Newsletter of the Michigan Entomological Society

Volume 58, Numbers 1 & 2 May 2013

Inside this Issue:

The MES Newsletter is published as four numbers per year

ISSN 1554-2092

59th Michigan Entomological Society's Annual Meeting June 14-16, 2013 -- Drummond Island

This year's MES Annual Meeting will be held on Drummond Island at the east end of Michigan's Upper Peninsula. All members should have received meeting registration materials in the mail by now. Similar materials and additional information can be found on the MES website. Drummond Island is located about 60 miles from the Mackinaw Bridge, and is one of Michigan's most beautiful and interesting locations. The meeting will be held at the Drummond Island Resort (DIR: drummondisland.com), which covers more than 2000 acres. Collecting is permitted on the DIR property so bring your gear! Drummond Island covers 87,000 acres (more than half state-owned),with about 150 miles of rugged scenic shoreline, and 34 inland lakes.

The DIR is known for great food and accommodations, including golf, skeet, bowling, kayaks, canoes, bikes, tennis, horseshoes, sauna, heated pool, WIFI, and more. **Note: please call and make your own room reservations with the DIR by May 21 (1-800-999-6343) and mention that you are with the Michigan Entomological Society.** The DIR is offering a discounted rate of $99/night per room for 2 people. The DIR will extend that rate if you want to come early or stay later. The DIR also has a few cottages that can be rented (these reservations should be made by May 14). If you wish other accomodations, Drummond Island also offers campgrounds, a motel, and 100s of cottages for rent. If you stay elsewhere, still register with Martin Andree for the meetings, meals and kayak trip.

The DIR has offered MES a 5-meal package (Friday dinner through Sunday Breakfast for $123.47 including tax and tip). We will have Friday dinner and Sunday breakfast at the DIR restaurant called Pins. Since people will arrive at different times, you can eat dinner on Friday on your own, or as a small or large group. Just let the staff know you are with MES. A whitefish dinner is being offered on

Continued on page 3

Drummond Island has more than 50 nearby islands, and a few dolomite limestone quarries (white areas) (http://www.northernproperties.com/)

2012 Issue of the *Michigan Botanist* dedicated to Ed Voss. A recent issue the Michigan Botanist was devoted the late Ed Voss (1929–2012), who was one of the founding members of MES. This issue of Volume 51 can be viewed online at < http://quod.lib.umich.edu/m/mbot/>). There were nine papers in this issue devoted to Ed, including one on Ed's entomological accomplishments by Brian G. Scholtens entitled "Edward G. Voss, An Accomplished Entomologist."

Volunteers Needed for Karner Blue Butterfly Surveys and More. As in the past few years, the Baldwin/White Cloud Ranger District of the Huron-Manistee National Forest is looking for volunteers to assist with monitoring and management activities for the federally endangered Karner blue butterfly in 2013. Volunteers are needed to help conduct surveys between mid-June and mid-August and to help plant native nectar plants in September. There are opportunities for individuals of all skill levels to participate. Training will be provided. Interested parties can volunteer during weekdays, for a few days, or a week or more. Limited mileage reimbursement and housing may be available upon request. The assistance of volunteers is vital to meet our recovery goals for the Karner blue butterfly! Some paid internships also are available. If interested in participating in the 2013 field season, please contact Heather Keough, District Wildlife Biologist, at 231-745-4631 x 3111 or hkeough@fs.fed.us.

ISSN 1554-2092

Notice: The Mackinac Island Butterfly House & Insect World is looking for interns and a manager for the 2013 season. These are paid positions. The Butterfly House is open from May through October, but the main season is June-August. The positions involve ordering foreign and domestic Lepidoptera, record keeping, rearing insects and growing host plants, and providing tours for the public. For more information, contact Bob Gale at galle25@aol.com or 231-818-0104. More information about the Butterfly House is at: www.originalbutterflyhouse.com

Careers as a Medical Entomologist in the US Army Medical Department

The US Army Medical Department has a continuing need for active duty entomologists to satisfy mission requirements worldwide. Medical Entomologists are commissioned officers in the Medical Service Corps. Their overall mission is to prevent arthropod-borne disease in soldiers, their families, and other individuals for whom the US Army is responsible.

Army entomologists plan and direct comprehensive programs for control of pests and animals affecting human health and the environment. They routinely conduct surveys to determine prevalence, distribution, relative abundance and significant habits of medically important insects and other animals, identify insects and other zoological specimens and evaluate resistance of insects and other pests to pesticides. Some entomologists monitor insect and rodent control programs and determine the effectiveness of pest management plans and operations. Others are responsible for the direction of a pesticide monitoring service, which includes determining usage levels, environmental contamination potential, as well as movement, storage and disposal of pesticides. Integrated Pest Management (IPM) is emphasized at all levels of Army Entomology.

Army Entomology offers many opportunities during a military career. Some assignments involve research on arthropod-borne disease transmission, vector physiology, detection of pathogens in arthropods, evaluation and development of new repellents, taxonomy of medically important arthropods, and development of arthropod survey and control equipment with associated management strategies. Other duties involve inspecting cargo returning from overseas locations for pests and vectors of disease, and recommending control procedures. Entomologists may command preventive medicine detachments that are deployed worldwide for contingency or humanitarian operations. Other entomologists work on military staffs preparing regulations, directives, standards and other criteria pertaining to military medical entomology programs. Some entomologists instruct Army and other Department of Defense personnel worldwide in all aspects of medical entomology, personal protection measures and pest management practices. At the more senior levels, entomologists serve as consultants in a staff capacity in laboratories, preventive medicine activities, Army Major Commands, or at the Departments of Army or Defense levels.

For details on eligibility, assignments, military rank and pay, retirement, length of initial tour on active duty, and benefits see <www.afpmb.org/content/dod-entomology>. In the East Lansing, MI, area you can learn more about Army Health Care opportunities by calling 1-517-337-9163 or email <9C3L@usarec.army.mil>.

Editor's Note: *Currently, there are about 65 Army entomologists, 39 in the Navy, and 17 in the Air Force. The Marine Corps gets all of its medical support from the Navy, so some Navy entomologists are assigned to the Marine Corps. Much more information and current job listings can be found at the* Armed Forces Pest Management Board *website at* <http://www.afpmb.org/content/dod-entomology>. *Each subsection has a "Join our career field" link which gives additional information and a point of contact.*

Continued from p 1

Friday. Pins usually seats people up to 9 pm, so try to eat before then. On Saturday, we will have all three meals as a group at DIR's main restaurant, "The Bayside," which features beautiful views of Potagannissing Bay. If you wish or need to skip a meal at DIR, we can offer smaller meal packages.

We plan to have our traditional meeting on Saturday morning with talks from members and guest speakers, and then offer various field trips on Saturday afternoon. One of our guest speakers is Scott Hicks (US Fish & Wildlife Service) who will talk on Threatened and Endangered Species in Michigan. We will have a local Drummond Island resident (Judge Michael MacDonald) give us some local history. Our first afternoon field trip is to the limestone alvars known as the Maxton Plains and will be led by Brad Slaughter, a botanist with the Michigan Natural Features Inventory. After that, we are lining up additional field trip options that include a guided kayak trip on a chain of four inland lakes, but depending on time, we may only get to the first two or three lakes. The approximate charge for the kayak trip is $65 per person for kayak and gear. We need at least 6 people to sign up for this trip to be a go, and 12 will likely be the maximum. No experience is needed. Our guide(s) will be from *Woods and Water Ecotours* in Hessel, MI. Their website is <www.woods waterecotours.com/> and contact information is: (906) 484-4157 and <Info@WoodsWaterEcotours.com>. We will try to push back dinner on Saturday night so that we can have longer field trips. Show your interest for the kayak trip on the registration form, or call or email Martin if you want. Later, we will pass your contact information on to *Woods and Water Ecotours* so that they can fit you with the proper kayak and gear. Other possible trips will be to the Fossil Ledges on the north shore (dirt bikes or 4WD vehicles are likely required for this rugged road), or to some nature preserves on the south shore. You can also explore and collect on your own, visit the Drummond Island Historical Museum, visit a local puddingstone carver, and more. We can visit some sites on Sunday morning as well for those interested.

Register for the rooms, meals, and kayak trip by May 21. For more information, contact Martin Andree by email: mjandree@koeze.com or by phone at (616) 724-2618.

Tentative Agenda and Approximate Times

Fri	3pm	Check In	DIR Hotel
Fri	5pm	Check In	DIR Cottages
Fri	5-6 pm	Gathering	The Annex
Fri	open	Dinner	Pins Bar & Grill
Sat	7:30	Breakfast	Bayside Dining
Sat	9-12	MES Meeting	The Annex
Sat	12	Lunch	Bayside Dining
Sat	1-3	Alvar Field Trip	Maxton Plains
Sat	3-5:30	Optional Field Trips	Register with Martin
Sat	6 (?)	Dinner	Bayside Dining
Sun	open	Breakfast	Pins Bar & Grill
Sun	11am	Check out	

Ferry: Departs from DeTour every hour. Cost for a round trip ticket is $12 (for car and driver + $2 for each additional adult; discounts for seniors.). The ferry typically leaves DeTour 40 minutes after the hour, and leaves Drummond 10 minutes after the hour (except 8 am). See the full schedule and fees at <http://www.drummondislandchamber.com/images/DIFerrySchedule050611.pdf>.

Breaking Diapause 2013: Ann Arbor, MI

Mark F. O'Brien: Museum of Zoology, University of Michigan, Ann Arbor, MI. Email: mforien@umich.edu

This year's Breaking Diapause was a departure from the last decade or more of holding the event at MSU's Natural Science Building. On March 16 2013, thirty enthused bug-lovers gathered at the University of Michigan's Biodiversity Research Center (BRC) on Varsity Drive, south of campus.

Thus far, the BRC is home to the UM Herbarium and the Museum of Zoology's Wet Collection. In the next few years, it will be remodeled to house the Museum of Zoology dry collections, the Museum of Anthropology, and the Museum of Paleontology.

One nice aspect of the BRC (for now) is that parking is free, and the access from major highways is easily navigated. I don't think anyone got lost, until they arrived at Varsity Drive and tried going into the Herbarium (which coincidentally was having tours). It was nice to see familiar faces, as many of the stalwarts (and some not so warty) appeared. I gave two tours of our wet collections, and anyone that has seen our old space at Ruthven Museums would appreciate how huge an upgrade we got at Varsity Drive. It's nice to have a clean, well-ventilated, and organized space to work in. The big table in the prep lab became an exhibit space for pinned Lepidoptera, and all of us were amazed at the skillful and comprehensive moth-mounting done by Dwayne Badgero. I'd have to say, he really wowed us with the results of his survey work in southeast Michigan.

It was a good day to spend some time talking shop and get some excitement going for the upcoming field season. Breaking Diapause has become an essential spark to the fellowship and ties that we share. (Photo credits: the above two photos were taken by Jorie O'Brien; photo below by Mark O'Brien.)

Martinoptera

Creepy Crawlers: A Half-Baked Introduction to Entomology

Martin J. Andree
3990 Four Mile Road NE, Grand Rapids, MI 49525
Email: mjandree@koeze.com

There are many good reasons that the 1960s were a fabulous time to be a kid. Mainly because you could still be one and were encouraged to do so. There were no narcissistic video games or texting addictions. The big plea to my parents was, "Can I go outside and play?" The answer was usually, "Yes, get out of the house, let off some steam and be back by dinner." Now that was release, and off I went. On days of rain or bitter cold, or a bad case of pink eye, or darkness, the answer to the plea was "No, you cannot go outside, it's raining, it's dark, it's 50 degrees below zero and you have pink eye."

I grew up without a television, a purposeful trick craftily administered by my parents. So staying in and watching "Gilligans's Island" or "Green Acres" on a rainy afternoon was not an option. No matter, there was never any good cause for boredom chez la maison Andree, they made sure of that.

It's sometimes difficult to tell what influences and experiences of youth have carried through to our adult lives. For certain interests the path is clear: I was encouraged to read as a child and it is still a great pleasure in my adult life, or when I was 9, my great uncle John gave me some purple bean seeds and because of that I am still a consummate and experimental gardener, or I hated algebra in Mr. Meyer's 7th grade algebra class and I still passionately hate algebra to this very second. The evolution of these early experiences can be easily associated to our adult lives. Others are a bit more murky.

My first foray into entomology was the summer of 1968, when I officially joined the 4-H club, "The Beetles," and entered my first insect collection to be judged that summer. Now here it is, forty-five years later and I am still leaping about with a butterfly net and filling cases with specimens. It is clear that my early experience of 1968 is responsible for the continuing case of moth madness that grips my soul every time the sun goes down. It's pretty much a straight line.

But what about experiences before 1968? What tipped the balance of my life's interests towards entomology? After much introspective thought, I believe I have isolated the root cause of my entomological endeavors. It all started in 1966, the very height of lax consumer protection and safety laws for the toy industry, back when toys were much less about safety and much more about fun. My earliest fascination with the insect world began, not on days when I was outside, in their domain, but on rainy, dark, cold days when I was confined indoors with goop in my eye. Goop is actually the operative word here as I've fingered the Mattel Company as the primary source of my adult moth mania.

Reprinted with permission from "MJ Thompson's Creepy Crawlers" at: <http://austinthompson.org/Thingmaker/MattelCreepyCrawlers.shtm#4477>. This site sells complete Creepy Crawler sets, molds, Plasti-goop, and more..

It all began with one of the best toys ever invented, "The ThingMaker." I can still see that golden yellow box top with that dorky kid on the cover. He was wearing a nerdy, light blue V-neck sweater with a white shirt and a tie. He was holding a giant red termite by the abdomen. In the background was his pesky kid sister, sporting red pigtails and a plaid jumper. She looked like she should be hawking burgers in a Wendy's print ad. Instead, she was holding a sallow looking swallowtail by the forewing and doing something dubious with a paintbrush. Boldly emblazoned above them in squiggling purple letters with oozing lime green slime dripping down them were the hauntingly enticing words, "*Creepy Crawlers*."

Now "Creepy Crawlers" were something that could really get a kid wound up about insects. The box cover was crawling with them! It honestly boasted, "Here's real fun!" and included the alluring phrase, "All kinds of twitchy, twertchy, wriggly things!" Who could possibly not be enthralled by twertchy bugs made of non-toxic, plastic Goop?

Not me, I was hooked. Inside the box was a Styrofoam tray that held the liquid plastic Goop, two bottles of paint, a knife, a spring handle that never worked, a sharp steel prick tool, sheets of clear plastic, the purple Creepy Crawler handbook, nine aluminum, multi-cavity molds and "The ThingMaker" oven. Even though the box was happy to point out that the oven was UL approved, it did not point out that it attained the unbelievably hot temperature of 360 degrees! How cool was that? At seven I had my very own personal oven that reached 360 degrees. There was no on-off switch, or variable settings, you just plugged it in and presto enough heat to warm the cockles of any kid's heart. There was no mention of parental control.

The process was gloriously straightforward: you plugged in the oven and let it heat up, selected one of the aluminum molds, inserted the spring handle into a slot and set it in the oven. Next you filled the selected mold cavity with Goop. Goop is sort of indescribable to those who didn't experience it, but it was a slimy, plastic liquid the consistency of catsup. Goop smelled of hours of unmitigated rapture and it came in a selection of standard colors, then later in neon and finally the coveted Glow-in-the-Dark Goop.

Best Manufacturing Practices seem to vary among kids however. The safe and OSHA fearing kids, would pre-fill the cold molds with Goop, carefully transfer them to the cold, unplugged "ThingMaker," and then plug in the whole shebang and wait with the patience and virtue of Dick and Jane. Now the other half, myself included, would first heat the oven red hot, set in the empty mold, let it get smoking hot, then try your best shot at squirting the Goop into the steaming mold cavity without spilling. This was impossible. This process however was much faster and much more exciting, as inevitable spills, over-fills and whatnots, resulted in an intoxicating, if not toxic plume of smoke that would fill my whole basement Creepy Crawler works. It was like toiling away in

the bowels of a foundry during the Industrial Revolution. Because of smoke detectors, this kind of fun is now verboten in most homes.

The next step in the process, the baking step, involved practiced trial and error, an impeccable data set and lots of luck. It was pretty much the Goldie Locks theory in Goop. If they were under-baked, the bottoms would be sticky. We aptly called this condition "goopy," as in, "Don't touch anything! They aren't done yet! They are still goopy!" The trouble was it was very difficult to tell if they were properly cooked. There was the subtle change of color, there was my mother's kitchen timer, and there was an ever so slight shift in the fragrance of properly cooked Goop. Neophytes used the included sharp steel pick to poke at the simmering creatures. The problem with this approach was the pick marks stayed there forever adding an unsightly and troublingly unprofessional aura to finished crawlers.

Lastly one cooled the mold and carefully pulled the Creepy Crawler free from the confines of the mold. I used to drop the hot molds into a cake pan of water, adding an extra explosive element to the process and a satisfactory hiss of industrial grade steam.

If the oven was the brains of the operation, the molds were certainly the heart. I wonder about the person who designed those molds, who made the choices about what Creepy Crawlers to include and what level of scientific detail to illustrate? There is no doubt that Mr. Creepy Crawler, whoever he was, was at the very least an astute biologist and by the ratio of Insecta to other represented classes, all of the evidence points to Mr. Creepy Crawler being an entomologist. Of the thirty-seven selections to chose from here is how the classes breakdown:

Branchiopoda- crustacean (extinct, but fossils can be found in abundance on Drummond Island, site of the fabulous upcoming 2013 Michigan Entomological Society's Annual Meeting! Sign-up today, join us and pick up your own Branchiopoda fossil!)

1 Asteroidea: starfish
1 Diplopoda: millipede
1 Chilopoda: centipede
1 Chephalopoda: octopus
1 Decapoda: lobster
1 Malacostraca: crab
1 Amphibia: frog
1 Oligochaeta: earthworm
1 Trilobita: trilobite (another extinct one. What a hoot!)
2 Mammalia: rat and bat
4 Reptilia: lizard, skink, snake, horned toad
5 Arachnida: scorpion, tick, 3 spiders
16 Insecta: (Ta-da!)

Wow, that makes 43.24% of Creepy Crawlers Insecta! No wonder I was swayed. I had a dog-eared copy of *How to Know the Insects* by H. E. Jaques, spiral bound and written in 1947. I used it to key out as many of the insect molds as I could. Mr. Creepy Crawler provided enough detail to even get to species level on a few of his molds.

According to Jaques, here is what I found in 1966:

1 Diptera: Un-described fly without wings (Template included to make plastic wings, if so desired). Possibly new to science? Could be any color, including recently introduced Glow-In-The-Dark Goop.

1 Odonata: Maybe *Anax junius* (Drury) without wings? (Template included to make plastic wings if so desired). I made them, but could never get them to stay in place. You had to cut a very precise slit in the thorax with a razor blade (not included) to accept the plastic wings. It never went well. There was always a lot of blood involved, mine mainly.

1 Hymenoptera: Undescribed ant. Possibly Formicidae. Possibly new to science. Possibly huge. Possibly with a proclivity towards world domination. Possibly red in color, or maybe purple, depending on Goop supply.

1 Isoptera: *Mastotermes darwiniensis* (Froggatt 1897) Giant Northern Termite, previously found only in Australia, but now reproducing in great numbers in the basement workshop of a seven year old boy in Grand Rapids, Michigan.

1 Dermaptera: Earwig, might be *Forficula auricularia* (L.) the perfect creepy insect if ever there was!

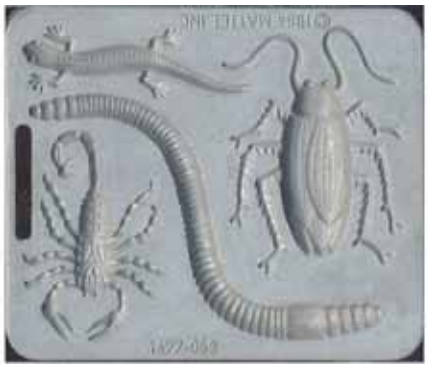
2 Orthoptera: Clearly *Parcoblatta pennsylvanica* (DeGeer), the Pennsylvania Wood Roach. And of course and maybe not so clearly, *Gryllus assimilia* (Fab.) the Common Field Cricket. Definitive field characteristics are gooey, sticky bottom, indicative of undercooking in "ThingMaker."

2 Hemiptera: Obviously the Back Swimmer, *Notonecta undulata* (Say) and the *Chlorochroa sayi* (Say), the Stink Bug. Aptly named, as there is nothing that brings me back to 1966 like the stinky smell of Goop at 360 degrees, sizzling and smoking up the basement in a blue, gray cloud of toxic joy. It was nirvana.

3 Lepidoptera: Now these were all toughies, UFOs as we now call them. One was supposed to be the body of a butterfly, the other a moth. Neither had wings, neither qualified as "creepy." Lastly there was a non-descript larva. There were no good clues. I finally settled on the butterfly being a swallowtail, because Wendy was painting one on the box top. The moth, however, was baffling. Today, of course, it is plain to see that it is a prefect aluminum likeness of the wingless female *Alsophila pometaria* (Harris, 1841), the Common Fall Cankerworm Moth. At this point, both myself and Jaques are unfamiliar with a wingless female *Papilio*, at least one not baked from orange Goop.

4 Coleoptera: Finally, the truth comes out. My Creepy Crawler had an inordinate fondness for beetles! His compellingly accurate beetle molds would make an entomologist out of anyone. They are flawless works of beauty. First there is the unmistakable Tiger Beetle *Cicindela repanda,* followed by a Stag Beetle *Pseudolucanus capreolus*, the Predacious Ground Beetle *Calosoma scrutator* and the Dogbane Leaf Beetle, *Chrysochus auratus*. My basement work room was full of these four beetle species, long, long series of them, each representing the wild variations commonly known in the larger, better Creepy Crawlers collections of the world.

I spent hours in the basement, maniacally burning through the Goop. From the electric blue bodies with clumpy gold paint, to the dirty yellow ones with the burned, crispy edges of brown, to the strange varieties that had multi-colored legs and weird, fantastic bubbles in heads, thoraxes and abdomens. From the over-cooked to the half-baked, I whipped up batch after exotic batch of all kinds of twitchy, twertchy, wriggly things. Little did I realize the molds of Mr. Creepy Crawler were also busy at work molding me. Kind of creepy.



Mold from "MJ Thompson's Creepy Crawlers"

CONSTITUTION AND BY-LAWS OF THE MICHIGAN ENTOMOLOGICAL SOCIETY

Article I – NAME

Section 1. This organization shall be known as THE MICHIGAN ENTOMOLOGICAL SOCIETY.

Article II – PURPOSE

Section 1. Promote the science of entomology in all its branches and by all feasible means and to advance cooperation and good-fellowship among persons interested in entomology.

Article III – MEMBERSHIP

Section 1. Any individual or organization interested in the purpose of the society shall be eligible for membership without regard to race, creed, color, religion, sex, national origin, ancestry, disability, age, or exercising their right of free speech.

Section 2. The classes of membership shall be Active, Honorary Life, Student, Sustaining, Institutional, and Life.

Section 3. Active: For individuals.

Section 4. Honorary Life: May be conferred upon any member who has performed long and distinguished service in the field of entomology to the State of Michigan or to the Society. Proposals for Honorary Life Membership shall be made in writing with a supporting statement by two Active Members and shall be acted upon by the Governing Board and submitted to the society for vote by mail ballot. Nominees must receive four-fifths of the ballots cast to be elected. The total number of Honorary Life Members shall not exceed five at any one time and not more than two shall be elected in any one year. Honorary Life Members shall be exempt from payment of dues but shall have all the privileges of active membership.

Section 5. Student: An individual attending school through graduate school.

Section 6. Sustaining: Any person or organization supporting the aims of the society by submitting an annual fee set by the Board.

Section 7. Institutional: Any institution, society, school, museum, or other organization desiring to support the aims of the Society, but not to the extent of a sustaining membership.

Section 8. Life: A one-time individual fee.

Article IV – OFFICERS

Section 1. The officers of this Society shall be President, President-Elect, Past President, Secretary, and Treasurer.

Section 2. President-Elect/President/Past President. The President-Elect shall be elected by mail ballot as specified in the By-Laws. He/she shall serve one year as the President-Elect, second year as President and third year as Past President. He/she shall assume the office of President-Elect at the close of the annual meeting next following his/her election.

Section 3. Secretary and Treasurer. The Secretary and Treasurer shall be appointed by the Board and shall serve for three years. They shall assume office at the close of the annual meeting next following his/her election.

Article V – GOVERNING BOARD

Section 1. The Board shall consist of the following members: President, President-Elect, Past President, one of the most recent available Past-Presidents, Secretary, Treasurer, three elected Members-at-Large, Associate & Journal Editors, Associate & Newsletter Editors, and Webmaster.

Section 2. The Governing Board shall conduct the business of the Society, interpret, and implement Society policy.

Section 3. In the event that a regional branch has not held a branch meeting for one year, a member-at-large shall be elected to the Governing Board in the same manner as other officers. The last branch chairman shall continue to serve on the Governing Board until he/she is replaced by an elected member-at-large.

Article VI – GENERAL GUIDELINES

Section 1. Notwithstanding any provision of the Constitution or By-Laws which might be susceptible to a contrary construction:

(a) The Society shall be organized and operated exclusively for scientific and educational purposes;

(b) No earnings or use of the Society name shall be incurred to the benefit of any private individual;

(c) No substantial part of the activities, funds, or publications of the Society shall be made to influence legislation or a public office candidate;

(d) The Society shall not be organized or operated for profit;

(e) The Society shall not:

Lend any part of its income or corpus, without the receipt of adequate security and reasonable rate or interest;

Pay any compensation, in excess of a reasonable allowance for salaries or other compensation for personal services actually rendered;

Make any part of its services available on a preferential basis;

Make any purchases of securities or any other property for more than adequate consideration in money or money's worth;

Sell any securities or other property for less than adequate consideration in money or money's worth.

The prohibitions contained in this subsection do not mean to imply that the Society may make such loans, payments, sales or purchases to anyone else, unless such authority be given or implied by other provisions of the Constitution or By-Laws.

Section 2. No officer or committee of the Society or of its Branches shall solicit in the name of the Society contributions for use in obtaining or paying for specialized entertainment.

Article VII – FUNDS

Section 1. Society funds shall be the responsibility of the Treasurer as specified in the By-Laws.

Section 2. A permanent fund shall be established to include donations and bequests. The fund shall be in custody of the Governing Board. Funds shall be invested and may be expended only by the Governing Board. Loans may be made to other established funds of the Society for self-liquidating projects.

Article VIII – PUBLICATIONS

Section 1. The publications of the Society will be a journal, a Newsletter, and computer webpage.

Article IX – STANDING COMMITTEES

Section 1. Standing Committees shall be identified by the Governing Board. Their duties and election are set forth in the By-Laws.

Article X – MEETINGS

Section 1. The annual meeting shall be at such time and place as may be decided upon by the President-Elect. Special meetings may also be called by the Governing Board.

Article XI – BRANCHES

Section 1. Branches shall be established on the basis of convenience of local members.

Section 2. Establishment of branches must be endorsed by the Governing Board and be approved by the Society.

Section 3. Membership shall be voluntary. Branch voting is limited to Branch members.

Section 4. Officers of each Branch shall have a Chair, a Vice-Chair, a Secretary-Treasurer, and a Recording Secretary. These officers shall be elected by their respective Branches.

Section 5. Activities of each Branch shall operate autonomously subject to the Society Constitution and By-Laws.

Section 6. Financial Responsibility of Branches shall not incur financial indebtedness in the name of the parent Society without explicit prior approval of the Governing Board.

Section 7. If any Chair of a Regional Branch should be elected to the position of President-Elect, his/her position as Chair of the Branch shall be considered vacated and the Branch shall fill the office in their designated manner.

Article XII – AMENDMENTS

Section 1. All proposed amendments shall be presented at an annual meeting. The President shall at that time appoint a special committee to consider the amendment or amendments and to report its recommendations at the next annual meeting. At that time members may make changes germane to the subject and purpose of the amendment, which shall then be referred by mail ballot to the entire membership. If two-thirds of the votes cast are in the affirmative, the amendment shall be adopted.

Article XIII – DISSOLUTION

Section 1. Upon dissolution of the Society, the Governing Board shall distribute the assets and accrued income to one or more organizations as determined by the Board but which organization or organizations shall meet the limitations prescribed in Section 1 of Article VI, immediately preceding.

BY-LAWS

Article 1 – MEMBERSHIP

Section 1. Privileges. All members shall have equal privileges, except as otherwise herein specified.

Section 2. Membership of persons who are accepted before July 1 shall begin with the preceding January 1; membership of those accepted at a later date shall begin in the following January 1, unless the earlier date is requested and the required dues have been paid.

Article II – OFFICERS' DUTIES

Section 1. President shall have and exercise such powers as are reasonably necessary to carry out his/her official duties, including: preside at Governing Board meetings and annual business meeting; arrange with Secretary in setting date of fall Governing Board meeting and agenda; appoint special committee members and Chair, specify their charge and time to report recommendations.; with Governing Board approval, fill vacancies in the standing committees, such appointees to serve until the next annual meeting; appoint representatives to other organizations and meetings as needed.

Section 2. President-Elect. shall serve as Annual Meeting Chair, determine site, date, and agenda and act as President if President cannot serve.

Section 3. Past President shall Chair the Nominating Committee, solicit nominees from the Board and from the membership by Newsletter notice, obtain needed information from all nominees, and notify the Secretary of those results; tabulate votes; notify all candidates of election results.

Section 4. Secretary shall record minutes of Governing Board and annual business meetings and submit them for publication in the Newsletter; prepare and send Governing Board members their meeting agenda; prepare ballot for printing; respond to routine mail requests; maintain an up-to-date membership/subscriber list, submit periodic changes to mailing firm, and submit it bi-annually for publication in the Newsletter; prepare membership meeting notices for the Newsletter.

Section 5. Treasurer shall maintain Society incomes and expenses; submit a report of Society's financial status at Annual and Governing Board meetings; file Non-profit organization form with IRS; maintain checking and other accounts; pay all bills in a timely manner; maintain backlog of all Society publications; maintain current dues status of all members and subscribers; purchase needed business supplies and equipment; prepare and mail author invoices. The Treasurer shall be bonded to assure Society liquidity.

Article III - GOVERNING BOARD DUTIES

Section 1. Shall interpret and implement policies of the Society.

Section 2. Print the dues schedule in the Society's publications and review the dues schedule each odd numbered year to determine if a change is needed for the next year.

Section 3. Provide recommendations to the President in his appointment and charge for Special Committees.

Section 4. Fill a vacancy in the office of the President-Elect by the candidate in the most recent election who received the next highest number of votes for that office; if such candidate is not available the Board shall form a committee of it own members with the President as Chair.

Section 5. Shall, in the event the Secretary or Treasurer cannot continue duties, fill that vacancy by appointment until the next regular election.

Section 6. General responsibility for the publications of the Society shall rest with the Governing Board.

Section 7. Appoint Editors of the Journal

and Newsletter associate editors for each, and a Webmaster.

Section 8. The Journal Editor's duties shall include: review and edit all manuscripts submitted for publication in *The Great Lakes Entomologist*; notify authors of charges; submit manuscripts to reviewers; prepare each issue of the Journal; respond to all publishing related quires; provide authors with separates and notify Treasurer of author charges; report status at Governing Board and Annual meetings.

Section 9. The Newsletter Editor's duties shall include: prepare at least 3 issues per year for printing, including Entomology Notes as available and membership list each two years; report status at the Governing Board and Annual meetings.

Section 10. Associate Editors duties shall include: assist Editors; assume duties of respective Editors in their absence.

Section 11. The Members-at-Large duties shall include: attend Governing Board and Annual meetings; participate in discussions of agenda items; serve on committees as requested by the President; assist other Board members as needed.

Section 12. The Webmaster duties shall include: creation and maintenance of the Society Webpage.

Article IV – DUES

Section 1. Dues for the Life membership class shall be at 20 times Active class, payable within one calendar year.

Section 2. Members in arrears at the end of the calendar year shall be dropped from membership.

Section 3. Sustaining shall be greater than Active and set by the Board.

Article V – COMMITTEES: STANDING AND SPECIAL

Section 1. Terms of Office and Rotation. Unless otherwise indicated, members of standing committees shall serve for periods of three years each. Their elections shall be so arranged that one-third of the terms shall expire each year. Special Committees shall be limited to one year unless extended by the President.

Section 2. Election of Standing Committees. The Governing Board shall serve as the nominating committee to propose a slate of candidates for election to positions on standing committees not filled in other ways. The candidates nominated by the Board, together with any nominated from the floor, shall be voted upon at the annual meeting. The Board shall designate which member of each standing committee shall serve as chair.

Section 3. Function of Special Committees. Develop and make recommendations to the Board on specific issues, normally within one calendar year. The committee is dissolved when final recommendations are accepted.

ARTICLE VI. VOTING PROCEDURE

Section 1. Voting and holding office shall be open to all individual members.

Section 2. The President-Elect, Secretary, Treasurer, and Members-at-large shall be elected by mail ballot by the following procedure: Membership shall be solicited by notice in the Newsletter and at least six months preceding the next election for nominees to fill vacancies. At least four months prior to each annual meeting the Governing Board shall meet to consider nominations. Nominees are apprised of office responsibilities, their approval to serve obtained, and notify the Secretary of candidate names. Names shall be placed alphabetically on a ballot, mailed to each member not later than two months before the annual meeting, for return in an envelope marked "Ballot." A return date of at least thirty days after issue shall be specified for the return of the ballots. Ballots received later than the specified date shall not be counted. The votes shall be tabulated by the Past President and two other non-candidate members s/he selects. The candidate or issue receiving the most votes shall be declared approved. The Governing Board and all candidates shall be promptly notified of the outcome.

Section 3. Terms of service of the three members-at-large shall be staggered over three years.

Section 4. If only one nominee accepts candidacy for a vacancy the Board shall declare that candidate winner without a vote.

Section 5. If two candidates for any office tie for high vote the winner shall be decided by the membership through secret ballot vote at the next annual business meeting.

Article VII – QUORUMS

Section 1. Ten active members shall constitute a quorum for the transaction of the business of the Society.

Section 2. Four members of the Governing Board shall constitute a quorum for the transaction of the business, provided, that all members of the board have been informed of the intent to meet.

Article VIII – AMENDMENTS

Section 1. Changes in these By-Laws may be made by a two-thirds vote of any general meeting or by a two-thirds majority of all votes cast in a mail ballot; provided, that written notice of the proposed amendment shall have been sent to every active member at least one month before the date of the meeting at which it is to be considered, or the last date for the receipt of the ballots in case of mail vote.

Article IX. PARLIAMENTARY AUTHORITY

All business, unless stated otherwise in the Constitution or By-laws, shall be conducted according to Robert's Rules of Order, revised edition.

Last Revised: 2013

Drummond Island is famous for Puddingstones (= Jasper Conglomerate)
http://www.drummondislandchamber.com/php?page=Puddingstone

William E. Miller (1930-2013)

Bill Miller, a Life Member of both MES and The Lepidopterists' Society, died on March 14, 2013 in St. Paul, MN, at age 82. Bill was born in McAllen, TX on July 13, 1930. Bill was the first Research Entomologist assigned to the new US Forest Service Insect Unit on the Michigan State University campus in 1956, and there he worked until he was transferred in 1964 to US Forest Service Insect Unit in St. Paul, MN, which is located on the University of Minnesota campus. While in Michigan, Bill worked primarily on biology and management of the European pine shoot moth (*Rhyacionia buoliana*), which was a new exotic pest in Michigan at the time. Bill continued to work for the US Forest Service on the University of Minnesota campus until 1982. After that, Bill was provided office space as an adjunct professor in the University of Minnesota, Department of Entomology, where he was an active member until his death. In The Lepidopterists' Society, Bill was elected to numerous positions on the governing board and served as the editor of Society's Journal from 1985 to 1988. Bill published over 100 scientific papers – his first in the 1950s and the last that I know of in 2011. A few of his papers include:

Miller WE. 1955. Biology of *Anacampsis innocuella* (Zeller), a leafroller on aspen. Journal of Economic Entomology 48: 622-623.

Miller WE. 1960. The European pine shoot moth: relationship between proportion of trees infested and number of insects per tree. Journal of Forestry 58: 647-648.

Miller WE. 1977. Wing measure as a size index in Lepidoptera: The Family Olethreutidae. Annals of the Entomological Society of America 70: 253-256.

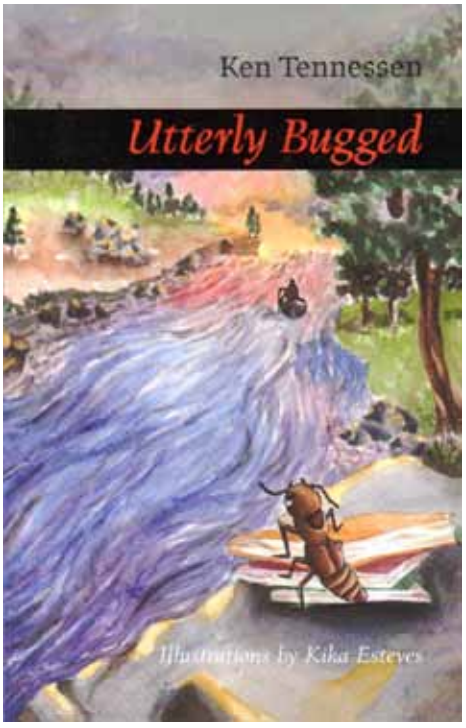
Miller WE. 1987. Guide to the Olethreutine moths of midland North America (Tortricidae). USDA Agriculture Handbook 660, Washington, D.C.

Miller WE. 1996. Population behavior and adult feeding capability in Lepidoptera. Environmental Entomology 25: 213-226.

Miller WE. 2005. Gall-inducing Lepidoptera. Pages 431-465 in Biology, ecology and evolution of gall-inducing arthropods. Edited by A Raman, CW Schaefer, and TM Withers. Science Publishers, Inc. New Hampshire.

Miller WE. 2011. Temperature-dependent development in capital-breeding Lepidoptera. Journal of the Lepidopterists' Society 65: 227–248.

Robert A. Haack, Newsletter Editor



Utterly Bugged a novella by Ken Tennessen

180 pages; 5.5" x 8"; retail $15
Red Dragonfly Press March 5, 2013
307 Oxford Street
Northfield, MN 55057
reddragonflypress@hotmail.com
www.reddragonflypress.com
507-664-3892

Book Description: Unaware that he has been transported back in time, retired entomologist Amos Garruty lands in a biological world unknown to him. Early on he sees peculiar dragonflies cure an injured snake, a superstition long debunked. Things soon take a turn for the worse when he sees a large bony-toothed bird streak through a clearing in the rainforest. He is aware that these flightless giants went extinct millions of years ago. He soon realizes he is alone. During his frantic struggle to return to the present, he is bitten by mosquitoes and unknowingly contracts a bygone virus. His ensuing travels in the United States unleash a hellish trail of infection. As people along his route get sick, it dawns on him that he might be a carrier. He tries to avoid contact, but is unsure what is really happening. Suspecting that authorities are hunting him, he flees to South America. His obsession with the enigmatic origins of insects continues to escalate, leading to a supernatural encounter that shakes him to his core.

About the Author: Utterly Bugged is Ken Tennessen's first novella. He writes poetry and short stories, as well as technical articles on insects. He calls Wisconsin home but travels widely, mostly researching and photographing dragonflies.

About the Artist: Kika Esteves is a Brazilian illustrator and comic artist. She was born in 1979 and graduated with a degree in Marketing and Advertisement Studies. She lives in Natal - Brazil with her husband and 2 cats.

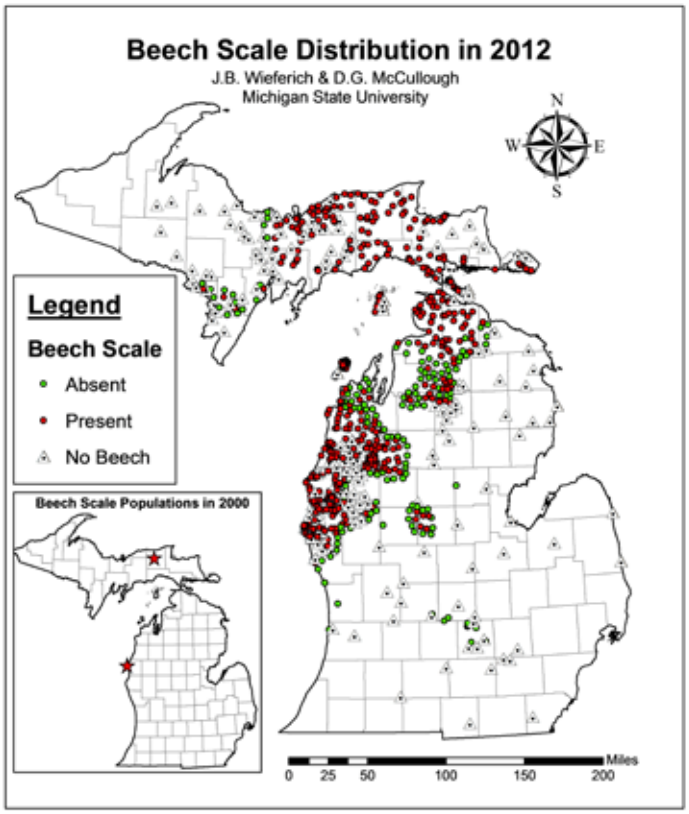
Ordering: Utterly Bugged is available for purchase through Red Dragonfly Press for $15.00 and is also available through Small Press Distribution (www.spd.org) and Amazon.com. Utterly Bugged is also available as an electronic book in formats for most e-readers, including iPad and Kindle.

Beech Bark Disease: Another Invasive Pest Clobbers Michigan Forests

James B. Wieferich[1] and Deborah G. McCullough[1,2]
[1]Department of Forestry, Michigan State University, East Lansing, MI 48824. [2]Department of Entomology, Michigan State University, East Lansing, MI 48824.
Email: jameswieferich@hotmail.com
mccullo6@mail.msu.edu

Beech bark disease (BBD) involves the nonindigenous, sap-feeding beech scale insect (*Cryptococcus fagisuga* Lind.) and cambium-killing *Neonectria fagisuga* fungi. Since it was introduced to Nova Scotia in the 1890s, BBD has spread southward and westward, causing widespread mortality of American beech (*Fagus grandifolia*) across much of its native range in North America. Beech bark disease was first identified in Michigan in 2000 in Ludington State Park in Oceana County and in Bass Lake Campground, north of Newberry, in Luce County. Substantial evidence indicates, however, that BBD in both areas was established at least ten years before it was first discovered. Michigan forests, which have been severely impacted by numerous invasive pests, encompass the western distribution of beech in North America, with the exception of a few areas where beech occurs in northeast Wisconsin. Unfortunately, BBD was identified in Wisconsin in 2009.

BBD begins when beech scales infest a tree. Beech scale has a single generation per year, but is completely parthenogenic (all females) and populations can build rapidly. First instar crawlers may be present from late summer through October. Crawlers move freely on a tree and may be carried some distance by wind, birds or other animals. People transporting infested logs and firewood have also inadvertently introduced beech scale into new areas. Once crawlers insert their mouthparts and begin feeding, they molt and remain immobile for the rest of their life span. Beech scales secrete white wax as they feed, and heavily infested trees will appear "woolly." Beech scale does not actually vector the pathogenic fungus, but the minute wounds in the outer bark from the feeding scales allows fungus to colonize tree. Native *Neonectria ditissima* cause perennial cankers on many hardwood trees, but rarely cause tree mortality. The *Neonectria* pathogen associated with BBD, however, does not cause external cankers, instead causes patches of inner bark to die. As the patches of dead inner bark coalesce, the ability of the tree to transport nutrients and water is disrupted. Leaves on affected branches fade and yellow, canopy dieback progresses, and eventually entire trees die.



BBD has three distinct phases. The first phase, termed "the advancing front," refers to stands that are infested with beech scale, but have no sign of the *Neonectria*. In the next phase, referred to as the "killing front," both beech scale and *Neonectria* are present, causing beech trees to decline and die. The final phase of BBD is known as the "aftermath forest." Most large beech trees have died or are infected with the fungus. Beech regeneration may be abundant and in the northeast, dense, nearly impenetrable thickets of beech sprouts may be present.

Effects of BBD on Michigan forests are becoming increasingly severe and widespread. The maple-beech-birch cover type comprises roughly 33% of the timberland in Michigan and includes more than 1.4 million board feet of beech. Beech is a particularly important species for wildlife, especially in late successional hardwood stands in northern regions such as the Upper Peninsula. Beech nuts produced by large trees are consumed by a variety of birds and mammals, ranging from bears and pine martens to turkeys and blue jays. Beech trees are often the only hard mast producer in northern areas, where oak and hickory are scarce. Mature beech trees also provide cavities and perching branches used by a wide array of birds and mammals. Beech trees are abundant in many Michigan forest campgrounds, state parks and other recreational areas, but once trees become infested with beech scale, potential windthrow becomes a concern. Personnel at Tahquamenon State Park, Ludington State Park and Bass Lake Campground, for example, have removed hundreds of dead or dying beech trees along trails or within campgrounds to protect visitors. The loss of overstory beech dramatically affects the aesthetics of these areas, as well as the productivity, biodiversity and overall health of affected forests.

Information about the current distribution and the spread of beech scale in Michigan is important for resource managers and landowners, who must assess vulnerability of stands and prioritize areas for pre-salvage, salvage and regeneration efforts. Our ongoing work at Michigan State University provides useful information related to (1) the spread of the advancing front of BBD and (2) the impact of BBD in Michigan forests.

Advancing front: Beech scale has become established across most of the beech range in the Upper Peninsula and in much of northwest and north central

Lower Michigan. As of 2012, three advancing fronts were delineated; one in the central Upper Peninsula and two in Lower Michigan. Recent data indicate spread rates from 2008-2012 were extremely variable, ranging from less than 1 km to more than 6 km per year. Several satellite populations of beech scale have become established on islands in Lake Michigan and Lake Huron or in areas of Lower Michigan that are more than 20 km from the nearest known infestation. This likely reflects long distance dispersal of beech scale eggs or crawlers by birds or humans. The most recent infestation in Isabella County, discovered in 2010, remains relatively localized at this point. Overall, in 2012, beech scale infestations were present in 30 Michigan counties, encompassing a total area of roughly 16,400 km^2 in Lower Michigan and 17,000 km^2 in Upper Michigan. In comparison, in 2005, beech scale was present in only 12 Michigan counties covering an area of about 2,667 km^2 in Lower Michigan and 6,214 km^2 in Upper Michigan.

Impact of BBD: In 2002-2003, we established permanent plots on 62 sites located in forests in Upper and Lower Michigan, in cooperation with forest health specialists at the University of Michigan and Michigan Department of Natural Resources. Sites were selected to represent three levels of beech basal area (low, moderate, high) and three levels of beech scale infestation (absent, low, heavy). Overstory and understory vegetation and coarse woody material (CWM – logs over 7.6 cm in diameter) were intensively surveyed. There was little evidence of beech mortality or other BBD impacts in 2003. These plots, however, provided baseline data, enabling us to quantify the extent, progression and rate of change in composition and structure, including CWM, as BBD advances. The absence of such baseline data has largely precluded any detailed assessment of the impact of the BBD complex in beech forests of the Northeast.

In 2003, beech scale was present in only 23 of the 62 sites, including 9 sites in Lower Michigan and 14 sites in the Upper Peninsula. As of 2012, beech scale is now present in 55 of the 62 sites, including 22 of the 28 sites in Lower Michigan and 33 of the 34 sites in the Upper Peninsula. Survey results from 2012 indicate that less than 6% of the beech trees in lower Michigan have been killed, while more than 25% of the beech trees in the Upper Peninsula have died. Composition of CWM in these sites, particularly those most affected by BBD, is shifting. In 2003, CWD was dominated by moderately or severely decayed logs, while in 2012, freshly downed, large diameter beech logs, have become more common. Tree species composition and abundance of saplings and seedlings remains similar to that observed in 2003. As BBD progresses, at least 50% of the beech trees are expected to eventually die and another 25% may survive as infected "cull" trees. So be sure to appreciate those big gnarly beech trees now, while you still can.

Battling Beech Bark Disease: Establishment of Beech Seed Orchards in Michigan

Jennifer L. Koch[1] and Robert L. Heyd [2]

[1] Research Biologist, Northern Research Station, U.S. Forest Service, 359 Main Rd, Delaware, OH 43015 Email: jkoch@fs.fed.us

[2] Forest Health Management, Michigan Department of Natural Resources 1990 US 41 South, Marquette, MI 49855. Email: heydr@michigan.gov

Amidst the dead, dying, and deformed beech trees left in the wake of beech bark disease (BBD; see Wieferich and McCullough , this issue), we are fortunate to find beech trees that remain healthy even in heavily infested areas. In stands across several US states it has been reported that disease-free beech trees are often found in clusters, providing evidence that resistance could be a genetic trait. Trees located in close proximity are likely to be closely related - either clonally through root-sprouting or as full- or half-sib seedlings (Houston and Houston 1994, 2000). BBD is initiated by feeding activities of the beech scale insect (*Cryptococcus fagisuga* Lind.), which create wounds that serve as entry points for *Neonectria* spp. of fungi. It is the fungal component of the disease complex that weakens and kills the tree. However, David Houston, retired US Forest Service plant pathologist and BBD research pioneer, demonstrated that beech trees that remained healthy despite intense BBD pressure failed to allow beech scale insects to establish even when eggs were directly affixed to the bark. Using the same technique, susceptible trees were readily infested (Houston 1983). In the absence of feeding by the beech scale insect, there is little opportunity for *Neonectria* to invade, minimizing impact of the fungus. Large-scale mortality levels in beech due to *Neonectria* have never been reported in the absence of the insect, so resistance to the beech scale insect equates to resistance to beech bark disease.

Genetic Studies on Beech Scale-Resistance

In 2002, research collaboration between Michigan Department of Natural Resources (MI DNR) personnel and researchers at the US Forest Service's

Figure 1. Pollination bags placed on mature BBD-resistant American beech tree in Ludington State Park, MI, to prevent pollen contamination during controlled cross-pollinations. (photo by DW Carey)

Northern Research Station laboratory in Delaware, OH, was initiated. The goals were to 1) demonstrate that resistance to the scale insect was a (heritable) genetic trait and 2) study the genetic basis/mode of inheritance of this trait in order to develop a beech tree-improvement program. As a starting point, full- and half-sibling families had to be developed for genetic studies. Resistant trees were identified along a campground road in Michigan's Ludington State Park that allowed a 70-ft-tall bucket truck access to the canopy of these trees. Certified tree climbers also assisted in these efforts that resulted in the production of two full-sib families and three half-sib families (Fig.1). The full-sib families were generated from the cross-pollination of two separate mother trees, one resistant and one susceptible, with pollen that had been collected from a second resistant tree. The half-sib families were obtained by collecting open-pollinated seed from the susceptible mother tree and the resistant mother tree as well as an additional susceptible tree.

Seedlings were tested for scale-resistance using an adaptation of Houston's method (Houston 1982) to artificially apply insect eggs to the stems. A known number of eggs were placed on foam pads and these were affixed to the bark of the seedlings. Approximately one year later the pads were removed and the number of healthy, egg-laying adults that had established were counted as well as the number of egg clusters (Fig. 2). Highly resistant trees did not allow successful establishment of any adults. In cases where a few adults were observed, there was no evidence of reproduction (eggs or nymphs). A range of susceptible phenotypes were observed, from trees that only had a few adults and egg clusters to trees that had hundreds of adults and eggs. All scale-resistance screening was carried out in a dedicated polyhouse located on site with our partners at the Holden Arboretum in Kirtland, OH.

Analysis of the data from the scale-resistance screening indicated there were significant differences in scale infestation and egg production between families (Koch et al. 2010). The family that had the highest proportion of resistant progeny (50%) was the one with two resistant parents. The full-sib family from a resistant x susceptible cross had only a slightly higher proportion of progeny that were scale-resistant than the half-sibling (open-pollinated seed) families from the susceptible mother trees, and both were in the same range of the occurrence of resistant trees reported in natural stands, 1to 5 %. Of particular interest was a fourth open-pollinated family that had been collected and sent to us from personnel at the Maine Department of Conservation. The beechnuts for this family had been collected from a resistant mother tree located in a stand that had been managed for BBD through the removal of all diseased trees ten years earlier (Farrar and Ostrofsky 2006). The only possible paternal parents or pollen donors for this family were the remaining resistant trees, so although this family was open-pollinated, each of the progeny apparently had two resistant parents. The proportion of progeny with resistance to beech scale in this family was also about 50%, similar to what was observed in the full-sib family with two resistant parents.

These studies allowed us to estimate the heritability of the scale-resistance trait, demonstrating a significant level of genetic control versus environmental influences. Not only is scale-resistance a heritable trait that can be successfully selected and bred for, but in a single generation using two resistant parents significant improvement can be achieved, increasing the proportion of resistant progeny in the next generation from about 1-5% to 50%. These initial genetic studies provided the information that was necessary for researchers to develop a tree improvement program as a tool in the battle against BBD.

The performance of the open-pollinated half-sib family from the managed stand in Maine, indicated that silvicultural methods designed to manipulate stand genetic composition by favoring resistant trees can also lead to tree improvement in the next generation. However, these findings are based on a limited sample size (one family) and may be influenced by the density and relatedness of the remaining resistant beech trees in the stand, as studies have shown that American beech is self-incompatible and even crosses between closely related beech trees can have low success rates (Koch and Carey 2004; unpublished data). Given the propensity of beech to reproduce clonally through root-sprouting, the number of mature beech in a stand may be significantly higher than the actual number of unique genotypes, possibly resulting in a limited number of reproductively compatible combinations of resistant parents.

The Hot Callus Grafting Method for American Beech

Figure 2. Screening seedlings for resistance to the beech scale insect. Panels from left to right: Adult egg-laden scale insects laying string of eggs (in center), eggs placed on foam affixed to bark of test seedling, resistant seedling 52 weeks later when foam was removed, susceptible seedling 52 weeks later when foam was removed. (photos by DW Carey & JL Koch)

One way to ensure sufficient genetic diversity to promote efficient reproduction of resistant beech trees is through the establishment of seed orchards. This involves the identification of select trees in native stands and the use of a method of vegetative propagation such as grafting to create clonal replicates of the desired genotypes that can be planted together in a field setting managed to encourage optimal nut-production. American beech is a hardwood species that has not been

amenable to vegetative propagation methods. Methods such as rooting of cuttings and micro-propagation have been unsuccessful in beech, and traditional grafting methods have yielded low and variable success rates (Barker et al. 1997, Ramirez et al. 2007, Pond 2008).

In spite of this, we have been able to achieve consistently higher grafting success rates with beech by utilizing a hot callus system for grafting. Hot callus grafting utilizes traditional grafting techniques such as top grafting and side veneer grafting, with the difference being that the hot callus grafting system keeps the graft union heated to promote callus formation, while keeping the rootstock and scion cool and dormant. This method has been reported to significantly increase the graft success of woody plants (Langerstedt 1984, Avanzato and Tamponi 1987). The hot callus system we employ relies on thermostat controlled heating cables attached to a wooden frame to supply heat to the graft unions. The system is set up in a greenhouse or cold room kept just above freezing. Sill plate foam is used to create an enclosed "heat chamber" by wrapping it above and below the graft union and affixing it to the board that supports the heating cable, as illustrated in Figure 3 and described in Carey et al. (in press).

Utilizing the hot callus system on more than 2000 graft attempts during a 6-year period, we reported an average overall success rate of 52%, compared to previously published grafting success rates in American beech of 30% and 12% in 2 consecutive years (Ramirez et al. 2007, Carey et al. in press). In an experiment directly comparing hot callus grafting to traditional methods of grafting in beech, we demonstrated a success rate of 67% using the hot callus system compared to 13% without it (Carey et al. in press). Our method was performed on more than 74 different genotypes of American beech (27 from Michigan), and less than 10% of these genotypes had success rates less than the average. This indicates that the hot callus grafting system works across a widely diverse collection of selections, which is what is required to develop seed orchards.

Containerized Seed Orchards

In cases where scion for grafting is collected from mature, seed-producing trees whose buds are programmed to form flowers at the time of collection, viable flowers emerge post-graft. Controlled cross-pollinations can be easily performed in the greenhouse on potted grafts (Fig. 4) instead of 70 ft up in the canopy of a mature tree in the field. These types of containerized controlled-crosses have allowed us to produce multiple new full-sib families with several different pairs of resistant parents in a single season. Not only are the crosses safer and easier to make in the greenhouse, but the plants produce higher quality seed when grown under conditions where light, temperature and nutrients can be carefully controlled. The beech seed produced from containerized greenhouse crosses had germination rates about twofold higher than what was observed from field-pollinated seed (Koch et al. 2007).

Seven more full-sib families have been produced using combinations of nine additional resistant parent genotypes. Both parents were from Michigan for five of these families, the other two families had one parent from Michigan. The progeny have all been screened for beech scale-resistance, and the findings have supported the original observations that the best performing families are those whose parents are both resistant to the beech scale. Across all seven families the average proportion of progeny with scale-resistance was 56%. These results provide additional evidence for the significant genetic gain that can be expected through the development of scale-resistant American beech seed orchards.

Installation of First BBD-Resistant American Beech Seed Orchard

The MI DNR has been monitoring BBD infested areas in Michigan and tracking putatively resistant trees since 2001. MI DNR personnel relied on snowmobiles for transportation to collect dormant scion material using sling shots to get rope saws high into the crowns of the selected trees. U.S. Forest Service researchers grafted the scions and confirmed the scale-resistance of the selected trees using the artificial infestation technique described above (Fig. 5). Installation of the first resistant American beech seed orchard began in 2011 at the Tree Improvement Center in Brighton, MI. To date, 74 resistant trees have been planted, but with heavy deer predation and drought conditions only 39 have survived through 2012. Installation of deer protection and improved irrigation is expected to increase survival rates as work continues to complete the seed orchard by 2014. Upon completion, the seed orchard will contain at least 15 ramets each of 20 different resistant genotypes for a total of 300 trees. It is estimated that a seed orchard consisting of 20 unrelated individuals should contain most of the genetic variation found in the native population (Johnson and Lipow 2002).

Figure 3. Above: Hot callus grafting system showing graft union with grafting rubber wrapped around it lined up between two heat cables prior to being sealed with sill plate foam. Below: Graft union sealed in heat chamber with sill plate foam. (photos by M Miller)

The full-sib families described from the containerized controlled crosses used nine of the genotypes destined for inclusion in the Brighton seed orchard, and so have given us a snapshot of at least a portion of the expected output from this orchard once it is mature and producing seeds (56 % of all progeny having resistance). Some of the seedlings were outplanted in November 2011 in the Michigan Upper Peninsula in an area heavily impacted by BBD. The one1-year survival rate has exceeded 95 %. These seedlings be monitored yearly for growth characteristics and scale-resistance. It is our hope that in the future the BBD-resistant

American beech seed orchard at the Brighton Tree Improvement Center will provide a valuable source of BBD-resistant beechnuts that can be used by both state and federal forest managers for restoration of healthy American beech for decades to come.

Acknowledgements

We would like to thank the Holden Arboretum for their partnership and support of the scale-screening facility. We thank the numerous MI DNR and U.S. Forest Service staff members who have helped with all aspects of this project. We also gratefully acknowledge the following funding sources that have supported various portions of our research: US Forest Service Northern Research Station, Forest Health Protection (FHP), FHP Evaluation Monitoring Program, and FHP Special Technology Development Program.

References

Avanzato, D and G Tamponi. 1988. The effect of heating walnut graft unions on grafting success. Acta Hort. (ISHS) 227:79-83.

Barker MJ, PM Pijut, ME Ostry, and DR Houston. 1997. Micropropagation of juvenile and mature American beech. Plant Cell Tiss. Org. Cult. 52: 209-213.

Figure 4. Containerized beech grafts that have been pollinated and are developing beech nuts.

Figure 5. Grafted Michigan BBD-resistant American beech.

Carey DW, ME Mason, P Bloese, , and JL Koch. 2013. Hot callusing for propagation of American beech by grafting. HortScience. In press.

Farrar A, and WD Ostrofsky. 2006. Dynamics of American beech regeneration 10 years following harvest in a beech bark disease-affected stand in Maine. North. J. Appl. For. 23: 192-196.

Houston DB and DR Houston. 1994. Variation in American beech (*Fagus grandifolia* Ehrh.): Isozyme analysis of genetic structure in selected stands. Silvae Genetica 43: 277-284.

Houston, DB, and DR Houston. 2000. Allozyme genetic diversity among *Fagus grandifolia* trees resistant or susceptible to beech bark disease in natural populations. Can. J. For. Res. 30: 778-789.

Houston DR. 1982. A technique to artificially infest beech bark with the scale, *Cryptococcus fagisuga* (Lindinger). Research Paper NE-507. USDA Forest Service, Northeastern Forest Experiment Station, Broomhall, PA, 8 p.

Houston DR. 1983. American beech resistance to *Cryptococcus fagisuga*. *In*: Proceedings, IUFRO Beech Bark Disease Working Party Conference. Gen. Tech. Rep. WO-37. USDA Forest Service, Northeastern Forest Experiment Station, Washington, DC, pp 38-41.

Johnson R. and S Lipow. 2002. Compatibility of breeding for increased wood production and long term sustainability: the genetic variation of seed orchard seed and associated risks. In: Proceedings Wood Compatibility Initiative Workshop 18: 169-179.

Koch JL, and DW Carey. 2004. Control cross-pollinations with American beech trees that are resistant to beech bark disease. *In*: Proceedings of the 14th Central Hardwoods Forest Conference. Gen. Tech. Rep. NE-316. USDA Forest Service, Northeastern Research Station, Newtown Square, PA, 358-364 p.

Koch JL, ME Mason, and DW Carey. 2007. Advances in breeding American beech for resistance to beech bark disease. In: David, A. (ed.) Proc. 3rd Northern Forest Genet. Assoc. Wkshp. Univ. of MN Dept. For. Res. Staff Pap. Ser. No. 194: 22-28.

Koch JL, ME Mason, DW Carey,, and CD Nelson. 2010. Assessment of beech scale resistance in full and half-sibling American beech families. Can. J. For. Res. 40: 265-272.

Lagerstedt, N.B. 1984. Hot callusing pipe speeds up grafting. Am. Nurseryman. Oct: 113-117.

Pond S. 2008. Conservation and propagation of American beech (*Fagus grandifolia* Ehrh.) through somatic embryogenesis. Propagation of Ornamental Plants 8: 81-86.

Ramirez M., J Loo, and MJ Krasowski. 2007. Evaluation of resistance to the beech scale insect (*Cryptococcus fagisuga*) and propagation of American beech (*Fagus grandifolia*) by grafting. Silvae Genet. 56:163-169.

***Fulgoraecia exigua* (Henry Edwards)**
(Lepidoptera: Epipyropidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Monroe Co., Petersburg SGA, NE of Lulu and Anders Rds.
Date: 20 Sept. 2011
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 1 specimen recovered; 1 additional specimen recovered on 11 August 2012, Lenawee Co., Morenci, Riverside Natural Area

Brachylomia discinigra (Walker)
(Lepidoptera: Noctuidae)
Submitted by: Kyle E. Johnson
Location: Michigan, Marquette County: McFarland Bog (46.21382°N 87.26143°W)
Date: 1 Sept. 2011
Collector: Kyle Johnson
Identifier: Kyle Johnson
Photo by: Kyle Johnson
Note: UV trap, 21-16°C (70-60°F), partly cloudy/calm night; sparsely treed acid peatland (a rather floristically diverse poor fen) near shrubby transitional fen and upland forest island. In 2012, I discovered another specimen in Mo Nielsen's collection (from Otsego Co.) that he apparently forgot to report!

***Spodoptera exigua* (Hübner)**
(Lepidoptera: Noctuidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Lenawee Co., Morenci, Riverside Natural Area
Date: 23 July 2012
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 9 specimens recovered; 1 specimen recovered on 8 Aug 2012 in Monroe Co, Petersburg SGA, SW of Lulu & Teal Rds.; 2 additional specimens recovered on 25 Aug 2012 in Hillsdale Co., SE of Buckeye and Pittsford Rds.

Trigrammia quadrinotaria (Herrich-Schäffer)
(Lepidoptera: Geometridae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Lenawee Co., Morenci, Riverside Natural Area
Date: 23 July 2012
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 1 specimen also recovered on 4 August 2012

***Spodoptera eridania* (Stoll)**
(Lepidoptera: Noctuidae)
Submitted by: Kyle E. Johnson
Location: Michigan, Keweenaw County: Eagle River (47.41271°N 88.29257°W)
Date: 9 Oct. 2011
Collector: Kyle Johnson
Identifier: Kyle Johnson (also confirmed by Hugo Kons Jr. and Jim Vargo)
Photo by: Kyle Johnson
Note: taken at rotten banana-brown sugar bait, 9:25pm-12:50am, 11°C (52°F); trailside through wet-mesic alder thicket, near mesic white cedar-balsam fir-poplar-birch-white spruce forest

***Nemapogon roburella* (Dietz)**
(Lepidoptera: Tineidae)
Submitted by: James T. Vargo
Location: Michigan, Newaygo County, Manistee National Forest, N 43.669 W 85.888
Date: 28 July 2012
Collector: James Vargo
Identifier: Terry Harrison
Photo by: James T. Vargo

***Acleris cervinana* (Fernald)**
(Lepidoptera: Tortricidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Oakland Co., Oxford, W of Brookhollow Dr.
Date: 31 October 2008
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 2 specimens recovered

***Acleris maccana* (Treitschke)**
(Lepidoptera: Tortricidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Oakland Co., Lake Orion, Bald Mountain Rec. Area W of Kern Rd.
Date: 16 March 2012
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 1 specimen recovered

***Notocelia rosaecolana* (Doubleday)**
(Lepidoptera: Tortricidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Oakland Co., Oxford, W of Brookhollow Dr.
Date: 11 June 2008
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 1 specimen recovered; 3 additional specimens recovered on 20 June 2009

***Acleris forskaleana* (Linnaeus)**
(Lepidoptera: Tortricidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Oakland Co., Oxford, W of Brookhollow Dr.
Date: 23 July 2008
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 2 specimens recovered

***Acleris schalleriana* (Linnaeus)**
(Lepidoptera: Tortricidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Washtenaw Co., Cherry Hill Nature Preserve
Date: 25 Nov. 2006
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 2 specimens recovered; 25 additional specimens recovered on 10 Nov. 2012 & 12 Jan. 2013, Oakland Co., Lake Orion, Bald Mountain Recreation Area W of Kern Rd.

***Sparganothis flavibasana* (Fernald)**
(Lepidoptera: Tortricidae)
Submitted by: Dwayne R. Badgero
Location: Michigan, Oakland Co., Oxford, W of Brookhollow Dr. Oakland Co.
Date: 23 June 2009
Collector: Dwayne R. Badgero
Identifier: Dwayne R. Badgero
Photo by: Dwayne R. Badgero
Note: 1 specimen recovered

Little Brown Beauties

Eileen Carlson
2300 Benton Center Rd.,
Benton Harbor MI 49022
Email: eileenc@sarett.com

A sedentary routine, a picky diet, a need to live in an exclusive neighborhood… the lifestyle of the Mitchell's satyr butterfly, *Neonympha mitchellii mitchellii* French (Lepidoptera: Nymphalidae), has made it one of Michigan's most endangered insects.

The glaciated areas of the Midwest once hosted numerous populations of the Mitchell's satyr. After the glaciers retreated unique wetlands called fens formed when groundwater flowed through the glacial deposits. The resultant calcium carbonate-rich (calcareous) soil supported tamaracks, poison sumac, some wildflowers and the satyr larval food, sedge grasses.

This specialized habitat is rapidly disappearing. Increased agriculture and building development has led to the destruction of wetlands as well as increased nutrient loading of the soil. Fen plants (including the butterfly's preferred tussock sedge, *Carex stricta*), adapted for nutrient-poor soils, are declining as the soil changes. Aggressive native and non-native plants make the most of these changes further reducing the availability of larval food.

Even when pockets of proper habitat exist, studies have shown that Mitchell's satyr populations rarely move from one fen to another. In fact, the adult female rarely flies unless disturbed. Generally, each generation hangs out in an area that gets progressively smaller with less and less food.

The Mitchell's satyr butterfly was listed as federally endangered in 1992. According to recent surveys by the Michigan Natural Features Inventory, the butterfly is known to occur at 16 sites in nine Michigan counties, primarily in southwest Michigan, and at two sites in northern Indiana. Of these sites, only six are considered viable enough to consistently support higher densities of adults.

One of those sites is situated on the grounds of Sarett Nature Center, located in southwest Michigan's Benton Harbor. Throughout its more than forty years of operation, Sarett has taught environmental education to countless numbers of families and schoolchildren.

Spread over 600 acres, the Sarett Nature Center is a mélange of ecosystems. Visitors can explore a restored prairie, dry upland forests, ponds, swamps, marshes and, of course, a fen. Three years ago an outdoor butterfly exhibit was constructed which seasonally houses native and non-native North American butterflies for public viewing.

Mitchell's satyr viewing, however, must be done in the fen. The best chance at spotting the butterflies is between the third week of June and the third week of July when adults emerge from pupation. A warm (80°F to 90°F), overcast and windless day will increase the chances of a sighting. Higher temperatures and sunnier conditions cause a significant reduction in their activity. They are nearly impossible to find after a heavy rainfall.

Entrance to Sarett Nature Center in Benton Harbor, MI

Watch for a medium-sized (wingspan 3.4 – 4.4 cm) warm tan to dark chocolate brown butterfly at the edges of the fen. A distinctive row of closely spaced, yellow-ringed black eyespots on the ventral wing will distinguish a Mitchell's satyr from the Appalachian brown (*Satyrodes appalachia*), eyed brown (*Satyrodes eurydice*), large wood nymph (*Cercyonis pegala*), or little wood satyr (*Megisto cymela*) butterflies which also visit the fen.

Mitchell's satyr by Doug Landis

The males fly very slowly on short flights. They are seen bobbing through, or just over, the tops of sedges and shrubs looking for a female. She will be perched on a leaf, or just emerging from pupation, ready to mate. During their three-week adult phase the butterflies rarely eat.

Eggs are laid in clusters on small plants close to the ground. A week later, the new larvae will begin feeding on the sedges and other grass-like plants of the fen. Older instars specialize on tussock sedge. After three molts the larvae enter a fall diapause tucked down in the sedges. The following May they begin eating again. After two more molts pupation occurs in mid-June.

Nate Fuller, the Conservation and Stewardship Director for the Southwest Michigan Land Conservancy, describes Sarett's population of Mitchell's satyrs as one of the larger in Michigan. Annual surveys, since the first documented observation in 1986, show that the previously stable population seems to be on a slight decline. The Land Conservancy hopes the numbers will rebound with more habitat restoration work and an increasingly successful captive rearing project.

Hopeful butterfly paparazzi can attend one of Sarett's weekend public programs; they are posted on the website (sarett.com) as they are scheduled. Groups of five or more can also schedule a private program by calling the nature center at (269) 927-4832.

NONPROFIT ORG.
U. S. POSTAGE PAID
East Lansing, MI
PERMIT NO. 14

Department of Entomology
Michigan State University
East Lansing, Michigan 48824

First Dragonfly

In the Upper Midwest
the winters are brutal,
with dragonflies under ice
any searching is futile.

But it's almost time now for
the first dragonfly to come out;
the crunch is off the fen
and gnats are flitting about.

The earliest spring species
are the little Boghaunters;
they are rare and hard to find
according to dragonfly hunters.

I've seen pictures of them
so I know they exist,
maybe this year I'll see one
if I pursue and persist.

So I'll scope out Sandhill fen
hoping just for once
a Boghaunter shows up—
I've been waiting ten months!

— **Ken Tennessen** 2012

Williamsonia fletcheri, the Ebony Boghaunter. Photo by Ken Tennessen at the Sandhill Wildlife Area in Wood County (central WI), 12 May 2012. With a Nikon D700, 180 mm macro, 1/400 sec, f18.