Phaëton

The Official Newsletter of the
Maryland Entomological Society

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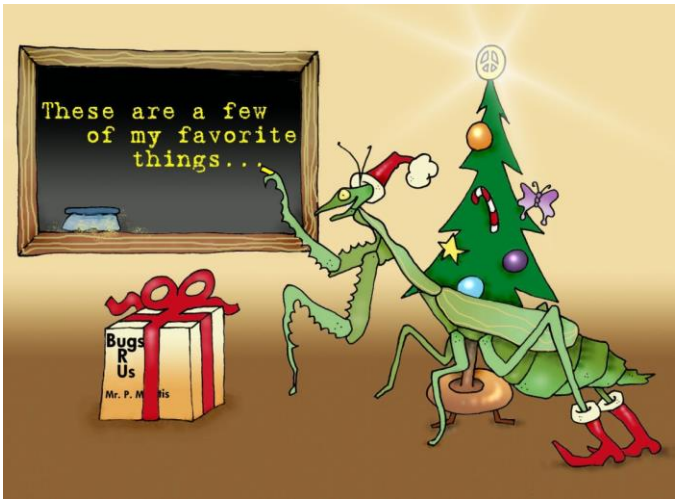
EDITOR: Aditi Dubey – aditid26@gmail.com
Hanna Kahl – hkahl@umd.edu
FACULTY SPONSORS: **Frank E. Hanson** and **Austin P. (Bob) Platt**
Department of Biological Sciences
University of Maryland Baltimore County (UMBC)
1000 Hilltop Circle
Baltimore, MD 21250
WEBSITE: http://www.mdentsoc.org/

As in past years, Gene Scarpulla and Marcia Watson asked their artist/cartoonist friend Ross Holtz to create an entomological holiday card that they could send it to friends and family. They are sharing their 2015 holiday card with you for the 2016 holiday season. (Ross is busily creating another design for them again this year.) "Merry Christmas and Happy New Year" from Gene and Marcia.



♫♫ June bugs on roses and crickets in clover,
Beetles that click and then flip themselves over,
Bright-colored butterflies flapping their wings,
These are a few of my favorite things. ♫♫

Merry Christmas & Happy New Year

Gene & Marcia

Original Artwork by *Ross E. Holtz* ©2015

VACANCY FOR MES SECRETARY

We are requesting members to consider filling the vacant post of secretary of the MES. Primary responsibilities include taking and preparing meeting minutes, including summaries of lectures. If you are interested, please contact society president Fred Paraskevoudakis at bugandrockman@msn.com

*****DON'T FORGET TO RENEW*****
*****IT'S MEMBERSHIP RENEWAL TIME*****
OCT 2016 – SEP 2017 MEMBERSHIP YEAR

Membership renewal forms were inserted in the front of the September 2016 issue of The Maryland Entomologist that was mailed out in September. If the date on your address label reads 2016, it is time for you to renew for the "October 2016 – September 2017" membership year. Please check that your contact information is correct and return the form along with your check (made out to Maryland Entomological Society) to: Edgar A. Cohen, Jr. (MES Treasurer), 5454 Marsh Hawk Way, Columbia, MD 21045.

WELCOME TO NEW MEMBERS

MES welcomes the following new members to the Society:

Seán G. Brady – Silver Spring, MD
Andrew D. Lerner – Columbia, MD
David A. O'Brochta – Rockville, MD
Anthony & Lisa Righter – Clarksburg, MD

HONORING MEMBER DONORS

MES wishes to honor the following members who made charitable donations along with their recent membership renewals. These donations help with the printing and mailing of *The Maryland Entomologist*.

Robert W. Dixon
Harold J. Harlan
Heloise Morgan
Frances B. Pope
Eugene J. Scarpulla
Warren E. Steiner, Jr. & Jil M. Swearingen
Elissa A. Weidaw
James D. Young

18 NOVEMBER 2016 MES MEETING MINUTES

The 313th general meeting of the Maryland Entomological Society was held on Friday, 18 November 2016 at UMBC and began at 8:15 P.M. with a welcome by President Fred Paras. The meeting proceeded immediately to the scheduled lecture, summarized below. There were discussions with the speaker afterward. A total of nine MES members and 11 guests attended the meeting and presentation. Afterward, attendees enjoyed a period of interesting conversation, viewed specimens brought in by members, and helped themselves to a generous variety of refreshments. A number of members remained for a brief business meeting.

The featured speaker, Dr. David O'Brochta had attended the group dinner before the meeting, and unfortunately, his car had been "booted" for being parked in an unauthorized space. After the presentation, Fred Paras drove the speaker back to the restaurant to help get his car released. Vice President Phil Kean presided over the subsequent brief MES meeting. MES Treasurer, Ed Cohen, reported that the current general funds balance was $ 4,763.96. Phil mentioned that the speakers for the next few regular MES meetings are listed in the latest issue of the Phaëton. The speaker for the next regular meeting (February, 2017) will be Hanna Kahl, co-editor of the Phaëton. During a brief discussion, it was established that several attendees at the pre-meeting dinner had been uncertain as to which parking spaces near the restaurant were restricted. A motion was then proposed, and passed, to have the MES treasurer reimburse Dr. O'Brochta the total cost of getting his car released from the "boot," mentioned above. There was further discussion of possible alternatives to this new "before the meetings" dinner site, Ship's Café Restaurant and Crab House. No clear consensus was reached among members present who also frequently attend these pre-meeting dinners. Further discussion of this via email exchanges before the next MES meeting (February 2017) was suggested.

Both Phil Kean and Harold Harlan each gave brief descriptions of their own respective participation in the "Young Stems Expo" program from 10 AM to 1 PM, Saturday, Nov. 12, 2016, at the Lyons Mill Elementary School, Owings Mills, MD. The MES had been requested to send some Entomologists (presumably members) who could show some insect specimens, explain what an Entomologist does, and tell the kids where or how they can get further information. The target audience had been stated to be children of ages 3 through 6 years, nonetheless, a lot of older siblings and parents visited and observed the displays. For more information about this program, go to: http://youngstems.weebly.com/. For access to related STEM education (entomological-based) available through the Entomological Foundation, affiliated with the Entomological Society of America (ESA), go to: www.entfdn.org .

After these discussions, the meeting was adjourned.
Respectfully submitted, ***Harold Harlan***

18 NOVEMBER 2016 MES LECTURE

Speaker: David O'Brochta, PhD: Professor-Insect Biology, Genetics, Molecular Genetics, and Biotechnology, Department of Entomology, University of Maryland, College Park, MD; Head-Insect Transformation Facility, Institute for Biological and Biotechnology Research, Rockville, MD; Editor-Insect Molecular Biology, Royal Entomological Society, UK
Title: "Genetic Technologies in Insect Research and Control"

Dr. David O'Brochta began by very briefly explaining some general concepts about genetic manipulation of living organisms. He cited some examples of successful (from our human perspective) historic and very recent genetic modifications of specific plants and animals. These examples included: Golden Rice modified to produce lots of vitamin A, mass-reared, sterilized, and released male fruit fly pests, and corn and soybean strains modified to produce bacterial insecticidal toxins (*e.g.*, *Bti* toxins). He then discussed some proposed modifications of specific human disease vectors or the pathogens that cause human diseases. He cited three case studies (all still in various phases of research) focused on preventing or interrupting transmission of specific human diseases and associated gene drive technologies. Those include: insect population control of a major vector species (an Oxitec, Limited program focused on *Aedes aegypti* L.), production of a malaria vaccine (with work by Sanaria, Inc.), and a worldwide program to eradicate malaria (spearheaded by the Bill & Melinda Gates Foundation and their numerous collaborators).

Ever since arthropod vectors have been known to transmit human pathogens (*i.e.*, since about 1881), vector populations have been controlled by physical means, source reduction, exclusion, topical oils, or herbal extracts, and more recently, synthetic chemical pesticides. The oldest genetic strategy for control of insects is the geographically-focused mass-release of sterile males of the target species, first tried by the USDA in 1954. The sterilization process (whether via gamma irradiation or chemical agents) usually reduces the biologic and mating vitality of the treated males. Extensive field monitoring has shown it is usually necessary to release at least

10 times the amount of sterilized males as untreated (natural) males present in the release cites (based on current local population monitoring) to effect significant reduction of the numbers of viable eggs produced by current local ("wild") females of the target species.

The Oxitec strategy involves a new twist on that historic sterile male technique. Lab-designed genes are first attached to transposable elements, or gene vectors, that can then be biochemically inserted into a specific site in the particular chromosome(s)/DNA of the target organism(s) (*Ae. aegypti* eggs, in this case). This is aided by specialized genetic probes and well-established techniques and tools of Crispr/Cas9 gene editing. Eggs laid within 90 to 120 min. by captive reared mosquitoes are then micro-injected with the lab-designed genes through their polar (blunter) end under a microscope. The eggs must be injected one-at-a-time, and within inert oil medium so that a technician can better visualize and direct the injection process. A trained technician can inject 1,000 to 1,500 such eggs per day. These lab-designed genes are created to cause a specific effect in the organism and become incorporated into the germ cells of the target individuals. The eggs will then develop into individuals that express (show) the characteristics caused by those artificial DNA segments.

Oxitec inserts a proprietary (and dominant lethal) "self destruct" gene (*i.e.*, an RIDL transgene) that is like a genetic time bomb. When the gene is activated, it causes production of a slowly lethal protein (not life stage specific). In the mass-production lab, the *Ae. aegypti* larvae that hatch from the modified eggs are reared in water that has a special chemical added that represses the gene. After those larvae have been raised to adults and leave the repressor chemical, the gene becomes active and slowly kills each individual genetically modified (GM) mosquito. Pupae of this mosquito species are sexually dimorphic, and a physical separation technique allows a very efficient detection (>99% efficient) of treated males. Oxitec also inserts a gene that produces a physical marker (a protein that fluoresces a specific color under UV light) to help detect and monitor their specimens that have been released into a field site. This GM mosquito strain developed by Oxitec is called OX513A.

The mass-released GMO males of the Ae. aegypti strain OX513A typically mate with con-specific wild (i.e., non-GM) females very successfully. Their offspring all carry the dominant lethal gene, and those larvae, lacking the repressor chemical, do not live long enough to emerge as adults. This process produces males that have more physical vitality and usually higher mating success than the males of this species that have been sterilized (by either irradiation or chemicals). Documented field success of this patented process (over the past 10 years) is very promising and it may offer a very good chance to interrupt transmission of Zika virus (and most other pathogens that are mainly transmitted by this mosquito species). The mass-rearing, mass-releases, and monitoring must be maintained until field monitoring shows local populations are reduced to below some pre-chosen target level, and can pose a large, fairly expensive, logistical challenge. Much of this is detailed in Carvalho et al. 2015.

Dr. O'Brochta also discussed the relevance of genetic technologies to control malaria. Malaria, *Plasmodium* species, has a complex disease cycle. The speaker briefly described the main steps in a typical life cycle of a human-pathogenic malaria species. He pointed out that the first thing sporozoites (individuals in the infective stage of malaria) do is infect cells of the human liver and multiply in great number. There they develop into merozoites (individuals in the main malaria stage that circulate in human blood) and spread throughout the host's body. These cyclically infect the red blood cells (RBCs) and consume and destroy them. Merozoites of each malaria species break out of their RBCs at synchronized intervals of 48-96 hours, depending on the species. Chills and fever attacks are typical malaria symptoms, and are caused by this periodic mass release of destroyed red blood cells into the host's blood stream.

Only about 60 of the more than 300 species of the mosquito genus *Anopheles* are capable of naturally transmitting the four species of malaria organisms (all in the genus *Plasmodium*) that can readily infect humans. Some *Plasmodium* stages only occur in their vertebrate hosts, others only occur in their arthropod hosts (vectors). Their life/disease cycle could be interrupted at any of the several developmental steps in either host. Certain chemicals (*e.g.*, quinine or chloroquine), taken orally at prescribed intervals, can usually prevent infection in humans if they are present at adequate concentrations in the circulating blood. However, such protection wanes rapidly if pills are not taken regularly. Physical exclusion of vectors (*e.g.*, using screens or bed nets), repellents, and indoor residual spraying of insecticides can reduce vector biting and reduce numbers of new infection cases, but can be less than 100% effective in many tropical countries. Many medical and public health experts believe that a vaccine may offer the best hope of long-term malaria prevention. However, the complex life cycle of human malaria organisms has so far thwarted development of such a vaccine, but recent research looks promising.

A Sanaria, Inc. has focused on developing a vaccine called PfSPZ that stops the sporozoite stage of *Plasmodium falciparum* from infecting a treated human. They claim more than 80% of individuals immunized with PfSPZ vaccine were protected from infection with *P. falciparum* for at least six months. The Gates Foundation and their multiple collaborators, especially in tropical countries, are also working aggressively to combat major infectious diseases, and currently are especially focused on malaria. Their work includes improvement in currently available products, like bed nets, residual sprays, vaccine development, and better monitoring devices. They are also working to improve related techniques, devices, planning, information sharing, and biological/genetic manipulation of the vector species involved.

The speaker briefly explained that both humans and insects (*e.g.*, mosquitoes) have innate immune systems that can detect invasive microbes, and then develop generalized anti-microbial proteins that may provide at least some protection. It may be possible to manipulate the biological responses to certain malaria species, making their development in the vector mosquitoes slower or entirely blocked. Humans have an

elaborate specific antibody system, but it is seldom effective against malaria parasites. In hyper-endemic malaria areas of the world, many older humans (more than 5 yrs. old) do usually develop some level of immunity (more like a tolerance) to malaria species circulating there. If those people are cured via medical treatments, or leave that area for a number of years, they may relapse when they later are exposed to the same malaria species. When that happens, their symptoms are usually very severe.

Since interruption of the normal development cycle of malaria parasites could be done at several points in the mosquitoes, one novel approach is to build a better mosquito. This could be attempted by changing the internal biology or physiology of a vector species via molecular techniques (genetic manipulations, like those mentioned above) and attempting to use gene drive to spread the desired gene(s) within the natural populations of the vector species of interest (For more reading see: https://www.bloomberg.com/news/articles/2016-06-16/gates-says-altered-mosquitoes-are-next-weapon-in-malaria-fight).

Time constraints caused Dr. O'Brochta to address this third case study only limitedly. He did remain for a while afterward to answer questions and talk to interested attendees.

Respectfully submitted, ***Harold Harlan***

2017 ADVANCED LANDSCAPE IPM PHC SHORT COURSE

Tue-Fri, 3-6, January 2017
Entomology Department, Plant Sciences Building, University of Maryland, College Park, MD

The annual Advanced Landscape IPM PHC Short Course is a recertification short course for arborists, landscape supervisors, IPM monitors, advanced gardeners, and others responsible for urban plant management. While registration for laboratory sessions is now full, there is a waitlist, and participants can register separately for the lecture sessions.

To find additional information and register, visit http://landscapeipmphc.weebly.com/

28TH USDA INTERAGENCY RESEARCH FORUM ON INVASIVE SPECIES

Tue-Fri, 10-13, January 2017
Loews Annapolis Hotel, 126 West Street, Annapolis, MD

General Session topics include:

- *Phytopthoras* in forests and natural ecosystems
- Update on the response to Spotted Lanternfly in Pennsylvania and supporting research
- NORTHEAST BIOCONTROL REGIONAL PROJECT (NE-1332): Honoring 27 years of leadership by Dick Reardon in research and implementation of biological control of forest pests

Other Presentations:

- Globalization and live plant trade
- Policy recommendations for importing woody plants
- Multi-lure trapping program to detect exotic Cerambycids at ports of entry in France
- Advantages to broadly targeted exotic species surveys
- APHIS EAB national program update
- Area wide pest management programs against the EAB: recent progress and challenges
- Update of EPPO activities in forest quarantine
- Why is the gypsy moth the world's most prolific forest defoliator?

Poster displays on invasive species and related topics are always welcome. Please contact Vince D'Amico (vincedamico@gmail.com) regarding guidelines and space availability.

A limited number of openings are available on the program for research presentations. Please contact Michael McManus at mmcmanus0121@comcast.net as soon as possible if you are interested in giving a presentation.

Additional information can be found at: http://www.nrs.fs.fed.us/disturbance/invasive_species/interagency_forum/

INTERSTATE PEST MANAGEMENT CONFERENCE

Wed-Thu, 25-26, January 2017
Maritime Institute of Technology - Training and Conference Center, 692 Maritime Boulevard, Linthicum, MD

The University of Maryland Department of Entomology and Maryland Extension Service present the 36th Annual Interstate Pest Management Conference. The Conference attracts hundreds of professionals in urban and structural pest management each year for comprehensive training by leading experts from industry, government, and academia.

Additional Information can be found at: http://ipmc.umd.edu/

Central Maryland Beekeepers Association
Supporting and promoting beekeepers and the viability of honeybees in central Maryland

MEMBERS MEETINGS

Tue, 3 January 2016; 7:00 p.m.
Dr. Eglute Trinkauskaite gives us a fascinating look at honeybees through the folk/spiritual lens. She has researched folklore related to traditional Lithuanian beliefs and will relate to us the importance of *Apis mellifera* in that culture.

Tue, 7 February 2017; 7:00 p.m.
Dr. Lewis Ziska from the USDA Agricultural Research Service will speak to us about an interesting effect of rising atmospheric carbon dioxide levels on plant pollen.

Members meetings are held at the Oregon Ridge Nature Center, 13555 Beaver Dam Road, Cockeysville, MD. Additional information can be found at: http://www.centralmarylandbees.org/meetings-3/membership-meeting-schedule/

ENTOMOLOGICAL SOCIETY OF WASHINGTON PUBLIC MEETING

Thu, 5 January 2017; 7:00 p.m.
Topic: TBA
Speaker: TBA
National Museum of Natural History, Smithsonian Institution, Washington, DC
http://entsocwash.org/.

ESA 2017 EASTERN BRANCH ANNUAL MEETING

Fri-Tue, 17-21, March 2017
Newport Marriott, Newport, RI

The 88th Annual Meeting of the Eastern Branch of the Entomological Society of America "Challenges in a Changing World" will be held in Rhode Island.
The Program Chair is now accepting submissions for papers and posters. The deadline to submit is **Saturday, December 31, 2016**.
The early-bird registration deadline is **Friday, January 20, 2017**.

Additional Information can be found at:
http://www.entsoc.org/eastern/2017-eastern-branch-annual-meeting

2016/2017 PROPOSED MES EVENT SCHEDULE

Regular MES lecture/meetings are held at the University of Maryland Baltimore County (UMBC) on the 3rd Friday of each of 6 months coinciding with UMBC's academic year. Proposed events for the upcoming MES membership year are:

Date	Speaker	Topic
Sep 18	Crab Feast/Meet-&-Greet	at J. KING'S Restaurant
Oct 21	Seán Brady	Entomological Collections: New Uses
Nov 18	David O'Brochta	Genetic Technologies
Feb 17	Hanna Kahl	Effects of Living Mulch on Arthropods
Mar 17	Daniel Perez-Gelabert	Orthoptera
Apr 21	Loyola Univ. Students	TBD
May 19	Members' & Students' Presentations & Elections	
TBD	Survey/Field Trip	

OCT 2016-SEP 2017 MES MEMBERSHIP YEAR OFFICERS

President	Frederick Paras
Vice President	Philip J. Kean
Secretary	(vacant)
Treasurer	Edgar A. Cohen, Jr.
Historian	(vacant)
Faculty Sponsors	Frank E. Hanson & Austin P. Platt
Journal Editor	Eugene J. Scarpulla
E-newsletter Editors	Aditi Dubey & Hanna Kahl

SUBMITTAL DEADLINES

SEP 2016 issue of the ***Phaëton***:
Please send member news items by 6 January, 2017.
Send e-newsletter drafts to Aditi at aditid26@gmail.com and/or Hanna at hkahl@umd.edu.

SEP 2017 issue of ***The Maryland Entomologist***:
Please send first drafts of articles and notes by 1 April, 2017.
Send journal drafts to Gene at ejscarp@comcast.net.

THE DEATHWATCH BEETLE

By Linda Pastan

1.
A cardinal hurls itself
at my window all morning long,
trying so hard to penetrate
its own reflection
I almost let it in myself,
though once I saw
another red bird, crazed
by the walls of a room,
spatter its feathers
all over the house.

2.
My whole childhood is coming apart,
the last stitches
about to be ripped out
with your death,
and I will be left—ridiculous,
to write
condolence letters
to myself.

3.
The deathwatch beetle
earned its name
not from its ugliness
or our terror
of insects
but simply because of the sound
it makes, ticking.

4.
When your spirit
perfects itself,
will it escape
out of a nostril,
or through the spiral
passage of an ear?
Or is it even now battering
against your thin skull, wild
to get through, blood brother
to this crimson bird?