality in Wayne Co. In 2009, we had many new records from the Huron and Raisin Rivers. Again, we have to ask the question -- are we seeing expanding populations, or are we merely more aware of the different species?

Corduliidae

Somatochlora linearis (Hagen), the Mocha Emerald, is a species that appears to frequent wooded, slow-moving creeks. Typically, these are groundwater-fed, and not the flash and bang type of streams in urbanized areas. The streams are usually shallow -- less than 20 cm deep, with mucky edges, lots of organic content, and do not dry up during the summer. One such stream at Maybury State Park in Wayne Co. appears to have a good population of Mocha Emeralds, and believe me, they are difficult to catch. I spent some time there with Julie and Darrin, and after many attempts, finally netted one myself. Darrin also collected another voucher in Lenawee Co. Jeff Sommer also found the species at Potato Creek in Saginaw Co. I suspect that it will finally be collected in Washtenaw Co. this coming summer, as there are several spots that look promising.

Somatochlora tenebrosa (Say), the Clamp-tipped Emerald, has been found at several fens across the Lower Peninsula, and because the sites are so far apart, it is welcome when new sightings turn up not far from previous ones. So, when I received an email from David Dister about a sighting in Manistee Co., I sent out the two closest dragonhunters - Stephen Ross and Carl Freeman to verify the find and obtain voucher specimens. The trio did not disappoint, as we now have vouchers from Manistee Co. *S. tenebrosa* appears to like small calcareous streams in fens, or at least that has been my experience this far.

I found *Williamsonia fletcheri* Williamson, the Ebony Boghaunter, near Canyon Falls in Baraga Co. in late May. This diminutive corduliid has now been found in a wide range of Michigan locales from across the UP to as far south as Mecosta Co. The sister species, *W. lintneri* (Hagen) is similarly dispersed in the state, being found as far south as Kent Co.

Libellulidae

As noted above, it was a great year for all the species of *Pantala* and *Tramea* and swarms of them were commonly observed. Darrin O'Brien and Julie Craves have a paper in press in a forthcoming issue of the Great lakes Entomologist about finding and collecting a voucher of *Tramea calverti* Mutkowski in Wayne County – a new state record.

As noted above, please remember that any new state records and county records must be vouchered specimens. Photographs are helpful to a point, but they do not replace the need for a voucher. A specimen can be verified, but a photograph cannot be examined further. No DNA, no measurements, no critical examination can take place. That is why MOS insists on a voucher specimen. If you would like to participate in collecting/observing for MOS, please contact me at mfobrien@umich.edu. Our web pages are at <http://insects.ummz.lsa.umich.edu/michodo/mos.html>.

Brown Marmorated Stink Bug: Description, Damage, Monitoring and Control Considerations for Michigan's Conditions

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(**Newsletter Editor's note:** The following story was posted on 10 February 2011 on the internet at Michigan State University's Integrated Pest Management Program and Crop Advisory Team (CAT) Alert Newsletters at the following URL: http://www.ipmnews.msu.edu/fruit/Fruit/tabid/123/articleType/ArticleView/articleId/3247/Brown-Marmorated-Stink-Bug.aspx>.) For information on BMSB that is geared towards organic growers see <www.bmsb.opm.msu.edu>.

The Brown Marmorated Stink Bug (BMSB), *Halyomorpha halys* (Stål), is an exotic pentatomid species native to Asia. Karen Bernhard of Pennsylvania State University Cooperative Extension, first found specimens in Allentown, Pennsylvania, in 1996.

In 1999, a specimen was found in a Rutgers University blacklight trap about 30 miles east of Allentown in Milford, New Jersey. Since that time, specimens have been identified in 29 US states, primarily in the Mid-Atlantic region but with additional populations in Oregon and Southern California. Midwestern populations of BMSB were found in Ohio in 2007, Illinois in 2009, and first reported in Michigan in 2011. As with many other invasive species, the distribution is likely spread wider than reported.

Photo 2. First instars. (Photo credit: Rutgers University)

Photo 1. Adult female. (Photo credit: Rutgers University)

Description. BMSB adults have the shield-shaped body typical of most stink bug species. The body is mottled brown with coppery or blue metallic-colored punctures on the head and pronotum. Adult bugs measure 12 to 17 mm long (approximately a half inch). Its most distinguishing characteristic is black antennae with a white band between the fourth and fifth antennal segments in both nymphs and adults. Eggs are light green and are oviposited in clusters of about 28 barrel-shaped eggs on the underside of leaves.

There are five nymphal instars that have the characteristic antennal markings (second through fifth) plus a white band on the tibia (third through fifth). Dark red eyes and a yellowish-red abdomen in the first instar are also characteristic of immature stages. Abdominal coloration gradually turns to off-white with reddish spots in later instars. Wing pads are easily recognizable in the fifth instar. Both immatures and adults have contrasting white and dark bands on the outer edge of the abdomen. All life stages emit a pungent odor when disturbed.

Life history. BMSB is native to Asia where it is an occasional pest of tree fruit and legumes. A preferred Asian host is the Princess Tree, *Paulownia tomentosa*, which acts as an early season host in the United States. Other early season hosts include apple, cherry and pear trees. BMSB has a host range of over 300 plants including many agricultural and ornamental crops. Feeding damage has been recorded in high value specialty crops including tomatoes, sweet peppers, raspberries, apples, peaches, pears and cherries as well as damage in corn and soybeans.

In Northern regions, such as Michigan, BMSB will likely have one generation per year. It requires 538 degree days (DD – based 50°F) to develop from egg to adult. An additional 148 DD are required for female maturation at 77 °F. In Allentown, Pennsylvania, an appropriate biofix to begin DD accumulations is when *P. tomentosa* is in full leaf. In northern states, adults emerge from overwintering sites in mid-spring, mate and begin ovipositing the first week of June. Where it has one generation, the nymphs develop and feed throughout the summer, molting to the adult stage at the end of July/beginning of August when there is a large peak in flight activity. High densities of the insect are very noticeable at this time as is feeding damage on susceptible plants. This "fall" generation continues to feed before moving to overwintering sites beginning in early September. Migration to overwintering sites is both temperature and day length induced.

Damage. BMSB is a sucking insect that inserts its proboscis into plant tissue to extract plant fluids. During feeding the surrounding cells are killed by digestive enzymes resulting in the formation of small necrotic areas at the feeding site. These areas appear corky, pithy or sunken, depending on crop phenology. In apples and peaches, feeding immediately following bloom causes the fruit to abort prematurely. Mid-season feeding can result in the characteristic "cat-facing" damage typical of plant bugs. Late season feeding results in pithy or sunken regions of mature fruit. This type of feeding damage makes the fruit or vegetables unmarketable for fresh market sales. Damage in corn caused failure of the kernels to

Photo 3. Fourth instar. (Photo credit: Rutgers University)

develop and delayed senescence in soybean as well as causing pod discoloration and distortion.

Damage from BMSB can be very extensive. For example, in 2006 and 2007 in New Jersey and Pennsylvania, commercial farmers using Integrated Pest Management (IPM) had a minimum of 25% fruit per tree that were damaged by stink bug feeding with upwards of 90% in apples and pears. Damage at these farms was attributed to BMSB because it was the dominant stink bug species at all sites. In soybeans, BMSB were present in densities surpassing treatment thresholds established for other stink bug species in southern regions. However, no pest management thresholds for BMSB have been established in any commodity.

Nuisance in homes and structures. In addition to being an agricultural pest, BMSB adults are a nuisance to homeowners. Adults overwinter in structures, such as houses, congregating on the outside of homes in early-mid September and moving indoors as temperatures become cooler. Once inside, they seek shelter and may not be noticeable except on warm days when they may become active. Their nuisance behavior is caused by large numbers congregating on or in the structure and by their offensive odor that is released when they are disturbed. During the winter months, the adults do not mate or feed. BMSB is not known to bite humans or pets. Adults leave overwintering sites in the spring as temperatures and day length increase.

Monitoring and control. BMSB can be monitored using attractant-baited traps, sweep nets or beating tray samples, and blacklight traps. Adults and nymphs are attracted to an aggregation pheromone, which in combination with pyramid traps has potential to monitor densities and dispersal of existing populations. Sweep net and beat samples are efficient monitoring methods to identify seasonality and density in a crop. However, only blacklight traps were effective in New Jersey at detecting new populations before damage was apparent in crops.

At present entomologists are still developing control programs for BMSB in agricultural crops. While pyrethroid and neonicotinoid insecticides have shown promise in laboratory trials against adult and fifth instars, these chemicals are restricted during the period of peak populations in tree fruit and have had mixed results in the field. Rutgers University has screened numerous insecticides against adult BMSB. Please follow label instructions, as well as proper safety and application procedures. Insecticides with ß-cyfluthrin, Bifenthrin, Cyfluthrin, Deltamethrin and λ-cyhalothrin as an active ingredient caused mortality of BMSB in the laboratory.

Photo 4. Late season BMSB damage in apple.

A newly described egg parasitoid species, *Trissolcus halyomorphae* Yang (Hymenoptera: Scelionidae) has been identified as the primary biological control agent responsible for the management of BMSB in northern China. This parasitoid causes 50% egg mortality and is the only natural enemy identified with a mortality rate exceeding 10%. *Trissolcus halyomorphae* has not been found in North America and endemic North American egg parasitoids cause less than 10% mortality (K. Hoelmer personal communication).

In homes, people have a few options to minimize the number of BMSB adults inside. The best option is to prevent BMSB from entering buildings. Exclusion methods such as caulking windows and doors and removing window air conditioners have shown to be helpful. Exterior insecticide applications as a perimeter spray may be helpful at reducing large numbers of adults entering the home, but timing is important and should be done at the beginning of the overwintering flight when adults begin to appear on the outside of the house. Once inside, they can be removed either by hand or by using a shop-vacuum. Insecticide applications against BMSB are NOT recommended indoors.

As BMSB disperses to new habitats, its overwintering nuisance behavior is often noticeable early and can assist in monitoring its distribution. Suspected populations should be reported and brought to your local county extension office for identification and reporting.

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Potato (*Solanum tuberosum*) as an Alternative Host for Rearing *Papaipema* Moths

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I'm not sure who was the first person to come up with using an alternate host for rearing of *Papaipema* (Noctuidae) larvae. But among my collecting colleague's, Richard Henderson has used sweet potato (*Ipomoea batatas*), and Mo. Nielsen and Jim Wiker have both used common carrot (*Daucus carota*) and I've used both. But the use of common potato (*Solanum tuberosum*) was probably by shear accident. Most likely what happened was that I did not have either sweet potatoes or carrots and simply decided to try using potato as a host. Anyway potato has worked out very well for me when rearing *Papaipema* species. I have now reared over 20 species of *Papaipema* (see list below) using potatoes. Some species are a little fussy and consequently take a little longer to get acclimated to an alternate host, but after their initial introduction to the host they do very well. To date, I have only had poor results when rearing *P. sciata* Bird and *P. maritima* Bird on potato. Both of these *Papaipema* species are sunflower (Compositae) feeders, and neither species did much better when switched to carrot. However, *P. maritima* did do a little better on carrot than *P. sciata*. Different *Papaipema* species take different amounts of time to develop.

Papaipema larvae feed in what I call "feeding bursts," i.e., feeding frantically for 1-3 days and then stopping and resting for a day or two before repeating the whole process over. Perhaps they are molting during what seems like a resting period. But in the long run they all become adults at about the same time, between 74 and 111 days (see Table). Growth rates for *P. sciata* and *P. maritima* were suppressed for some reason. I will have to wait until this fall to try and secure more ova of these two species and then attempt more rearings to understand why I cannot rear these two species on potatoes when I've been able to rear 20 other *Papaipema* species so well. The 20 species of *Papaipema* reared on potato to date did go through all larval instars, pupation, and normal-sized adults did emerge. The duration of time from 1st instar larvae emerging from ova to pupation and then adult emergence are similar between larvae reared in potatoes and wild larvae that develop in their natural host. There are of course slight variances in the development time between *Papaipema* species when rearing the larvae in potatoes. If the old-time collectors like H. Bird, H. Hessel, and A. Wyatt had stumbled across this way of rearing *Papaipema* larvae, I probably would not be writing this paper now! The larval development times that I have recorded using potatoes as hosts (50-78 days) are similar to the 60-75 day durations reported by Bird (1923) and Wyatt (1915-1942). In addition, the duration of the pupal period that I have observed (23-33 days) is similar to that reported by Bird (1923; 24-33 days).

Table 1. Typical range of developmental times (days) for *Papaipema* larvae when reared on alternate hosts and duration of the pupal period for 20 species of *Papaipema* species collected in Michigan and reared indoors at room temperature.

Life stage	Duration	Running total
1st instar	4-5 days of which 1-2 days is idle to next instar	5 days
2nd instar	5-8 days of which 1-3 days is idle to next instar	13 days
3rd instar	6-9 days of which 3-4 days is idle to next instar	22 days
4th instar	8-12 days of which 3-5 days is idle to next instar	34 days
5th instar	10-18 days of which 3-5 days is idle to next instar	52 days
6th instar	10-14 days of which 4-6 days is idle to next instar	66 days
7th instar	7-12 days of which 4-7 days is idle to pupa	78 days
Larval period	50-78 days total	
Pupal period	24-33 days	
1st instar to adult	74-111 days	

Acknowledgements
I would like to thank my collecting colleagues for their input on rearing *Papaipema* larvae on alternate hosts, including Richard Henderson, Mo Nielsen, and Jim Wiker.

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Bird H. 1923. New life histories, species and varieties in *Papaipema* (Lepidoptera) No. 22. Canadian Entomologist 55:106-07.

Wyatt, A.K. 1915-1942. The field notes of Alex. K Wyatt. Part 11. Noctuidae (in part). Noctuinae to amphipyrinae - personal notes bound and stored by the Field Museum of Natural History, Chicago, IL.

Table 2. Species of *Papaipema* reared on potato by the author as of 2010

*P. appassionata (*Harvey)
P. arctivorens Hampson
P. baptisiae (Bird)
P. beeriana Bird (northern & southern forms)
P. birdi (Dyar)
P. cataphracta (Grote)
P. cerussata (Grote)
P. circumlucens (Smith)
P. eupatorii (Lyman)
P. harrisii (Grote)
P. impecuniosa (Grote)
P. inquaesita (Grote & Robinson)
P. nebris (Guenée)
P. nelita (Strecker)
P. polymniae Bird
P. pterisii Bird
P. rigida (Grote)
P. rutila (Guenée)
P. silphii Bird,
P. speciosissima (Grote & Robinson)

In addition, I have reared new species #1 (unnamed), new species #2 (but often called the Ostrich fern borer), plus two unknown forms of *Papaipema*, one a possible hybrid, and the other appears to be in the baptisiae/birdi complex.

Techniques for Rearing *Papaipema* Larvae

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I like to do my *Papaipema* rearing during the cold months of winter, which allows me to keep better track of their life history, recording data day by day, along with taking photos of each species as needed to document their movement, changes in form and color, and any other unknowns. Information on the larval life history of most *Papaipema* species is unknown but greatly needed to complete our understanding of the *Papaipema* species of Michigan.

After exposure to a suitable cold period (usually October to mid-January), I bring the *Papaipema* ova indoors, but only the number I wish to rear. It takes roughly 10 to 20 days before egg hatch at 72 to 76°F. Soon after I see the newly emerged larvae, I use a fine paint brush to place one or two larvae into an air-tight container that has a potato or carrot inside to serve as an artificial host. Before transferring the larvae, I use a toothpick to make a few openings into the host. You now have to tease the larva into the tunnel, which may take several tries. After the larva crawls into the tunnel, I plug the opening with a broken toothpick and leave it there for about a week. I then remove the toothpick and look for signs that the larva has begun to feed such as frass around the edge of the toothpick. Not all larvae will start feeding this way and it is common to lose a few.

I keep the tunnel plugged for another 2 to 3 days while the larvae burrow inside the host. By the time the larvae have become 3rd instars the host starts to dry up and gets messy. At this time the container needs to be cleaned. Whenever the host starts to get soft or rotten, I change to new host material. Mold and fungus can kill the larvae. The chamber must be kept dry and clean. I place paper toweling on the bottom of rearing container to help keep excess moister from accumulating inside the air-tight chamber. As larvae become 3rd or 4th instars or larger, I place the host into a new chamber with a vented top to allow air circulation, which keeps mold and moister down. At this stage, I usually clean the new chamber every other day. When larvae are getting ready to pupate, I clean the chamber and put light sand or a black dirt mix in the bottom for a pupatating medium. Some *Papaipema* species pupate inside their host, while others will crawl out and pupate in the medium presented. After pupation has occurred, I place the chamber where I can keep close watch. It takes about 1 month before the adult moth emerges. In general, at room temperature, it takes around 100 days to complete the life cycle from ova to adult. It is well worth the effort of what seems a never ending cycle of cleaning when the adult moth stands before you in all its spender!

Rearing *Papaipema impecuniosa* on potato. Shown here is a 3rd instar larva.

The Apple Flea Weevil: An Emerging Pest in Michigan

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Over the last several years the Apple Flea Weevil (*Orchestes pallicornis* Say; although some place it in the genus *Rhynchaenus*) (Coleoptera: Curculionidae) (Fig. 1) has become an increasingly common pest in Michigan apple orchards. We have primarily found it in organic orchards, but we have also observed damage in two conventional Michigan orchards. At low populations the weevil likely goes unnoticed, but at high populations it is capable of causing total crop loss. As a point of reference: two organic farms in Southwest Michigan as well as the organic block at the MSU Clarksville Research Station reported a 90% or worse crop loss in 2010.

Figure 1: Adult apple flea weevils on the underside of an apple leaf and closeup.

The apple flea weevil emerges in the early spring between the "green tip" and "pink" stages of apple bud development. Adults feed on leaves and buds resulting in characteristic "shot hole" type damage (Figs 1-3). Adults lay eggs in the leaves and larvae develop as leafminers, typically feeding from the middle of the leaf to the edge. Larvae pupate within a pupal chamber formed between the two leaf surfaces (Fig. 3) and emerge in June and July. Newly emerged adults feed on leaf tissue before entering diapause in late August or September. Previous literature states that adults overwinter at the base of trees. We have confirmed this using berlese funnel extractions of leaf litter collected from infested orchards, with more than 100 beetles collected in a gallon sample.

Identification of damage due to this pest is often delayed because it is often misdiagnosed as either frost damage or phytotoxicity from sulfur or other compounds. Adult feeding prior to fruit set causes buds and blossoms to abort while larval feeding

causes brown patches on leaf margins that resemble sulfur damage. Adult damage further mimics frost damage because beetles begin feeding at the base of trees and work their way up to the top. Management of this pest will depend on preventing adults from feeding on young foliage and buds, most likely through the application of adulticides. Insecticide screenings conducted by the MSU organic pest management lab are ongoing.

The apple flea weevil is a largely unresearched pest. Previous outbreaks of the weevil include one in the early 1980s and a severe outbreak in the late 1920s. One of the most recent scientific publication on the weevil is from 1950 (Cutright 1950). From old records it appears that adult weevils are long lived (up to 48 days post diapause) and have a single generation per year. Larval development appears to be completed over 2-3 weeks. "Old time" pest management recommendations (*e.g.* arsenate of lead, DDT) are now inappropriate for both conventional and organic management. Conventional preblossom applications of Lorsban® or Guthion® at "green tip" or "pink" stages likely provide management in conventional orchards. However, the upcoming phase-out of Guthion®, recent loss of EndoSulfan®, and high potential for the loss of Lorsban® will make researching pest management alternatives for this emerging pest a priority. Currently there are no proven options for organic management of this pest, although lab bioassays suggest that it is susceptible to pyrethrums and spinosads (unpublished data).

There are at least three parasitoids recorded in studies conducted in the 1930s and the MSU organic pest management lab has collected at least four species of parasitoids from farms in Michigan (Fig 4). Scouting for this pest is best accomplished by examining trees for characteristic adult "shot hole" damage (Figs 1-3). Adult beetles are typically found on the underside of leaves. Adults are fairly shy and will typically hop or drop off foliage when approached or disturbed. Larval feeding is also readily apparent especially once the larvae have formed their pupal chambers (Fig 3) at the leaf margin. The pupal chamber will

Figure 2: Apple foliage heavily damaged by apple flea weevil.

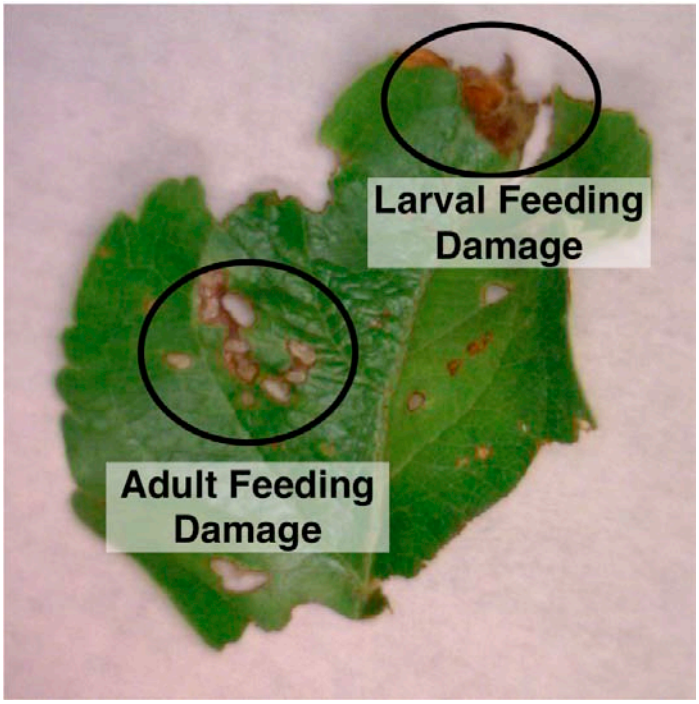

Figure 3: Characteristic apple flea weevil adult and larval damage.

have the appearance of a brown pocket that resembles a small "bubble wrap" cell.

We are initiating studies to determine the phenology of this pest and its parasitoids as well as explore potential management regimes, including studies of OMRI (Organic Materials Review Institute) approved materials, cultivation techniques, and burning. Funding for these projects has been obtained by MSU project GREEEN as well as the Organic Farming Research Foundation. Additional information and a video can be seen at <http://expeng.anr.msu.edu/news/article/learn_about_apple_flea_weevil>.

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Cutright, C. R. 1950. New insecticides for summer control of apple flea weevil. Journal of Economic Entomology 43: 947.

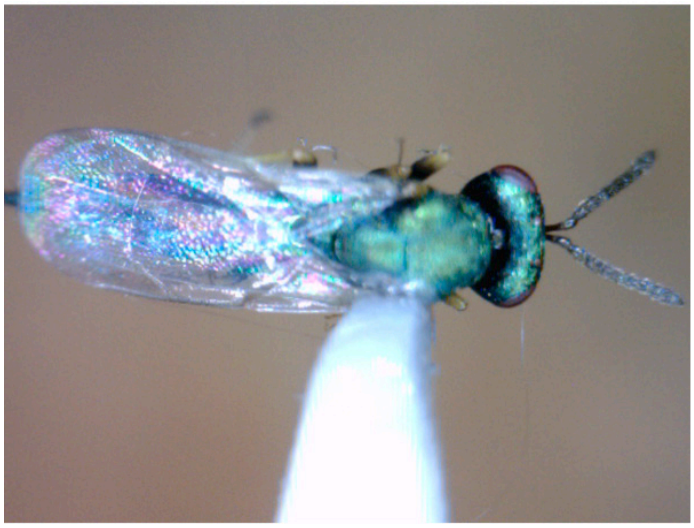

Figure 4: Apple flea weevil parasitoid.

First Detection and Response to the Arrival of Spotted Wing Drosophila in Michigan

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Michigan is a leading producer of fruits and vegetables, with one of the most diverse specialty crop sectors in the nation. As the top region for growing highbush blueberries, tart cherries, and Niagara grapes (among other food crops), it is important that Michigan maintains the economic vitality of these agricultural industries when threatened by invasive insects. This is particularly important at a time when agriculture is one of the few bright spots in the Michigan economy, and MSU Extension specialists have been keeping their eyes on the horizon for potential insect threats.

New potential invasive insects of fruit crops. Over the past few years, we have become increasingly concerned about four insect species that might affect fruit crops in the Great Lakes region. This list includes Light Brown Apple Moth (*Epiphyas postvittana*), European Grapevine Moth (*Lobesia botrana*), Brown Marmorated Stink Bug (*Halyomorpha halys*), and Spotted Wing Drosophila (*Drosophila suzukii*) or SWD. All of these species infest various fruit crops and the climate in the Great Lakes region would be highly suitable for their invasion and subsequent establishment. The two moth species have been detected in recent years in California in multiple counties, and are the subject of eradication/management programs with quarantine protocols in place to prevent further movement of these species between states. These exotic moth species were not found in Michigan during a widespread monitoring program conducted in 2010 by the Michigan Department of Agriculture. Establishment of the brown marmorated stink bug in Michigan was first reported in 2011 based on specimens first collected in two Michigan counties in 2010. This species is of high concern because it has recently become a major pest across the Mid-Atlantic States with damage to fruits, vegetables, field crops, and ornamentals, as well as a nuisance pest because it invades homes in large numbers to overwinter.

This article focuses on the fourth of these exotic species, *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae). A native of Asia, this vinegar fly has been reported since the 1930s in the literature as a pest of fruit crops. The adult male of this species has a distinctive spot on each of the wings (Fig. 1), but it is the female morphology that makes it an agricultural threat. This species is one of only two *Drosophila* species that have serrated ovipositors that allow them to cut into intact fruit to lay their eggs (Fig. 2). This morphological feature has significant implications for susceptible crops, because it means that SWD larvae can be present at harvest-time, rather than the typical *Drosophila* that need weakened or split flesh to allow oviposition. With the fresh and processed fruit market having zero tolerance for insect contamination, this new pest, which can reproduce rapidly (one generation every 12 days at 65-70°F) and has high fecundity (up to 300 eggs laid per female), poses a significant threat.

Figure 1. Male *Drosophila suzukii* clearly showing the two spots on the wings. The two dark bands on the foreleg are also partially diagnostic for this species. Note that other *Drosophila* trapped in Michigan during 2010 also had dots on the wings but they were either located elsewhere on the wing or were a different shape. Photo by Gevork Arakelian.

During 2010, SWD flies were detected in monitoring traps only after susceptible crops were harvested (see below). As we approach the coming 2011 growing season, we will learn much more about the ecology and management of this insect under our local conditions.

Forming a SWD Response Team. SWD was first detected in the continental US in 2008 in raspberry plantings in central coastal California. It quickly moved through many of California's main fruit production regions and during 2009 was detected in Oregon, Washington, and British Columbia with infestations in blueberry, raspberry, cherry, and other fruit. The crops most at risk from this pest include those with thin skin and soft flesh. At first the arrival of SWD in the US seemed like a west coast issue and that The Rockies might keep the fly out of eastern states. However, modern interstate trade seems to have made that unlikely, and in late 2009 SWD was found in Florida. At that point, MSU entomologists took much more notice and invited interested organizations to form a SWD Response Team. The SWD Response Team is comprised of fruit commodity leaders, Michigan Department of Agriculture (MDA), MSU Extension educators and members of the MSU Entomology and Horticulture Departments who have been meeting since early 2010 to develop monitoring plans and to coordinate efforts within Michigan. This group developed an Early Detection-Rapid Response (EDRR) plan, both to monitor for this insect and to develop some response scenarios depending on when and where the pest was detected.

Monitoring and teamwork lead to 2010 detection in Michigan. Over 300 monitoring traps were deployed in early summer 2010, mostly in fruit farms but also at some processing sheds, rest stops, and urban gardens, and also around the MSU campus. For many weeks there were no captures of SWD in these traps but on Thursday, 23 September 2010, the first suspect flies (a few males and one female) were found in Allegan County by MSU Entomology technician Steve Van Timmeren. These flies were driven to MSU campus that same afternoon by John Wise, and the identification was

verified through the online key developed by Oregon Department of Agriculture by MSU Entomology graduate student Noel Hahn that same evening. The next day I took the samples to Gary Parsons, collection manager at the MSU Albert J. Cook Arthropod Research Collection who also confirmed their identity using the key. Robin Rosenbaum at MDA explained the process for getting samples officially submitted to USDA-APHIS Plant Protection and Quarantine's division for insect identification, and so at 1pm that Friday, 24 September 2010, Laurel Lindemann drove the flies to Jim Zablotny at the APHIS-PPQ office near the Detroit airport. Dr. Zablotny provided tentative official confirmation of SWD male and female flies that Friday afternoon, and early the next week the USDA Systematic Entomology Lab in Beltsville, MD, sent official confirmation. Such a rapid determination of the species identity of these samples by the USDA taxonomists was very helpful at the start of our response to this pest's arrival in Michigan.

During the long warm fall of 2010, additional detections were made at many more sites including farms, rest stops, urban gardens, and at the MSU campus. In total, 13 of the 28 counties monitored were found to be positive for this pest (Fig. 3). Our 2010 sampling efforts and the eventual trap distribution were somewhat haphazard and responsive to the hotspots that were first identified in September, but we have been able to highlight some of the major areas of distribution. The cold weather in early December finally brought the catches of flies down to zero. However, during fall 2010 we were able to determine that SWD flies are able to withstand cold nights in the 20's and remain active the following day and that they can infest some of our wild berry-producing plants such as dogwood and poke-weed. Further monitoring in 2011 with support from the Specialty Crop Block Grant through MDA will help further delineate SWD distribution of in Michigan.

Monitoring for SWD. One of the most important functions of the SWD Response Team is to coordinate our monitoring program for understanding where SWD are present in Michigan. We are using a simple trap design based on a plastic 32-oz cup with ten 3/16 inch holes around the sides of the cup, leaving a 3-4 inch

Figure 2. Distinctive ovipositor morphology of *Drosophila suzukii*. Photo by Martin Hauser.

section without holes to facilitate pouring out of the liquid (Fig. 4). The holes can be drilled in sturdy containers or melted with a hot wire or wood burner in the cups with thinner plastic. Pour 1-2 inches of apple cider vinegar into the trap as bait. To help attract flies and to ensure that trapped flies do not escape, a small yellow sticky trap can be placed inside the trap. This is optional, because the trap can still work well if the sticky trap is omitted, but then a small drop of soap should be added to the vinegar to prevent fly escape. Traps must be hung in the shade in the fruit zone to optimize catch. Attach a wire to the sides of the trap and then fasten the trap to a branch or trellis. A commercially-available trap (Contech Co.) is now being marketed and it performed well in some 2010 trials on the west coast.

We recommend that traps are checked weekly for SWD flies and that the vinegar is changed weekly to retain its activity. During 2011, we will be running a study to compare different durations of vinegar deployment. Pour the old vinegar into a bottle or away from the trap location, and then place the traps back near the crop with fresh vinegar. Continue monitoring through harvest and post-harvest to determine whether the fruit need protecting.

Online SWD monitoring database. For the 2011 season, MSU will be establishing an online database for recording SWD capture information from monitoring traps. This will provide a central site for data collection and the weekly county-level reports will be used by MSU extension staff. We also hope to engage the Master Gardener network to provide further outreach into counties where fruit agriculture is sparse. We welcome MES entomologists joining this network of monitoring sites so that we can further increase our geographic spread. This system will be online by June, and information on registering as a member of the SWD Monitoring Team will be posted later through our SWD website (see below).

Getting the word out – rapid extension education response. When new invasive insect pests arrive there is a rapid learning curve for everyone affected. In this case, large amounts of extension information in English have been developed by west coast research and extension colleagues, and they have made available their translations of the early Japanese literature. This has helped our Michigan team get up to speed quickly on this pest, and to develop some useful extension materials. With assistance from the MSU IPM Program's Joy Landis we have launched a SWD website (www.ipm.msu.edu/SWD.htm) that will serve as the central clearing house for all information on this pest in Michigan. At this site you can find an MSUE fact sheet in English and in Spanish, guides to monitoring for SWD, management information, a video about trap construction and placement, and regional contacts.

In addition to the printed and electronic information, MSU Extension specialists and educators have spent the winter giving talks at grower meetings to increase awareness about SWD. This has been challenging given that we have little experience with this pest in the Upper Midwest, but members of the SWD Response Team have provided numerous talks to fruit growers around the main fruit producing regions of the state, from Benton Harbor to Traverse City. These talks have focused on awareness, monitoring, identification, and management and we plan to generate much more information for Michigan by the end of this year.

As spring 2011 approaches, our education efforts have transitioned to focus on hands-on training events. These workshops provide extension educators, growers, scouts, and consultants with a chance to see SWD eggs, maggots, pupae, and adult flies. We demonstrate trap construction, placement, checking, and how to sample fruit for the SWD maggots. We hope that this early effort in training will enable better management decisions to be made during the summer if this pest is found again.

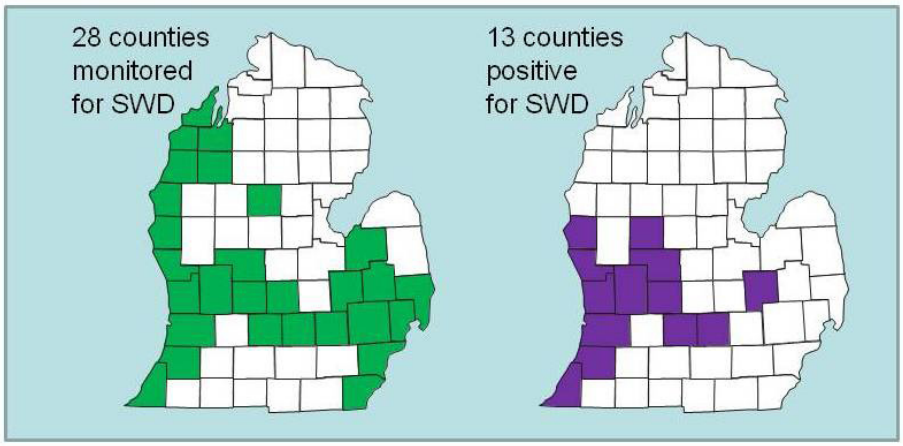

Figure 3. The 28 counties in Lower Michigan monitored for *Drosophila suzukii* during 2010 (left), and the 13 counties in which positive detections were made (right). Sampling effort and average trap counts varied widely across the sampled counties. Image: Rufus Isaacs.

Figure 4. The monitoring trap used for SWD. A plastic container with holes, containing apple cider vinegar as bait, and a sticky trap to catch flies. Traps may also be used without the yellow sticky trap if a drop of unscented soap is added to the apple cider vinegar. Photo: Rufus Isaacs.

Next steps. This coming summer the SWD Response Team will learn much more about how this pest behaves under Michigan conditions. We are continuing with a widespread monitoring effort that will provide important insights into distribution, phenology, and sex ratios of this insect. Our newly-established research projects will address sampling methods, optimal monitoring techniques, and methods for control in conventional and organic farms.

If you are interested in learning more about the ongoing response to SWD detection in Michigan, keep in touch with our activities at <www.ipm.msu.edu/SWD.htm>.

Acknowledgements. The monitoring, research and extension activities of the SWD Response Team are supported by MSU, Michigan Department of Agriculture, Project GREEEN, The USDA Specialty Crop Block Grant Program, and various Michigan commodity organizations.

Photos from Breaking Diapause that was held at the Natural Science Building at Michigan State University on 19 March 2011.

Mo Nielsen and Ron Priest

Ted Herig, Toby Petrice, George Heaton, Adrienne O'Brien, Elwin Evans.

Thomas E. Wallenmaier 1941 - 2011

MES lost one of its longtime members on 2 March 2011, when Tom Wallenmaier passed away after battling brain cancer since 2009. Most recently Tom had served as MES President during 2008-2009, and organized the MES Annual Meeting that was held at University of Michigan – Dearborn in 2008.

Tom was born in Detroit on 12 December 1941. He graduated from Catholic Central High School in Detroit in 1959. Next he attended the University of Detroit, where he graduated with Bachelor degrees in philosophy and English. In 1967, he received his M.A. in Philosophy from Marquette University in Milwaukee, Wisconsin. In fall 1967 he began teaching philosophy at St. Leo College in Dade City, Florida, but after one year returned to Michigan to study for his Ph. D. in philosophy at Michigan State University, as well as to study biology and teach philosophy at the University of Detroit (U. of D.). Later, Tom received his Ph.D. from MSU in 1973 and his M.S. from U. of D. in 1975.

Tom married Marrion Darby in 1970, and had two children: Rachel and Stephen. In 1975, Tom began his federal career with the Defense Supply Agency in Battle Creek, MI. In 1976, Tom took a position with USDA APHIS (Animal and Plant Health Inspection Service) as an agriculture inspector in New York City. In 1980, Tom transferred to the USDA APHIS headquarters near Washington, DC. Tom's wife Marrion died of diabetes in 1984, and in 1986, Tom married Maggie Lee May, who already had two children, Robert and Edward.

In 1992, Tom moved to Michigan where he worked as the supervisor for the USDA APHIS office at the Detroit Metro Airport. In 1996, Tom took an early retirement from the USDA and began working as an educational consultant. In 2000, Tom took a fulltime position teaching philosophy at Henry Ford Community College, in Dearborn, MI.

Tom had many interests. Besides entomology (especially microlepidoptera), Tom enjoyed sailing, amateur radio, music (played piano, guitar), languages (French, German, Latin, and Greek), genealogy of the Wallenmaier family, and religion.

Tom accepting the gavel as be became MES President in 2008.

Besides being an active member of MES, Tom was also a member and past-President of the Maryland Entomological Society. Tom published many papers during his career, including a philosophy textbook in 2008 entitled "Logic That Works." Tom is survived by his wife Maggie; four children, and three grandchildren.
Robert A. Haack, Newsletter Editor

2011 First State and Provincial Records

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There were 12 submissions for new state records this year, representing three orders. Most of the Lepidoptera reported here were discovered as unreported by Robert Kriegel as he recorded specimen label data from specimens housed at the Michigan State University collection. As our long-time friend, Mo Nielsen, has many times said, "Some of my best collecting has been done in other peoples' collections!" Thank you all for these first reports.

Note. If you plan to cite any of the first reports below, cite the first line of each entry (i.e., the species, order, family) as the title and the submitter as the author.

***Onthophagus taurus* (Schreber)**
(Coleoptera: Scarabaeidae)
Submitted by: Gary Parsons.
Location: Michigan, Missaukee County, M.S.U. Ag. Exp. Station.
Date: 24 September 2010.
Host/Habitat: pitfall trap baited with cow dung.
Collector: Rachel Rounds, Evart, Michigan.
Identifier: Gary Parsons, M.S.U. Collections Mgr., A. J. Cook Arthropod Research Collection.
Voucher: Michigan State University.

Photographer: Ronald J. Priest
Reference: compared with European specimens in collection.

***Cameraria fletcherella* Braun**
(Lepidoptera: Gracillariidae)
Submitted by: Ronald J. Priest.
Location: Marquette Co., T47N-R23W, Sec. 01 sw/se.
Date: 21 March 2003 (forced emergence).
Larva recovered: 28 Sep 2002. Lot: RJP2005.
Host/Habitat: *Quercus rubra* Red Oak leaf miner.
Collector: Ronald J. Priest.
Identifier: Ronald J. Priest.

Voucher(s): personal collection of Ronald J. Priest.
Notes: Previously reared only from *Quercus alba*, White Oak.
Photographer: Ronald J. Priest
Reference**:** Braun, A. F. 1908. Revision of the North American Species of the Genus *Lithocolletis* Hubner. Trans. Am. Entomol. Soc. 34:269-357.

Caloptilia betulivora **McDunnough (Lepidoptera: Gracillariidae)**
Submitted by: Robert D. Kriegel.
Location: Michigan, Antrim Co., ca. 3 miles north of Eastport.
Date: 2-3 Aug 2002.
Host/Habitat: UV light.
Collector: F. W. Stehr.
Identifier: Ronald J. Priest
Voucher: Michigan State University Collection.
Photographer: Ronald J. Priest.
Reference: compared with specimens at Smithsonian Museum.

Caloptilia flavella **(Ely) (Lepidoptera: Gracillariidae)**
Submitted by: Robert D. Kriegel.
Location: Michigan, Dickinson Co., T44N-R30W, Sec. 01 ne ¼ .
Date: 14 May 1998.
Collector: Ronald J. Priest.
Identifier: Ronald J. Priest.
Voucher: Michigan State University Collection.
Photographer: Ronald J. Priest
Reference: compared with specimens at Smithsonian Museum.

Caloptilia invariabilis **(Braun) (Lepidoptera: Gracillariidae)**
Submitted by: Robert D. Kriegel.
Location: Michigan, Menominee Co., T35N-R29W, Sec. 36 nw ¼ .
Date: 28 Jun 2005.
Host/Habitat: adult on *Quercus ellipsoidalis* (Northern pin oak).
Collector: Ronald J. Priest.
Identifier: Ronald J. Priest.
Voucher: Michigan State University Collection.
Photographer: Ronald J. Priest
Reference: compared with specimens at Smithsonian Museum.

Acrocercops albinatella **(Chambers) (Lepidoptera: Gracillariidae)**
Submitted by: Robert D. Kriegel.
Location: Michigan, Clinton Co., T05N-R01W, Sec. 36 ne ¼ .
Date: adult, 02 Aug 2004. Larva recovered: 19 Jul 2004. Lot: RJP1496.
Host/Habitat: leaf miner in *Quercus velutina* (Black oak).
Collector: Elwin Evans.
Identifier: Ronald J. Priest.
Voucher: Michigan State University Collection.
Photographer: Ronald J. Priest
Reference: compared with specimens at Smithsonian Museum.

Leucanthiza amphicarpeaefoliella **Clemens (Lepidoptera: Gracillariidae)**
Submitted by: Robert D. Kriegel.
Location: Michigan, Clinton Co., T05N-R01W, Sec. 24 sw ¼ .
Date: adult 17 Sep 1999. Larva recovered: 28 Aug 1999.
Host/Habitat: leaflet miner in *Amphicarpaea bracteata* (Hog-peanut). Larva recovered on 28 Aug 1999; Lot: RJP931.
Collector: Ronald J. Priest.
Identifier: Ronald J. Priest.
Voucher(s): Michigan State University Collection.
Photographer: Ronald J. Priest
Reference: Forbes, William T. M. 1923. The Lepidoptera of New York and Neighboring States. Part 1. Cornell Univ. Ag. Exp. Sta. Memoir 68.

Stigmella saginella **(Clemens) (Lepidoptera: Nepticulidae)**
Submitted by: Robert D. Kriegel.
Location: Michigan, Schoolcraft Co., T46N-R13W, Sec. 34 ne ¼ .
Date: 15 May 1998.
Collector: Ronald J. Priest.
Identifier: Ronald J. Priest.
Voucher(s): Michigan State University Collection.
Photographer: Ronald J. Priest.
Reference: Wilkinson, Christopher and M. J. Scoble. 1979. The Nepticulidae (Lepidoptera) of Canada. Mem. Entomol. Soc. Can. No. 107.

***Tischeria badiella* Chambers**
(Lepidoptera: Tischeriidae)
Submitted by: Robert D. Kriegel.
Location: Michigan, Isabella Co., T14N-R05W, Sec. 32.
Date: 24 Mar 2000 (forced emergence).
Larva recovered on 01 Oct 1999.
Host/Habitat: leaf miner in *Quercus alba* (White oak); Lot: RJP973.
Collector: Ronald J. Priest.
Identifier: Ronald J. Priest.
Voucher(s): Michigan State University Collection.
Notes: miner recovered on 01 Oct 1999, rearing lot: RJP973.3.
Photographer: Ronald J. Priest.
Reference: Braun, Annette F. 1972. Tischeriidae of America North of Mexico (Microlepidoptera). Mem. Am. Entomol. Soc. No. 28.

***Tischeria castaneaeella* Chambers (Lepidoptera: Tischeriidae)**
Submitted by: Robert D. Kriegel.
Location: Michigan, St. Joseph Co., T07S-R12W, Sec. 18.
Date: 08 Apr 1999 (forced emergence).
Larva recovered on 16 Sep 1998.
Host/Habitat: leaf miner, reared in *Quercus rubra* (Red oak); Lot: RJP858.
Collector: Ronald J. Priest.
Identifier: Ronald J. Priest.
Voucher(s): Michigan State University Collection.
Notes: miner recovered on 16 Sep 1998, rearing lot: RJP858.2.
Photographer: Ronald J. Priest.
Reference: Braun, Annette F. 1972. Tischeriidae of America North of Mexico (Microlepidoptera). Mem. Am. Entomol. Soc. No. 28.

***Tegeticula intermedia* (Riley)**
(Lepidoptera: Prodoxidae)
Submitted by: Robert D. Kriegel.
Location: Michigan, Shiawassee Co., Owosso.
Date: 18 Jul 1953.
Collector: Bruce Wilson.
Identifier: Ronald J. Priest.
Voucher(s): Michigan State University Collection.
Notes: Revision of this complex brought to our attention by George Balogh.
Photographer: Ronald J. Priest.
Reference: Pellmyr, Olle. 1999. Systematic revision of the yucca moths in the *Tegeticula yuccasella* complex (Lepidoptera: Prodoxidae) north of Mexico. Systematic Entomol. 24: 243-271.

***Prodoxus decipiens* Riley**
(Lepidoptera: Prodoxidae)
Submitted by: Robert D. Kriegel.
Location: Michigan, Berrien Co., Grand Mere Dunes.
Date: 05 Jul 1968.
Collector: Dale F. Cosper.
Identifier: Ronald J. Priest.
Voucher(s): Michigan State University Collection.
Notes: Revision of this complex brought to our attention by George Balogh.
Photographer: Ronald J. Priest
Reference: Althoff, David M., Joshua D. Groman, Kari A. Segraves, and Olle Pellmyr. 2001. Phylogeographic structure in the Bogus Yucca Moth *Prodoxus quinquepunctellus* (Prodoxidae): comparisons with coexisting pollinator Yucca Moths. Molecular Phylogenetics and Evolution. 21: 117-127.

***Sialis cornuta* Ross**
(Megaloptera: Sialidae)
Submitted by: E. D. Evans.
Location: Michigan, Houghton Co., Calumet vicinity.
Date: 01 Jul 1969, female.
Collector: John B. Perona.
Range: Northeast Oregon and British Columbia eastward.
Identifier: Elwin D. Evans.
Voucher(s): A. J. Cook Arthropod Research Collection, Michigan State University.
Notes: This is the farthest eastern record of this species. Specimen: Michigan State University Collection.
Photographer: Ronald J. Priest.
Reference: Ross, Herbert H. 1937. Studies of Nearctic aquatic insects. Ill. Nat. Hist. Surv. Bull. Vol 21, art. 3: 57-78.

New BOOK by a MES Member

Brenda Dziedzic, President of the Southeast Michigan Butterfly Association, has just published a book entitled "**Learn About Butterflies in the Garden**." The book covers 33 butterflies from egg to adult, with over 240 color pictures, and information on host plants, butterfly gardening, and rearing techniques. The book can be purchased on-line at www.ButterfliesInTheGarden.com as well as at www.amazon.com. The cost is $19.95. Book signing events are listed at <www.ButterfliesInTheGarden.com>.

Reflections on One Entomologist's Training and Career

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Nothing in my early life particularly directed me toward a career in biological sciences. I had no especial interest in the natural world until, after leaving the U. S. Army Air Corps at the end of World War II, I began my freshman year at Ohio University. During my first semester, I elected General Zoology, a course then required of all pre-professional students. It was taught by an exceptionally charismatic professor, Dr. Hershel Gier, whose lectures so fired my interest in animal life that I decided then and there to become a zoologist.

The University of Michigan and Its Museum of Zoology

I transferred to the University of Michigan in 1948. At Michigan, I elected, among other courses, General Entomology, the lectures of which were delivered by the distinguished aquatic entomologist / limnologist Prof. Paul Welch, and the laboratory section was handled by Prof. Urless N. Lanham. Each of these superbly qualified zoologists was excellent in his own way. Dr. Welch, the author of a pioneering book in the field of limnology, was a dignified, highly formal professor of the "old school." He was always impeccably attired in a suit, necktie, and vest with a gold watch chain and academic key draped across the front, and he wore exactly the same outfit in the field, compromising with reality only by substitution of boots for shoes. In contrast, Dr. Lanham was a quiet, scholarly man best known for his textbook of general entomology. Neither was charismatic, but the subject matter they presented so kindled my interest that I knew that I was to become an entomologist. Upon inquiry, I learned there were no additional entomological courses offered in the Department of Zoology, though Prof. Knight of the Medical School had a program in medical entomology and Prof. Samuel A. Graham had a forest entomology program in the School of Forestry and Natural Resources. I wasn't interested in either of those options, but I also learned that a wide range of entomological pursuits could be followed at the Museum of Zoology. I decided to transfer there. Dr. Lanham kindly arranged an appointment for me with Prof. Theodore H. Hubbell, the renowned Orthopterist and Curator of the Museum's Insect Division, following which interview I was accepted into Hubbell's program.

The Insect Division

The Insect Division of those days was relatively small. Its staff consisted only of the museum director Dr. J. S. Rogers who researched Tipulidae; Drs. Hubbell and I. J. Cantrall who researched Orthoptera; Ms. Ada L. Olson who carried out general insect curating; George W. Byers who, under the tutelage of Dr. Rogers, researched Tipulidae and Mecoptera and served as divisional Research Assistant; and, of course, secretarial help. It was not until later, at about the time I left the division, that Profs. Alexander and Moore assumed positions on the Insect Division staff and Byers obtained his doctorate and left for the Snow Entomological Museum, of which he ultimately became Director. Prof. Hubbell and his associate at the Insect Division, Prof. Cantrall, were involved in systematic research on the orthopteroid insects, of which they and their immediate predecessor, Prof. Frederick Gaige, had amassed one of the foremost collections in the world. That collection was then said to be the third largest in the world, exceeded in size only by those of the Philadelphia Academy of Natural Sciences and the British Museum.

Most of the Insect Division's 4-5 million specimens consisted of dried, pinned insects within glass-topped wooden cases called "Michigan drawers" enclosed within standard-sized metal cabinets. The division's collections of Hemiptera, Coleoptera, Lepidoptera, Odonata, and Diptera (especially Tipulidae) were extensive, as was, of course, the Orthoptera collection, but there was relatively little space devoted to alcoholic and other fluid-preserved specimens, and none to insect sound recordings.

Inasmuch as there was no available office space, my initial assignment was a desk and chair in the Animal Room where I shared quarters with, among other malodorous creatures, a Massasauga rattlesnake, assorted rodents and lizards, and various noisy birds. Though the space wasn't sumptuous, it was adequate, and my office mates seemed not to object to my presence. Then, following Byer's departure, graduate student Ed Kormondy and I took over his vacant office. Ed, an insect ecologist, was an affable chap with an interest in governance. He went on to become President of the University of Hawaii. Upon Ed's graduation, Dennis Hynes, a crane-fly specialist, took his place in the office before moving on to California State Polytechnic College at San Luis Obispo. Finally, Dennis was replaced by the voluble Ted Cohn who went on to teach systematic entomology and evolution at San Diego State University. Now retired, Ted alternates between working at the museum in Ann Arbor and overwintering in California.

Even after my marriage in 1949,1 was well funded, having the G. I. Bill, which provided for tuition, books, housing, and food, a teaching fellowship in the Department of Zoology, and my beloved wife's salary at the university's General Stores, but, when Dr. Rogers asked me to replace the departed George Byers as Research Assistant, I readily accepted. I didn't need the money, and I was certainly busy, but I felt the experience would be invaluable. Thus, I continued serving as a Teaching Fellow in the Department of Zoology (involved in laboratories of courses such as General Zoology, Comparative Vertebrate Anatomy, Natural History of Vertebrates, and General Entomology) at the same time as I functioned as divisional Research Assistant in the museum. In the latter capacity, I performed general curatorial activities, preparing microscope slides, pinning and labeling insects, incorporating them into the collections, helping visiting entomologists, and working for Dr. Cantrall at the university's nearby E. S. George Reserve, all as I worked on my personal research. In short, I was busy, but I found the life exhilarating.

Several things are memorable from the period when I served as Research Assistant at the Insect Division. One was when Profs. Hubbell and Cantrall and I went on a 10-day field excursion throughout southeastern United States in search of orthopteran topotypes. That trip, one of many I ultimately took as Research Assistant, afforded me the opportunity to get to know better those two knowledgeable, veteran entomologists. Hubbell was ever the more reserved, scholarly, and driven of the two and Cantrall (whose speech had a pronounced midwestern United States twang) was always the more casual, relaxed, and easy-going.

We searched particularly for brachypterous *Melanopli*, but, of course, took specimens of whatever Orthoptera materialized. We collected, for example, the supposedly "rare" katydid *Hubbellia marginifera* which proved to be relatively common high up in the tops of the local conifers. I soon learned why young assistants who could climb trees were essential to entomological excursions. Moreover, we visited the home laboratories of a number of well-known entomologists including Prof. B. B. Fulton, of North Carolina State University during the course of our trip. Dr. Fulton was an especial hero of mine because of his pioneering research on cricket systematics.

On another occasion, Drs. Hubbell and Cantrall and I traveled to Columbus, Ohio, to the home of the well-known entomologist C. H. Kennedy so that—to the chagrin of the Ohio State Museum authorities—we could transport to Ann Arbor his extensive private collection of Odonata which had been purchased by the Michigan Museum. When added to the existing collection in Ann Arbor, the Michigan odonate collection was one of the truly great collections of those insects in the world. Prof. Kennedy was probably best known for his research on ants including "piss ants," as he liked to call them. He was a notoriously irritable individual with a way of getting what he wanted. Upon learning that I was a cocker spaniel enthusiast, he announced that, during the length of our stay, I was to walk his spaniel, which I did obligingly both because I love cockers and because my two bosses ordered me to do so. And he invariably asked the animal upon our return if he had enjoyed his defecation, but the dog never answered. In a related vein, once when Dr. Kennedy was visiting the University of Michigan Biological Station in northern Michigan, he was approached by a student with a question. The student, after receiving Kennedy's typically gruff response, glanced upward at a calendar affixed to the wall overhead. Noticing the month on the document, he said: "Why, that's last month, Dr. Kennedy." Kennedy looked upward, then slowly, laboriously got to his feet, pulled over a chair, stood on it, and, without comment, carefully scrawled *last month* at the top of the calendar before resuming his seat in front of the microscope.

The Detroit Entomological Society and the Michigan Entomological Society

The former Detroit Entomological Society held certain of its meetings at the museum during this period. It was about this time (1954) that it gave rise to today's Michigan Entomological Society affording me the opportunity to meet many local insect enthusiasts including the dipterist George C. Steyskal, the lepidopterists Jack Newman and Mogens C. Nielsen, the hymenopterist Henry K. Townes, the botanist and butterfly enthusiast Warren H. Wagner, Jr., Justin ("Doc") Leonard, and many, many others. Steyskal, who was originally a talented amateur entomologist, later assumed a research position at the United States National Museum in Washington. Townes, who researched ichneumon flies, founded the American Entomological Institute. These were interesting people, and I benefitted from the experience. I might add that, some years later (1964), I was personally honored by election as MES President.

Wayne State University

The early part of my academic life that is the main subject of this discussion came to an end in 1956-1957 when I was awarded the doctorate, left the Insect Division, and assumed a faculty position at Wayne State University. All of my subsequent academic assignments were at Wayne State except for several foreign visiting lectureships. At Wayne, I taught General Entomology and Insect Distribution and Behavior before becoming Director of our Northwoods Biological Station and Fish Lake Programs and later assuming the Chairmanship of the Department of Biological Sciences. During that long career, I published close to a hundred scientific reports and several books including a textbook of entomology. My research during the first decade after leaving the Insect Division was devoted to a study of the distribution and behavior of southeastern Michigan Orthoptera. Afterward (the 1960's through the 1990's), I focused entirely on the study of Spanish, Mediterranean and Atlantic island, and Argentine orthopteroid insects, one result of which I was to become co-founder and First President of the today's thriving international Orthopterists' Society.

Some Thoughts Arising from the Foregoing

Few of us are charismatic lecturers capable of capturing the hearts and minds of students and of transforming their thinking, but it behooves all of us to present as enthusiastically as we can precise, up-to-date science and to be as attentive as possible to the needs of the students who come into our lecture halls and laboratories eager to learn. In my case, I had the best of academic experiences; I had Profs. Gier, Hubbell, Cantrall, and Rogers who went out of their way to provide me with a superb introduction into my chosen field. The type of dedication they showed to students is all the more important for us to emulate today because our discipline is undergoing—in my opinion—a most unfortunate transition. The General Entomology course that once was a staple of every major liberal arts science department is fast disappearing from the curriculum, being replaced by a headlong rush into "more relevant" areas such as molecular biology, molecular genetics, biochemical physiology, and the like. Yes, these new disciplines are exciting and important, but let's not forget the classical disciplines including entomology. Please, let's not let entomology go down the drain.

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New Butterfly Management Publication

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I am very grateful to the Southern Wisconsin Butterfly Association Chapter of the North American Butterfly Association for posting a series of articles I've written called "Butterfly Conservation Management in Midwestern Open Habitats." The links are on the chapter's Resources web page: <www.naba.org/chapters/nabawba/resources.html>. This series arises from the field work my husband Scott Swengel and I have done, as well as the numerous reports and publications of other hobbyists and entomologists. The topics covered draw on the many queries we've received from nature lovers, scientists, managers, and agency staff about habitat management and butterfly conservation in the Midwest.

Butterfly declines and losses are being documented in the Midwest, and not just in the larger landscape, and not just in small, isolated preserves, but also in large, high-quality nature preserves. Habitat management is a factor that can contribute to declines but can also help secure and recover butterfly populations. Habitat management is also one of the factors most within the control of humans. This is good news, because it gives us an opportunity to make a significant difference in conserving butterflies. Each part begins with a one-paragraph summary of its contents. In these sections, I provide an overview of the issues and problems, my views on how science works, what it can and can't do, how seemingly conflicting science can be reconciled, what I've learned from my field work and readings, and how I recommend moving forward based on both what has been documented and what isn't known yet. I encourage you to skip around to the parts applicable to your questions or situations. I hope this is helpful for understanding what the situation is for midwestern butterflies of open habitats and what you and I can do to help them.

My subjects are the compelling problems of butterfly declines as well as good news you can use to reduce or reverse them. A variety of reports indicate losses not just in the developed landscape but also in large nature preserves. Based on my field research and scholarship, as well as enjoying wildflowers and hiking and camping around North America, I'd like to share my perspectives on how butterfly populations and their habitats persist and change over time, and how habitat management affects those outcomes. Even though the patterns are complex and variable, butterflies readily demonstrate reliable and orderly patterns. We can't make butterflies play by our rules, but if we learn their rules, there's great potential for our conservation efforts to retain and even enhance the butterflies that also call our region home.