# NEWSLETTER

*of the*

**MICHIGAN ENTOMOLOGICAL SOCIETY**

**Volume 45, Number 2** **July 2000**


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# *A Michigan Monarch Recovered in Mexico*

Adapted from *Monarch News*: *A Newsletter from the Monarch Butterfly Project*, Volume 1, Issue 1, 2000.

The Monarch Butterfly Project is a cooperative project between the Hiawatha National Forest of the US Forest Service and Wildlife Unlimited of Delta County, Michigan. In 1999, 58 volunteers contributed over 450 hours to monitor monarch reproduction and migration and to improve habitat for monarch butterflies near Penninsula Point, Delta County, in Michigan's upper peninsula.

The highlight of the 1999 Monarch Butterfly Project was the recovery of the monarch bearing tag number 105247. It was recovered by Dr. Lincoln Brower at El Rosario, a monarch butterfly reserve near Angangueo, Mexico, on 23 March 1999. El Rosario is over 2000 miles from Peninsula Point. This male monarch was tagged at Peninsula Point on 4 September 1998 by Ruth Gifford, a resident of Delta County. Dr. Brower, called the " Dean of Monarch Studies" by National Geographic, has been of great assistance to the Monarch Butterfly Project and his recovery of monarch #105247 makes this recovery all the more special.

More remarkable perhaps is the fact that only 88 monarchs were tagged at Penninsula Point in 1998. The chances of any of these being recovered were very slim. Monarch Watch at the University of Kansas and the Monarch Program in California are now paying rewards in Mexico for tagged monarchs. This has increased the recovery rate of tagged monarchs from less than 0.01 percent to about 1 percent.

## Officers of MES

President .....George Balogh
President-Elect ..... Mark O'Brien
Immediate Past President ..... Ron Priest
Secretary .....Robert Kriegel
Treasurer ..... Mo Nielsen
Member-at-Large (2000-03) ... Gwen Pearson
Member-at-Large (1999-02) ... Owen Perkins
Member-at-Large (1998-01) .... Dave Cuthrell
Journal Editor ..... Randy Cooper
Newsletter Editor ..... Bob Haack
Associate Newsletter Editor ... Therese Poland
Webmaster .....Mark O'Brien

## Current Annual Dues Schedule

Student (through High School)..... $ 5.00
Active ..... $15.00
Institutional ..... $35.00
Sustaining ..... $25.00
Life ..... $300.00

## Introducing the New Officers of the Michigan Entomological Society

**President-Elect: Mark O'Brien**

Mark is the Collections Coordinator of the Insect Division of the Museum of Zoology at the University of Michigan. Mark received his B.Sc. (Biology) from the State University of New York, College of Environmental Science and Forestry and his M.Sc. (Biology) from Syracuse University in Syracuse, NY. His research interests include Hymenoptera and Odonata.

**Governing Board Member-at-Large: Gwen Pearson**

Gwen is an Assistant Professor in the Department of Biology at Albion College. Gwen received her Ph.D.(Entomology, Minor Horticulture) from North Carolina State University, her M.Sc. (Entomology, Interdisciplinary Minor) from North Carolina State University, and her B.Sc. (Zoology) from Ohio State University.

Congratulations to our newly-elected officers - Welcome Aboard!

Thanks to our returning and newly-elected officers!

## Mo Nielsen Awarded Honorary Membership in the Michigan Entomological Society

Ron Priest, Department of Entomology, Michigan State University, East Lansing, MI 48823

*Mo Nielsen, Recipient of Honorary Membership Award at the MES 2000 Annual Meeting*

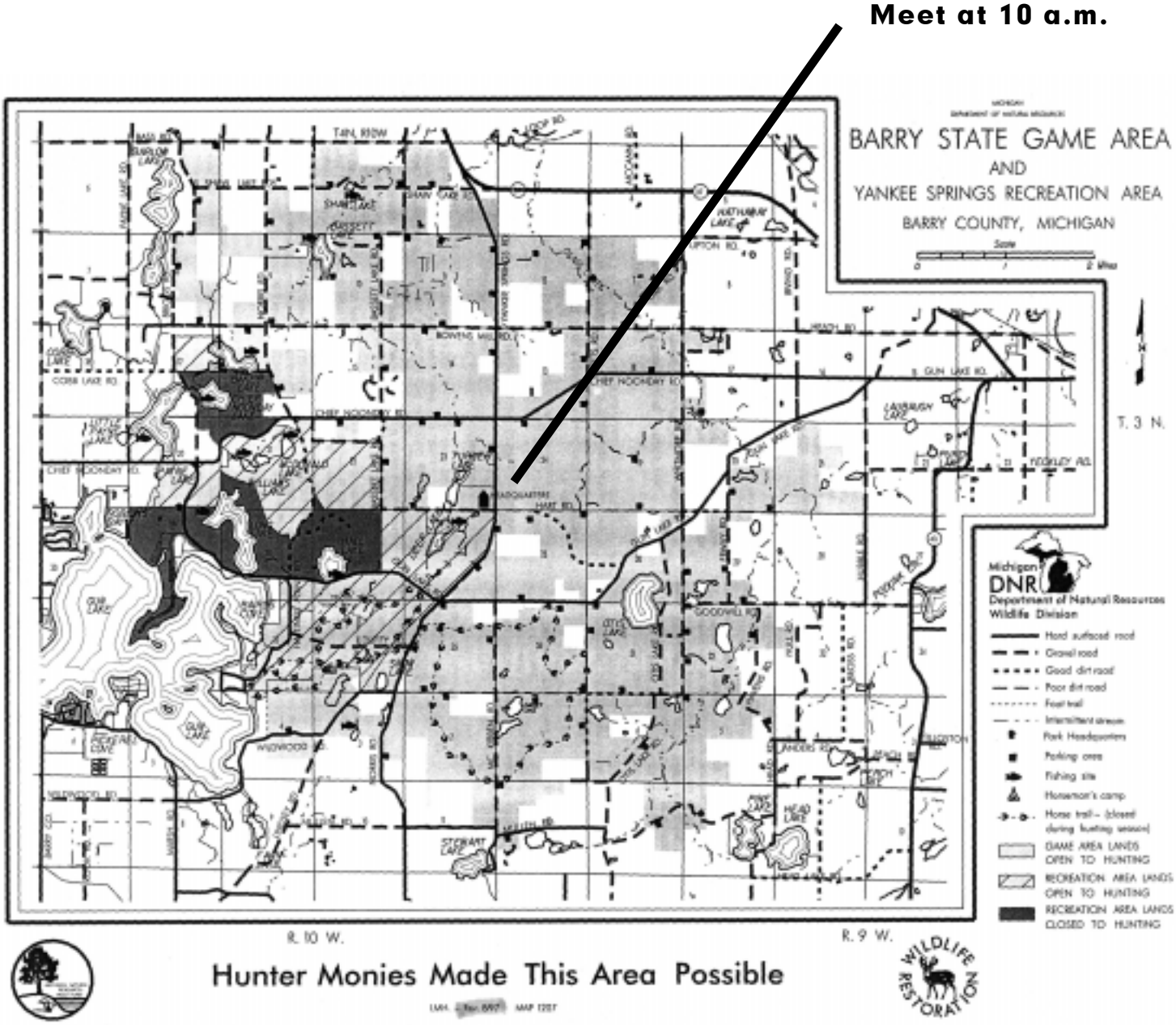
One of the highlights of this year's annual meeting was the presentation of the awardof HonoraryMembership to Mo Nielsen, one of the most active members of our Society! The award of honorary membership requires distinguished service in entomology or to the Society. Mo Nielsen is certainly highly deserving of this honor on both counts. Mo has provided many individuals with encouragement, knowledge, and his tremendous enthusiasm for Lepidoptera over the years. He is unofficially known as "Mr. Michigan Butterfly" for his expertise on Michigan's butterflies and skippers. He spent more than 50 years studying butterflies in the field, combed records and perused numerous private and insititutional collections to compile a complete list of every butterfly ever recorded in Michigan. His efforts are summarized in a 3-part list of Michigan Lepidoptera published during 1992-1998 and in his 1999 book, "Michigan Butterflies and Skippers: A Field Guide and Reference." In addition to his long and distinguished career in entomology, Mo has been the single most stabilizing force of the Michigan Entomological Society for over 36 years. He served as president from 1964-65, Chair of the Editorial Board from 1966-67, Executive Secretary from 1968-1991 and continues as Treasurer, a position he has served since 1992. Mo has led and encouraged field trips at annual meetings and hosted the annual spring "Breaking Diapause" meetings at MSU for the past several years.

Congratulations, Mo, on receiving this highly deserved and distinguished award!

## MID-SUMMER FIELD DAY : Saturday, 26 August 2000

For the first time in several years, the Michigan Entomological Society is holding a mid-summer field day. It's planned for Saturday, 26 August, at the Barry State Game Area and Yankee Springs Recreation Area. The site is located in Barry County about 35 miles southwest of Lansing. We plan to meet at 10 AM at the Park Headquarters located on the corner of Yankee Springs and Hart Roads. From Hastings take Gun Lake Road (M-37 & M-43) west approximately 8 miles (Gun Lake Road becomes Chief Noonday Road) to Yankee Springs Road. Turn south and travel one mile to Hart Road and Park Headquarters. See accompanying map.

Our guide will be Dave Cuthrell a staff entomologist with the Michigan Natural Features Inventory. Habitats at these sites are varied and include oak woods, prairie fen, dry sand prairie, lakes, and a number of wadable streams. This is a great opportunity for MES members and their families to enjoy collecting, observing, and learning about insects and nature. Plan to stay the day and even the next. Camping is available at Yankee Springs Recreation Area and motels are located nearby in Hastings. You may also want to stay up all night with some of us and black light for moths and other UFOs! Call Dave at 517-641-6598 or E-mail (cuthreld@state.mi.us) by 23 August to confirm last minute meeting plans. Do mark your calendar for 26 August and bring all your outdoor enthusiasts. See you then!!!



# Michigan State University Entomology Department Summer Outreach Programs

Cathy Bristow, Department of Entomology, Michigan State University,
East Lansing, MI 48823
E-mail: cbristow@pilot.msu.edu

Entomology is really reaching out to youth and teachers this summer and fall. In addition to the on-going tours and open-house visits to the Bug House and the Butterfly House, we are offering a series of summer and school term programs that will allow our young students to become bug-savey junior entomologists. Starting with a short course for teachers, the Entomology Department is offering Bug College for Teachers (College of Natural Science Course: NSC 600 Special Problems for K-8 Teachers) for the third year. This 10-day course is taught by Cathy Bristow and Tom Ellis, with much assistance from many of the dedicated faculty, graduate students and staff. This summer's helpers and visitors include Laura Palumbi (teaching assistant), Jen Donovan and John Mugg (keeping live insects in the classroom, and butterfly gardening), Rich Merritt, Kelly Wessell and Eric Hoffman (aquatic insects), Erica Jenkins (IPM in the schools) and special guest, Gary Dunn from the Young Entomologists' Society (YES). The course, which is designed to meet the MEGOSE (Michigan Essential Goals and Objectives for Science Education (K-12)) standards, has lots of hands-on activities and chances to practice what is being taught. The last two years have been a great success, and we hope this year's 16 participants will come away with some real enthusiasm for insects.

The Bug Camps for Kids series has already completed its two half-day camps to full capacity groups (25 kids per camp). The first of the camps was "Pollination Station". A third camp called "Water Works" is scheduled for August 5 and will feature aquatic insects in MSU's ponds and streams. This year, for the first time, we are offering a four-day residential camp for boys and girls ranging in age from 9 to 12. Our sixty-two campers, coming from as far afield as St. Ignace, will get a real taste of campus life with four nights in real dorms, and days filled with a variety of fun and educational activities. Besides discovering the world of insects, and making a collection, each camper will participate in preparing a slide show which will be stored

## Michigan State University

### Bug House
**(517-355-4662)**

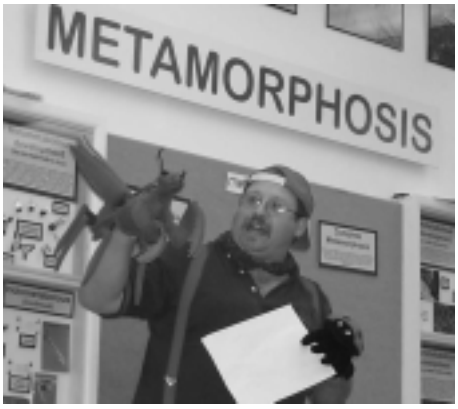
The Bug House contains live insect displays, exhibits, and "hands-on" activities. Guided tours for groups less than 30 are available Monday-Friday, 9-3pm. Cost is $24.00 for a one-hour program. Special hours have been arranged for those who may be interested in visiting, but do not constitute a group. A guide is available to answer questions.

*Located in room 243, Natural Science Building. Admission is by donation.*

### Butterfly House
**(517-355-0348)**

The Butterfly House has several species of free flying butterflies to show the interaction of flora and fauna. Visit the butterflies from 9am to 4:30pm, Monday through Friday.

*Located in the Crop and Soil Sciences Building. Admission is free.*




digitally on recordable compact discs for their 'scrapbooks'. Other activities include a presentation by the Science Theater Chief, and a story-telling hour by Cameron Wood, a member of the Nokomis Learning Center and the Nokomis Indian Tribe, who will explore the relationship of insects to Indian Folklore. Finally, the 47 boys and 14 girls will get an evening at a genuine Lugnuts game. Laura Palombi and Breana Simmons have been the lead counselors for the camp. Other counselors include Eric Hoffman, Meghan French, Brian McCornack, John Peterson, Mary Mugg, and Alicia King.

Finally, this fall will kick off our second annual GET BUGGED program where Entomology graduate students actually work in local classrooms over the year to help guide teachers and students in real scientific inquiries that involve insects. Last year, Jen Donovan led several workshops for elementary teachers, who were then paired with one or more personal 'mentors'. The mentors, Breana Simmons, Eric Hoffman, Ozzie Hernandez, Meghan French, Jana Lee, Brian McCornack, and Mary Mugg, were stars in their respective classrooms.

## Moths of America North of Mexico (MONA) is 30 Years Old in 2000

Eric H. Metzler, Secretary
The Wedge Entomological Research Foundation, 1241 Kildale Sq. N., Columbus, Ohio 43229-1306
Phone: (614) 888 3642
E-mail: spruance@infinet.com

In September 1970, Richard B. Dominick and Charles R. Edwards drafted the introduction to the first fascicle of the venerable *Moths of America North of Mexico* series of publications. Affectionately known as MONA, that first monograph, Fascicle 21 Sphingoidea, Hawkmoths, by Ronald W. Hodges began an ambitious publication project that successfully continues to document that portion of the lepidopteran fauna, known as moths, of the Nearctic Region plus Greenland.

In 30 years of publication, the MONA series has documented the occurrence of 2,381 species from the region. Three hundred thirteen species and 23 subspecies were described as new to science in the series. Larger showy and popular moths such as the sphinx moths and giant silkworm moths are included as well as some of the smallest moths, the Cosmopterigidae.

In its conception MONA was meant to be an authoritative replacement for the long out-of-date W. J. Holland's *The Moth Book*, originally published in 1903 and reprinted in 1968 by Dover. The highly popular and, until 1968, much sought after Holland provided some color illustrations, brief annotations about the species, and briefer taxonomic notes. Yet the number of species in Holland was limited, and nearly all species of smaller moths could not be identified with this, the only guide to moths in North America.

The idea for MONA needed time to develop, and eventually a nucleus of people including R.B. Dominick, C.R. Edwards, D. C. Ferguson, J. G. Franclemont, R. W. Hodges, E. R. Hodges, E. G. Munroe, E. W. Classey, B. Harley and others joined their knowledge, enthusiasm, and tenacity to publish the first MONA fascicle.

Five years after the first monograph was published, a public non-profit foundation, the Wedge Entomological Research Foundation, named in honor of Dominick's home in South Carolina, was formed to continue the vision of Richard Dominick, who unexpectedly died after just a few years and after only a few monographs were published.

Now in its 26th year, the foundation continues to publish the highly acclaimed series. The Entomological Society of America awarded Ronald W. Hodges its prestigious Thomas Say Award in 1990 for his leadership with the MONA series. Published reviews of the monographs in the MONA series have been highly complimentary.

Upcoming fascicles include the tribe Macariini (Geometridae) and the genus *Catocala* (Noctuidae). The Wedge Entomological Research Foundation is actively searching for competent authors of monographs for the series. In addition, the board of directors of the foundation desires to publish suitable monographs beyond the scope of the MONA series. Interested persons should contact the Foundation at: The Wedge Entomological Research Foundation, 85253 Ridgetop Drive, Eugene, Oregon 97405- 9535, USA.

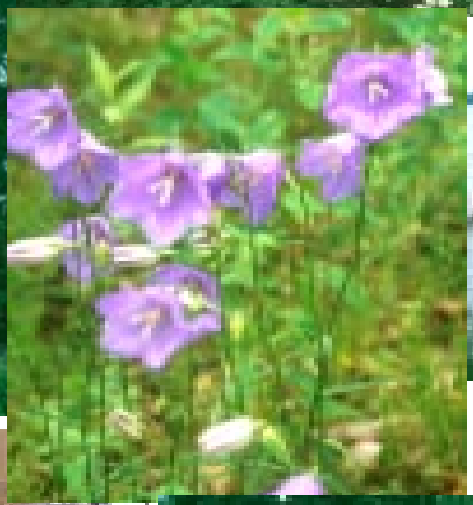
The Wedge Entomological Research Foundation gratefully thanks its subscribers, its supporters, the persons who provide data and energy to assist the authors, and the users of the monographs. Were there not a need, the project could not be sustained. Were there not an interest and dedication of moth collectors, the project would be impeded. Completion of the preliminary survey remains a major goal.

For further information contact Eric Metzler or:

Ronald W. Hodges, Managing Director
The Wedge Entomological Research Foundation
85253 Ridgetop Drive
Eugene, Oregon 97405-9535
(541) 684-0484
rwhodges@continet.com

## *Photos from the MES 2000 Annual Meeting*

## *Kellogg Biological Station*



# 2000 Michigan Entomological Society Annual Meeting

The 46th Annual Meeting of the Michigan Entomological Society was held on 1-3 June 2000 at the Kellogg Biological Station (KBS) located on the shores of Gull Lake in Hickory Corners, MI. The theme of this year's meeting was insect photography and featured three guest speakers with expertise on field photography, laboratory specimen photography, and digital photography. Two new events were included at this year's meeting: A Photo-Salon competition (in keeping with the theme of the meeting), and a Student Presentation Competition. Although the number of entries for the competitions was low this year, both events were very successful and popular and will become regular parts of future meetings. In addition to the invited speakers and student presentations, there were 4 submitted presentations and 5 poster displays. Following the meeting a collecting and photography field trip was held. Overall the meeting was a great success thanks to the organizational skills by George Balogh. We would also like to thank George Heaton for taking photographs at the MES annual meeting.

## Insect Photography - Beginner's Tips

David Ahrenholz, MD, Burn Center Office, 640 Jackson St., St. Paul, MN 55101-2595
E-mail: ahren005@maroon.tc.umn.edu.

Insect photography can be a great hobby, even for the amateur. Many of us have access to at least a 35 mm SLR camera. But most normal camera lenses won't focus close enough to permit large images sizes of small insects and standard macro lenses move us so close we scare away the subject. If you are only shooting dead or posed bugs, this is not a problem. I recommend finding a used 105 mm macro lens for live insect photography and a small dedicated flash unit. Then you can stalk your insects without scaring them away. The flash will freeze the motion of your subject and provide lots of light (use a small lens aperature). I can't recommend natural light photography for most beginners. You will need high speed film even in daylight. Use a high shutter speed to minimize your motion. A tripod is necessary for really sharp pictures but is way too clumsy for almost everything that is awake and active. Start with color print film (it is very tolerant of exposure errors) and easy to enlarge; slide film is not for beginners. When you are happy with the results on print film you can move to slides if you like.

Don't spend all your money on brand new equipment. Digital photography is driving down the prices of used film cameras very quickly – I always buy used when possible. Just be sure to ask for a 10 day return option if you are not satisfied.

Stalking your subject is the real thrill of the sport. Wear dark colored clothing and approach from a low angle. Cover the shiny parts of your equipment with black tape. Wearing knee and elbow pads will allow you to kneel or crawl up on wary subjects. Be careful of poison ivy, cacti, ground nesting bees, or fire ants (in the south) – all lessons I have learned the hard way.

You will dramatically increase the percentage of sharp pictures if you set your focus first and then move up on the insect, watching through the viewfinder. Move the camera very slowly toward the subject and trip the shutter just as the insect appears sharp in the viewfinder. Don't freeze up and try to be perfectly rigid to focus. This will increase your side to side motion and decrease the percentage of sharp pictures.

If you find a co-operative subject, shoot lots of images. Some insects like butterflies get ragged after a few days, so finding an attractive specimen can be a challenge. Don't skimp on film. Often only one of many images I shoot is really sharp or has just the right pose. Nothing is worse than finding you have five pictures which are pretty close, but just not quite right.

There are several good books available which can give you endless options for insect photography. I recommend two by John Shaw: "Nature Photographer's Complete Guide to Professional Field Techniques for the Beginner" and "Closeups in Nature for the Intermediate Photographer." Larry West's book, "How to Photograph Insects and Spiders," will provide ideas not found in the other two. Happy Hunting!

# Winners of the First Annual

**Category I**
**Life History and Behavior:** photographs exhibit some aspect of insect life with entries judged based on technical difficulty, rarity, and entomological content as well as overall aesthetic qualities.

## First Place (Category 1 and overall)

**Photographer:**
Gail Stratton,
University of Mississippi
**Title:**
*Last Chance: Female Green Lynx Spider and* Monobia quadridens *L. (Eumenidae)*
**Comments:**
The spider held the female wasp then two male wasps arrived and tried to mate with the female wasp
**Equipment and Film:**
Olympus OM-2; 100 mm Kiron Macro Lens; Synchronized flash; 400 ASA Seattle film

## Second Place

**Photographer:**
Gail Stratton,
University of Mississippi
**Title:**
*Pandora Sphynx (Sphingidae) with Braconid Pupae*
**Comments:**
*Eumorpha pandorus* found on poison ivy leaf
**Equipment and Film:**
Olympus OM-2; 100 mm Kiron Macro Lens; Synchronized flash; 400 ASA Seattle film

# Photo Salon Competition

**Category II**
**Insect Portraits:** photographs that depict insects in a static or aactive state with entries judged on overall aesthetic qualities, technical difficulty, and rarity within the insect or arthropod group.

## First Place

**Photographer:**
Gail Stratton,
University of Mississippi
**Title:**
*Stinging Rose Caterpillar (Limacodidae)*
**Comments:**
Found on apple leaves
**Equipment and Film:**
Olympus OM-2; 100 mm Kiron Macro Lens; Synchronized flash; 400 ASA Seattle film

## Second Place

**Photographer:**
Owen A. Perkins,
Royal Oak, MI
**Title:**
*Monarch Nectaring*
**Equipment and Film:**
Pentax Spotmatic II,
Kodachrome film

## Presentations for the Student Competition

Introductory remarks by Randall Cooper
16672 152nd Avenue, Spring Lake, MI 49456
E-mail: renzie@aol.com

For the first time this year, the MES Annual Meeting has included a competition enabling students to compete for cash prizes and sharpen their skills in presenting oral papers. Presentations were judged on the quality of the written abstract, the presentation itself, and the creativity, scientific rigor, and significance of the research. All of the student presentations this year were excellent and the competition was extremely close. The panel of three judges awarded first place ($200.00) to Lukas Stelinski, 2nd place ($100.00) to Julie Stahlhut, and 3rd place ($50.00) to Matthew Johnson. Congratulations to the three winners!

## Representative Homoptera Communities as Bioindicators of Habitat Quality in Sand Prairie Ecosystems in Newaygo County, Michigan

Matthew E. Johnson and James P. Dunn.
Department of Biology, Grand Valley State University, Grand Rapids, MI 49401

The Homoptera are a diverse group of insects including many groups specific to plant and soil types, making them good indicators of prairie quality. In the summer of 1999, we sampled the Homoptera community of sand prairie ecosystems of varied quality. Through species identification, we are determining whether differences in number or types of individuals occurred between plots. The study areas included unmanaged remnant prairie areas, controlled burn plots and clearcut plots. We were especially interested in differences between burned and and unburned plots, and significant differences were found in types and numbers of Homotera present. Initial findings indicate that unmanaged remnant prairie areas were the most diverse and populated, recently burned areas were slightly lower, and clearcut areas were very lacking in homopteran representatives.

## Complementary Sex Determination in a Solitary Hunting Wasp

Julie K. Stahlhut and David P. Cowan
Department of Biological Sciences, Western Michigan University, Kalamazoo, MI 49008
E-mail: julie.stahlhut@wmich.edu

Complementary sex determination (CSD) has been observed in over 30 hymenopteran species in 7 different superfamilies. Its most common form is believed to be single-locus CSD, in which heterozygotes at a polymorphic sex determination are female, while both the homozygotes and hemizygotes are male. The presence of CSD may be confirmed by a high incidence of male diploidy in the offspring of sibling matings. Breeding experiments indicate that the solitary wasp, *Euodynerus foraminatus* Saussure (Vespidae: Eumeninae), which has been observed to mate with nestmates in nature, produces diploid males when the parents of the brood are siblings. These diploid males occur in the approximate proportions expected under a single-locus CSD model. Further experiments with DNA microsatellite markers are planned in order to confirm diploidy in these males and determine levels of sibling mating in nests collected from natural populations.

## Differential Behavioral Patterns Among Cherry Fruit Fly Species (Diptera: Tephritidae)

Lukasz L. Stelinski and Oscar E. Liburd
Department of Entomology, Center for Integrated Plant Systems, Michigan State University, East Lansing, MI 48824, E-mail: stelinsk@msu.edu

In an attempt to develop independent management strategies for the eastern cherry fruit fly *Rhagoletis cingulata* (Loew) and the black cherry fuit fly *R. fausta* (Osten Sacken), we investigated the behavioral responses of both species to standard commercial baited and unbaited traps. In 1998, we studied the responses of *R. cingulata* and *R. fausta* to Pherocon AM boards, using the recommended V-shaped orientation in sour cherry, *Prunus cerasus*, orchards. Significantly ($P < 0.05$) more *R. cingulata* flies were caught on Pherocon AM boards baited with aqueous solutions of ammonium baits compared with traps that had solid ammonium baits mixed into the TangleTrap ®. In 1999, several commercial traps for monitoring key *Rhagoletis* species were studied in both sour cherry and sweet cherry, *P. avium*, orchards. Commercial traps included an unbaited three-dimensional Rebell ™ trap and several types of ammonium baited traps, including a 9-cm diameter red sphere, a modified version of the Ladd® trap (L & S trap), a Pherocon AM yellow board in the vertical, and V-shaped orientation. Results indicate that significantly more *R. fausta* flies were caught on unbaited Rebell™ traps compared with any other commercial traps studied during the first trapping period. A higher percentage of *R. fausta* females compared with males were captured on unbaited Rebell™ traps and baited Pherocon AM yellow boards throughout both trapping periods. Red sphere treatments (regardless of baiting system) consistently captured significantly fewer *R. fausta* flies than any other treatment evaluated. Responses of *R. cingulata* to traps were different from those observed for *R. fausta*. Both male and female *R. cingulata* flies responded with approximately equal frequency to unbaited Rebell™ traps and baited Pherocon AM yellow boards. Captures of *R. cingulata* on unbaited Rebell™ were not significantly different from other commercial traps including the 9-cm diameter red spheres baited with ammonium acetate mixed into the Tangle-Trap®, L & S traps, and the baited Pherocon AM yellow boards deployed in a vertical orientation. The study demonstrated that the unbaited Rebell™ trap was the most effective and selective device evaluated for monitoring *R. fausta* flies. The unbaited Rebell™ trap also caught *R. cingulata* and *R. fausta* flies earlier than all other traps studied. We recommended the use of unbaited Rebell™ traps for monitoring *R. fausta* adults. Finally, the red sphere (9-cm diameter) is not recommended for use in *R. fausta* monitoring programs.

## Making Photographs of Lepidoptera Specimens for Publication

Eric H.Metzler, Invited Speaker
The Ohio Lepidopterists, 1241 Kildale Sq. N., Columbus Ohio 43229-1306
E-mail: spruance@infinet.com

An author of a scientific paper should provide illustrations that most accurately depict and interpret the data being presented. One type of scientific illustration is photographic representation of specimens and body parts. Desired results require an assemblage of equipment, techniques, cooperation of others, experimentation, and pursuit of better results. Apparati that are specifically designed to help achieve excellent photographs, such as versatile cameras, high quality optics, and stable stands should be combined with equipment that is designed to achieve consistent illustrations of scientific specimens. For photography of adults I recommend a camera with no fewer features than found on the Nikon F3 hp and an Aristogrid light box for illumination. For photography of prepared slides of body parts, I recommend an Aristophot made by Leitz, or an equivalent piece of equipment. Additional experimentation with background colors, filters, stains, and film helps to achieve the best image. The photo lab or person processing the film and making the prints must be included in the team of persons striving to achieve the best possible results.

## Applications of Digital Imaging - Real Life Situations and Solutions

Mark F. O'Brien, Invited Speaker

Insect Division, Museum of Zoology,
University of Michigan, Ann Arbor, MI 48109
E-mail: mfobrien@umich.edu

Digital Imaging is any method that produces computer-readable image files. It can be primary acquisition of images or secondary image-processing, and can be analog-digital conversion or pure digital imaging, depending upon equipment and methodology used.

Images can be created by color flat-bed scanners, slide scanners, CCD Video cameras, digital still cameras and digital video cameras. Flat-bed scanners offer the opportunity to easily image 3-D objects as long as they are not far from the plane of the scanner glass plate. For less than $100, one can buy a color flat-bed scanner and make 300 dpi images of Lepidoptera, Odonata and other insects. Although not as high quality as a photograph, these images are useful for web catalogs, sending information via e-mail to others, and to use as a quick way to get identifications.

Slide scanners offer the opportunity to capture images from color slides or negatives and use them in a variety of ways once they are on your computer. Although expensive, slide scanners combine the best of conventional photography with a way to make digital copies of your work.

Quick Cams are useful for web pages, capturing images for low-resolution use, and for teaching. Although often limited to 320 x 240 pixels, quick cams can focus to within 4 inches of the camera, so one could use them for a sort of "macro" photography.

As we approach the high end of digital imaging, the basic element is the number of pixels per image. The more pixels, the higher the image quality and the more expensive the camera. Cheap digital cameras may take 640 x 480 pixel photos, whereas the best digital cameras take over 2.5 million pixels per image.

At the UMMZ, we use a variety of digital methods to create images for web pages, courses, and for research projects. Whether it is an inexpensive video camera being used to make web photos, or a complex system for making images of electrophoresis gels, these digital imaging devices save us a great deal of time and money over conventional photographic procedures.

Although current digital technology is not as precise in color latitude and resolution per image as conventional color slides, the various techniques and equipment allow us to replace conventional photography where such standards are not as critical.

## Egg Production Dynamics in the Boxelder Bug (Boisea trivittata)

Karin A. Grimnes

Department of Biology, Alma College, Alma, MI 48801
E-mail: grimnes@alma.edu

Ovaries from mature boxelder bug females were examined in order to characterize the production and provisioning of eggs. Five egg stages were identified on the basis of their length and width, color, and presence and degree of chorion sclerotization. An analysis of seasonal samples indicated that females emerged from winter hibernation with the smallest eggs (stage 1) and established fat body reserves through feeding. Provisioning of eggs occurred rapidly, demonstrated by a steep rise in the number of females that contained all egg stages. The summer population mated and laid eggs that hatched, grew and matured in time for the winter hibernation cycle. Most females engaged in mating within the spring or summer populations had full ovaries containing all egg stages, but the requirement of a full ovary for mating was not absolute.

# Aquatic Insects as Bioindicators of Land Use Change in the Grand Traverse Bay Area of Michigan

Robert A. Haack[1], Toby R. Petrice[1], Sheridan K. Haack[2], David Hyndman[3], David Long[3], Bryan Pijanowski[4]

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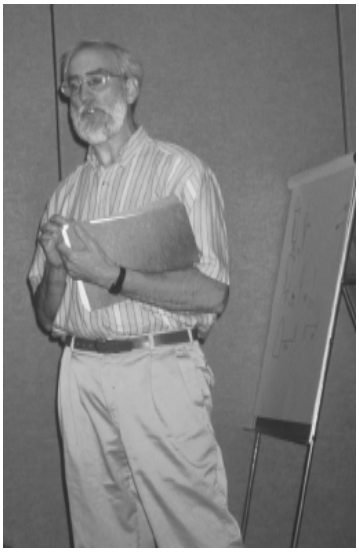
[2]US Geological Survey, 6520 Mercantile Way, Suite 5, Lansing, MI 48911

[3]Department of Geological Sciences, Michigan State University, East Lansing, MI 48824

[4]Department of Entomology, Michigan State University, East Lansing, MI 48824

In 1996, the US-Canadian International Joint Commission identified five key stresses impacting the Great Lakes Basin Ecosystem: nutrient inputs (e.g., phosphorous and nitrogen), persistent toxic substances, physical alterations (e.g., sedimentation, infiltration, runoff, water levels), human activities and values (as manifested in land-use change, populations growth, urbanization, etc.), and exotic species. Michigan's Grand Traverse Bay Watershed (GTBW) is currently undergoing all of these problems as a result of rapid population growth and regional land-use change. In 1992, a Relative Risk Analysis Project identified the absence of land-use planning as Michigan's most urgent environmental priority. This project report stated that land-use planning was seldom carried out due to the lack of adequate water quality indicators of land use practices.

Researchers at Michigan State University (David Hyndman, David Long, Bryan Pijanowski) and the US Geological Survey (Sheridan K. Haack) initiated work in 1997 on biogeochemical indicators of land use change in the GTBW. The objectives of this project are to (1) develop linkages between stream biogeochemistry and land use/management for inclusion in a Land Transformation Model; (2) develop linkages between land use and groundwater dynamics to provide a mechanism to examine the transport of chemicals associated with particular land use activities: (3) conduct high and low resolution sampling with an expanded list of chemicals/bioindicators to verify water quality indicators of specific land uses; (4) develop state-of-the-art 2-dimensional and 3-dimensional computer visualizations of data and model outputs; (5) conduct a viewshed analysis of the GTBW to approximate the influence of views and vantage points on regional development; (6) develop and calibrate the new land use change model using neural network techniques; and (7) conduct stake holder workshops and technology transfer activities of that knowledge and data generated by this project can be used by local government and regional resource mangers.



We (Robert Haack and Toby Petrice) became involved in the above study in 1998, adding an aquatic macroinvertebrates component to the study. Aquatic macroinvertebrates are useful bioindicators of water quality because most are relatively immobile and dwell on the stream-bottom. Macroinvertebrates vary greatly in their tolerance to pollution with some groups being very sensitive (e.g., Plecoptera, Ephemeroptera, Trichoptera, Megaloptera: Corydalidae, and gilled snails), others being moderately sensitive (e.g., Diptera: Tipulidae, Odonata, and amphipods), and others being tolerant to pollution (e.g., Diptera: many Simulidae and Chironomidae, leeches and lunged snails). Several stream quality indices have been developed based on the relative abundance of macroinvertebrates from these three sensitivity groups present in stream samples collected according to standardized procedures.

In the fall of 1998, we sampled 31 sites in the Boardman River and Mitchell Creek watersheds, which are part of the larger GTBW. The sites were distributed in areas with different amounts of forest cover and land use. Percent forest cover and urban and agricultural land use at each site was quantified. At each site, three Hester-Dendy multiple plate samplers were set out in the stream bottom and anchored with a brick. The samplers were collected after six weeks and all insects were identified to the order and family level. We determined stream quality using three macroinvertebrate indices: 1) the Percent EPT (Ephemeroptera, Plecoptera, and Trichoptera); 2) the Ratio of EPT to Chironomidae; and 3) the Total Stream Quality Index (used by the Michigan Department of Environmental Quality). At each site, water quality analyses were performed by the other cooperating scientists and included parameters such as water pH, turbidity, dissolved oxygen content, temperature, specific conductance, and concentrations of selected ions. Water samples were collected and plated to determine coliform bacterial counts.

The three different macroinvertebrate indices all gave similar results. Overall, water quality, as measured by the aquatic macroinvertebrate indices, was positively related to increases in percent forest cover, and negatively related to increases in percent urban and agricultural land use, specific conductance, concentrations of Ca and $NO_3$ ions, and total coliform count.

## Asian Longhorned Beetle: Eradication and Research Efforts in the United States

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The Asian longhorned beetle (ALB), *Anoplophora glabripennis* (Motschulsky), was first discovered in the United States in New York in 1996 and then in Illinois in 1998.

This exotic wood borer is native to China and Korea and attacks and kills apparently healthy trees of various ages and sizes. In both New York and Chicago the beetle is attacking mostly maple trees. In addition, this beetle has attacked aspen, birch, willow, elm, ash, horsechestnut, and Rose-of-sharon trees. In China, ALB is considered a major pest throughout its distribution where its primary host trees include elm, maple, poplar, and willow. As of May 2000, 4693 infested trees have been cut down and destroyed in New York and 1371 in Chicago in an effort to eradicate ALB in the United States. However, new infestations are likely to occur in the future given the large quantity of material imported from China as solid wood packing material that may contain exotic wood-feeding insects upon arrival. Therefore, a major research program is underway to develop means to control ALB and prevent widespread infestations.

In 1999, we tested the systemic insecticide imidacloprid, using four injection techniques and four tree species; three diffuse-porous species (maples and aspen) and one ring-porous species (elm). We used the Mauget trunk injector, Wedgle trunk injector, Acecap trunk implant and Kioritz soil injector along with water controls. The tree species included boxelder (*Acer negundo*), silver maple (*Acer sacharinum*), quaking aspen (*Populus tremuloides*), and American elm (*Ulmus americana*). The systemic was applied in May and then samples were collected and tested for ALB mortality in June, July, and September (4-, 8-, and 16-weeks post-injection, respectively). Additional samples of the foliage, twigs, and branches were for frozen for subsequent chemical residue analysis. In the US Forest Service quarantine lab in Ansonia, CT, ALB adults were allowed to feed on the test twigs for 1-2 weeks and larvae were allowed to feed inside the branch samples for about 4-6 weeks. Overall, for all injection techniques and tree species combined, little adult mortality occurred, however, modest levels of larval mortality did occur. Adults fed on the outer bark of the twigs during their maturation feeding, and thus did not feed deep enough (into the xylem) to obtain a lethal dose. The highest levels of ALB larval mortality occurred in branch samples collected 16-weeks post-injection. Overall, larval mortality was as high as 70% in the treated trees and 17% in the control trees. The highest larval mortality was seen in the boxelder trees using the Mauget trunk injector. Larval mortality could have increased had we allowed the larvae more time to feed before dissecting the branch samples. Residue analyses indicated that for the mauget trunk injection devices, 33-100% of the twig samples and 67-100% of the foliage samples contained detectable levels (>0.03ppm) of the parent compound imidacloprid.

## Color, Bacteria, and Mosquito Eggs as Ovipositional Mediators for *Aedes aegypti* and *Aedes albopictus* (Diptera: Culicidae)

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Selected bacterial washes,color, and mosquito eggs were comparatively examined as mediators for oviposition with *Aedes aegypti* and *Aedes albopictus*. Any evidence of combined additive activity was noted. All colored washes alone were preferred over selected bacterial washes. The combinations of color and bacteria in a single wash were better mediators for oviposition than colored washes alone. The bacterial content of the breeding water was a more important factor than egg presence in oviposition site selection.

# Changes in Carabid Community Structure in a Dry Sand Prairie After Removal of the Pine Overstory (POSTER)

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Ground beetles (Carabidae) are often used as bioindicators in land-use studies because they are (1) diverse, (2) abundant, (3) well known taxonomically, and (4) appear highly sensitive to habitat change. In 1996, we initiated a study on the Huron-Manistee National Forests in Newaygo County, Michigan, to document changes in the carabid community structure as a result of harvesting the overstory red pine stand on more than 140 acres. Prior to planting these sites with red pine seedlings in the 1940s, they were open dry sand prairies. Surrounding the harvested sites were natural stands of white pine and oak as well as natural dry sand prairies.

We used pitfall traps to collect carabids throughout the summers of 1996, 1997, and 1999: 1996 was the year prior to harvesting, 1997 was the first growing season post-logging, and 1999 was the third growing season post-logging. A total of 45 traps were used in 1996, 50 in 1997, and 48 in 1999. In each year, traps were placed in (a) the mature red pine stands either prior to logging or after logging; (b) nearby mature red pine stands that were never cut; (c) nearby natural stands of mixed white pine and oak; and/or (d) nearby natural dry sand prairies that had never been converted to pine plantations.

For the three years combined, more than 16,200 carabids were identified, representing 94 different species. Overall, 40 species (43%) were represented by five or fewer individuals. The five most commonly collected carabids for all habitats combined were *Harpalus pensylvanicus* (4094 individuals), *Carabus goryi* (3896), *Synuchus impunctatus* (1679), *Pterostichus pensylvanicus* (1248), and *Harpalus lewisii* (1032).

Fifty-four species (57% of all species) were found to be unique to a specific habitat (unique = 95% or more of the total 3-year catch was from a single habitat), of which 30 species were represented by five or fewer individuals (30/54 = 56%). Of the 54 species, 39 species from 10 different tribes were unique to the clear cut areas (7037 individuals); 7 species from 6 tribes were unique to the natural openings (19 individuals); 4 species from 4 tribes were unique to the red pine stands (16 individuals); and 4 species from 3 tribes were unique to the mixed white pine/oak stands (61 individuals). For 44 of the 54 carabid species, all individuals were collected within a single habitat. Of these 44 species, 29 (29/44 = 66%) were represented by five or fewer individuals. These results indicate that there are several carabid species that could serve as bioindicators of specific habitats.

*Michigan Lepidoptera Survey*
*Owen A. Perkins, Royal Oak, MI.*
*Lepidoptera Survey Committee of the Michigan Entomological Society*

*Alternatives to traditional dry mount displays: recreating the era of "Great Discovery"*
*Martin J. Andree, Grand Rapids, MI*

# *MES Governing Board Nominees Wanted for 2001*

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If you do not want to be a nominee yourself consider nominating someone else. The only requirement of a nominee is to be a current MES member. The Governing Board meets once during late fall and, if needed, again at the annual meeting. All member nominees willing to run are considered candidates and their names will appear on the next ballot.

While you're thinking of it send me your list of nominees with their names, phone numbers, and an approximate time convenient to reach them.

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**A proposed constitutional amendment would change this position from one year to three.*

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