Phaëton

The Official Newsletter of the
Maryland Entomological Society

Volume 33, Number 2 **November 2012**

EDITOR: **Eugene J. Scarpulla** – ejscarp@comcast.net
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

Meeting Announcement

The **M**aryland **E**ntomological **S**ociety's **289th** regular meeting will be held **Friday, 16 November 2012**, at **8:00 p.m.**, in **Room 004** (one floor below the street level), **Biological Sciences Building**, University of Maryland Baltimore County (UMBC). Bring a friend and specimens, observations, and books to share. Refreshments will be provided. Presentations are scheduled to begin at 8:15 p.m.

Speaker: **Stephen D. Allgeier, Faculty Extension Assistant, University of Maryland, College of Agriculture & Natural Resources, Home Horticulture & Master Gardener Coordinator (Carroll County), Westminster, MD**

Title: **The Brown Marmorated Stink Bug: 3+ Years and Other New Invasive Pests**

Steve will be discussing the impacts of new invasive pests on Mid-Atlantic producers and homeowners and also discuss recent trials and the efficacy of control options. Besides the **Brown Marmorated Stink Bug**, *Halyomorpha halys* (Stål) (Hemiptera: Pentatomidae), Steve will also discuss the **Emerald Ash Borer**, *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae); the **Japanese Cedar Longhorned Beetle**, *Callidiellum rufipenne* (Motschulsky) (Coleoptera: Cerambycidae), the **Spotted Wing Drosophila**, *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae); and the **Lone Star Tick**, *Amblyomma americanum* (Linnaeus) (Acari: Ixodidae).

Steve lives in Westminster and graduated from Western Maryland College (now McDaniel College) in the early 1980s. He has been the Master Gardener Coordinator and Horticultural Consultant for the University of Maryland Extension, Carroll County since the spring of 1999. As Master Gardener Coordinator he oversees the training of the Master Gardener volunteers and helps to coordinate their outreach within the Carroll County Community. His job description is "to educate Carroll residents about safe, effective and sustainable horticultural practices that build healthy gardens, landscapes, and communities." In the role of Horticultural Consultant he helps residents with Home and Garden questions, however he also serves as a catch all, answering questions such as "What kind of snake is this?" to "My child ate these berries. Are they poisonous?" Steve is a Licensed Arborist and a Professional Horticulturalist.

Meet for Dinner before the Lecture

If you are interested in meeting for dinner before the lecture, you are invited to join the guest speaker and your fellow MES members at **Kibby's Restaurant and Lounge**, "Home of Baltimore's Best Shrimp Salad Sandwich." Kibby's is located inside the Baltimore Beltway at 3450 Wilkins Avenue, Baltimore, MD 21229, just 15 minutes from UMBC. Meet at the restaurant **promptly at 6:00 p.m.**

For more information concerning the meeting, please contact one of the following people:

Annapolis Area:	**Harold Harlan**	(410) 923-0173 (Home)	haroldharlan@comcast.net
Baltimore Area:	**Fred Paras**	(410) 374-0425 (Home)	bugandrockman@msn.com
	Phil Kean	(410) 944-4630 (Home)	
	Frank Hanson	(410) 455-2265 (Biological Sciences, UMBC)	hanson@umbc.edu
Bowie Area:	**Gene Scarpulla**	(301) 464-3170 (Home)	ejscarp@comcast.net
Southern MD:	**Bob Platt**	(410) 586-8750 (Home)	platt@umbc.edu

19 OCTOBER 2012 MES MEETING MINUTES

The 288th general meeting of the Maryland Entomological Society was held on Friday, 19 October 2012 at UMBC and began at 8:32 p.m. with a welcome by President **Fred Paras**. Many students from Fred's microbiology class at Baltimore City Community College were present to hear the evening's speaker. The meeting launched immediately into the main program with an introduction of, and then a presentation by, our guest speaker Dr. **Leo J. Kenefic**. His talk is summarized below. The program was followed by discussion and refreshments, and then an MES business meeting was convened. Minutes from the May 2012 meeting were read and approved, and MES Treasurer **Ed Cohen**'s report was given, citing an MES funds total of $2011.88 after slight postage expenses were deducted and new dues were received. Many thanks were expressed to Publications Editor **Gene Scarpulla** for producing another fine issue, Volume 5, Number 4, of the Society's journal in September 2012. Members were reminded to send donations to the Natural History Society of Maryland (NHSM) to save and preserve the sizable and benchmark-status collection of moths assembled over a lifetime by MES Charter Member and Historian **Bob Bryant**. (Donation details can be found in the October 2012 issue of *Phaëton*.) Many original Maryland moth records are contained in the collection's holdings. Under pertinent published material, **Ed Cohen** mentioned the article "On the future of Lepidopteran systematics and estate planning," appearing in the Fall 2012 issue of *News of the Lepidopterists' Society*. It features, among others, MES Charter Members Dr. **Douglas C. Ferguson** and Dr. **Ronald W. Hodges**. MES Faculty Sponsor **Bob Platt** mentioned a recent 53-page draft report by MES member **Jennifer Frye** of the Maryland Department of Natural Resources, Wildlife and Heritage Service which presents a management plan for captive rearing and restoration of the Baltimore Checkerspot, *Euphydryas phaeton* (Drury) (Lepidoptera: Nymphalidae), in Maryland. **Gene Scarpulla** (via MES member **Sam Droege**) displayed four boxes of moths that were donated to MES by Dr. W. Nelson Beyer, Zoologist at the Patuxent Wildlife Research Center. The moths were collected by Dr. Beyer over several years. MES Secretary **Dick Smith** displayed one of two 2-ft by 3-ft frames of mounted Vietnamese butterflies donated to MES by Carroll County Bird Club member Maureen Harvey. MES officers recommended the contribution of the Beyer moth collection and the Vietnamese butterfly displays to the NHSM for their collections facility in Overlea, Maryland. Finally, MES Vice President **Phil Kean** offered drawers of rare United States and tropical Lepidoptera for display at the meeting.

Respectfully submitted, ***Richard H. Smith****, MES Secretary*

19 OCTOBER 2012 MES LECTURE

"Malaria Control: vectors, drugs, and vaccines" – Leo J. Kenefic, Ph.D., Postdoctoral Fellow, University of Maryland School of Medicine, Center for Vaccine Development, Malaria Group, Baltimore, MD

Dr. **Leo J. Kenefic** opened his talk with a short history of the occurrence of, research regarding, and attempts to control malaria worldwide. The symptoms of malaria were described in ancient Chinese medical writings. In 2700 BC, several characteristic symptoms of what would later be named malaria were described in the *Nei Ching*, (*The Yellow Emperor's Classic of Internal Medicine*). In China, during the 2nd Century BCE (before common era), the Qinghao plant, *Artemisia annua* L. (Asteraceae), was described in the medical treatise, *52 Remedies*, found in the Mawangdui Tomb. In the United States, this plant is known as the annual or sweet wormwood. The active ingredient of Qinghao was isolated by Chinese scientists in 1971. Known as artemisinin, it is today a very potent and effective malaria medication, especially in combination with other medicines. Quinine, from the bark of the cinchona tree, *Cinchona* spp. L. (Rubiaceae), and long-used by the Quechua Indians of Peru for fever, was brought from Peru to Europe in the late 1500s by Jesuit missionaries to fight malaria. In 1898, the Scottish physician Sir Ronald Ross isolated malaria parasites from the salivary glands of mosquitoes that had fed on infected birds. He proved that mosquitoes were the vector for malaria in humans by using Koch's Postulates (these can establish the microbial source of a disease) to show that certain mosquito species transmit malaria from bird to bird. Ross received the 1902 Nobel Prize in Physiology or Medicine for his work. In 1880, the French physician Charles Laveran, working in the military hospital of Constantine, Algeria, observed pigmented microscopic parasites inside the red blood cells of people suffering from malaria and proposed correctly that malaria was caused by this protozoan, for which he received the Nobel Prize in Physiology or Medicine in 1907. In 1898, a team of Italian investigators, led by Giovanni Grassi, discovered the transmission of malaria by the *Plasmodium* protozoan by using mosquitoes infected by feeding on a patient in Rome and then producing malaria in volunteers subjected to these same mosquitoes in London.

In the present, malaria is still a pervasive cause of death, especially in children under age 5, in South America, Central Africa, and Southeast Asia. There are nearly one million deaths and over 200 million cases of malaria reported worldwide each year.

Dr. Kenefic next briefly discussed the life cycle of *Plasmodium falciparum* (Welch), the primary protozoan causative agent in malaria. This parasite has three major life cycles: 1) the sporogonic cycle while in the mosquito vector, 2) the exo-erythrocytic cycle in the human liver, and 3) the erythrocytic cycle in which they circulate in the human blood stream and infect red blood cells. The pathogen is in the form of merozoites which maintain a haploid chromosomal composition during the exo-erythrocytic cycle. These forms develop into sexually mature gametocytes in the erythrocytic cycle. These are ingested by mosquitoes during a blood meal and fuse in the mosquito's hemolymph to become diploid sporozoites and thus strengthened by the genetic diversity of the parent forms. The sporozoites are injected back into humans during a subsequent blood meal, and these move to the human liver and produce

merozoites, thus re-initiating the life cycle. Human malaria infection will appear over a course of 8 to 25 days with the development of fever, vomiting, extreme feelings of hot and cold, and retinal damage. The infection may develop to severe malaria characterized by spleen and liver enlargement, hypoglycemia, anemia, and renal failure. Cerebral malaria is possible and is characterized by unusual posture, uneven gaze, seizures, and coma.

In American history, malaria infection became especially critical during the construction of the Panama Canal from 1905 to 1910. In 1906, of the 26,000 Canal workers, over 21,000 were hospitalized for malaria at some time during their work. By 1912, the number of hospitalized workers had decreased to approximately 5,600 through programs of swamp drainage and malaria treatment. From 1914 to 1942, the United States Public Health Service established malaria control activities around military bases in the malaria-prone regions of the southern United States to allow soldiers to train year round. Although discovered by German Hans Andersag in 1934 and called resochin, chloroquine was finally recognized and established as an effective and safe antimalarial treatment in 1946 by British and United States scientists. For vector control measures, DDT was first synthesized in 1874, but its insecticidal property was not discovered until 1939 by Paul Müller in Switzerland. It was used for malaria control at the end of World War II after it had proven effective against malaria-carrying mosquitoes by British, Italian, and American scientists. Müller won the Nobel Prize in Physiology or Medicine in 1948 for his discovery. The National Malaria Eradication Program, a cooperative undertaking by state and local health agencies of 13 Southeastern states and the Communicable Disease Center (currently Centers for Disease Control), began in 1947 by promoting drainage of swamps and use of insecticides. By 1951 as a result of this program, malaria was considered eliminated from the United States. In Italy at the end of 19th Century, malaria cases amounted to 2 million with 15,000-20,000 deaths per year among an Italian population of 30 million people. At the end of World War II a massive malaria control program based on DDT spraying was carried out in Italy and led to its elimination there by 1950. In 1955, the World Health Organization began a worldwide malaria eradication program focused on house spraying with insecticides, drug treatment, and surveillance. Successes included malaria elimination in many nations with temperate climates and seasonal malaria transmission while other countries such as India and Sri Lanka had sharp reductions. However, the emergence of drug resistant malaria strains, widespread resistance to available insecticides, wars and massive population movements, difficulties in obtaining sustained funding from donor countries, and lack of community participation made the long-term maintenance of the effort untenable. Completion of the eradication campaign was eventually abandoned in 1978. Unfortunately, malaria has been on the increase in most tropical parts of the world since that time. *Anopheles* spp. Meigen mosquitoes (Diptera: Culicidae) are the chief vectors of malaria, and over 100 species in this genus have been identified as carriers. Present day vector controls consist of habitat reduction, insecticide spraying (including both larvicides and adulticides), insecticide-treated bed nets, and biocontrol. Rotational draining and refilling of marshlands to interrupt the mosquito's life cycle is found to be an effective breeding habitat reduction technique. Biocontrol techniques consist of introducing larva-feeding fish and aerial-insect-feeding bird populations to mosquito-infested areas and also spraying with the bacteria *Bacillus thuringiensis israelensis* Berliner (*Bti*). *Bti* strains possess plasmids which encode numerous toxins that attack a mosquito by forming lethal pores in its midgut. A novel biocontrol approach has also been proposed recently that uses maternally-inherited endosymbiotic *Wolbachia* spp. bacteria transinfected into *Anopheles* mosquitoes. *Wolbachia* is found to reduce the level of oocysts, in which malarial sporozoites form, in infected mosquitoes.

Various drugs are still administered that act against various stages of the malaria life cycle in the body. However, resistance of these drugs by the malaria parasite has been emerging since the late 1950s with resistance to chloroquine throughout East and West Africa, Southeast Asia, and South America. Currently, the World Health Organization (WHO) promotes artemisinin-based combination therapies (ACT) as the first-line treatment for malaria worldwide. Combinations are effective because the artemisinin component kills the majority of parasites at the start of the treatment, while the more slowly eliminated partner drugs clear the remaining parasites. The semi-synthetic artemisinin derivative artesunate is associated with a mortality rate that is approximately 30% lower than that of quinine and is now recommended by the WHO for treatment of all cases of severe malaria. Recently and unfortunately, there have been signs that the efficacy of ACT and artesunate monotherapy have declined in the Cambodia-Thailand border region. To plan containment strategies, WHO and the National Malaria Control Programs of these countries established a multipartite task force. Studies conducted as part of this task force between June 2007 and May 2008 showed parasite clearance times of 84 hours after drug treatment, compared to 32 hours in other world areas. Such developments have accentuated the need for identifying genetic markers in *P. falciparum* that are associated with the emerging resistance. The conventional candidate gene approach for such research focuses on associations between genetic variation within pre-specified genes of interest and phenotypes or disease states. This approach is limited by its reliance on prior knowledge about biological, physiological, or functional disease relevance, which is a detriment when new clinical phenotypes rapidly emerge. However, more recently developed molecular tools are allowing insight into disease mechanisms and pinpointing potential regions of interest in the entire pathogen genome. These are the so-called genome-wide association studies (GWAS) and quantitative trait locus (QTL) techniques which can detect a new genomic region of interest that is in or near a potential candidate gene. New microarray data analysis techniques allow researchers to examine differential gene expression between cases and controls, and can help pinpoint new potential genes of interest. In addition, the availability of

genetic information through online databases enables researchers to mine existing data and web-based resources for new candidate gene targets. The GWAS is challenged by the fact that the *P. falciparum* genome consists of 14 chromosomes and around 23 million base pairs and the pathogen exhibits a high rate of polymorphism in each geographic region. Recent studies have associated *P. falciparum* drug resistance to specific gene point mutations. Single nucleotide polymorphism (SNP) chip genotyping arrays, which measure only a subset of gene variants, act as proxies for other markers and make use of genetic marker correlations (a process known as "tagging") to simplify the GWAS. These techniques are being applied to *P. falciparum* in the low parasite clearance regions. Parasites collected during these trials were genotyped at approximately 8,000 SNPs using a *P. falciparum*-specific molecular inversion probe. Each SNP was scored using three extended haplotype homozygosity measures. A comprehensive list of gene loci based on the combined rank score revealed a number of novel regions possibly under recent positive selection for low parasite clearance. Young (and long) low-frequency haplotypes are associated with this positive selection. Advances have also occurred recently in malaria vaccines. Subunit vaccines, produced from specific protein subunits of a virus and addressing a limited number of malarial haplotypes have been developed. They also have less risk of adverse reactions than whole virus vaccines. One such vaccine is produced from the saliva of malaria-infected irradiated mosquitoes. Another vaccine, known as RTS,S, was engineered using genes from the outer protein of *P. falciparum* and a portion of a hepatitis B virus (HBV). Although having only 50% efficacy against malaria, such vaccines do significantly reduce malarial death rates among children. Several vaccine challenge studies, which incorporate human volunteers, are utilized to study subunit vaccines. Laboratory mice are also utilized to study vaccine efficacy. The need for laboratory breeding of infected mosquitoes has been reduced by directly injecting sporozoites into the livers of immunized and non-immunized laboratory mice.

Respectfully submitted, ***Richard H. Smith****, MES Secretary*

DON'T FORGET TO RENEW
IT'S MEMBERSHIP RENEWAL TIME
OCT 2012 – SEP 2013 MEMBERSHIP YEAR

Membership renewal forms were inserted in the front of the September 2012 issue of *The Maryland Entomologist* that was mailed out last month. If the date on your address label reads 2012, it is time for you to renew for the "October 2012 – September 2013" membership year. Please check that your contact information is correct and return the form along with your dues to: **Edgar A. Cohen, Jr.** (MES Treasurer), 5454 Marsh Hawk Way, Columbia, MD 21045. If you have misplaced your membership renewal form, you can find a generic copy that is a separate attachment accompanying this newsletter.

WELCOME TO NEW MEMBERS

MES welcomes the following new members to the Society:

Leo J. Kenefic	**Baltimore, MD**
Beth B. Norden	**Lake Placid, FL**
Matthew D. Tillett	**Cumberland, 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*.

Frank D. Fee
Jennifer A. Frye
Stuart M. Fullerton
Jason P.W. Hall
William J. Hubick
George M. Jett
Janet A. Lydon
Arnold W. Norden
Beth B. Norden
Floyd W. Shockley
M. Alma Solis
Timothy W. Thompson
James D. Young

HAROLD J. HARLAN RECEIVES 2012 LEADERSHIP AWARD FROM *PEST CONTROL TECHNOLOGY* MAGAZINE

MES member **Harold J. Harlan** (Civilian Entomologist, Senior Scientific Associate at the Armed Forces Pest Management Board) is the recipient of a 2012 Leadership Award in the October 2012 issue of *Pest Control Technology* magazine. The magazine article traces Harold's life from a small child growing up on the farm in Ohio to his current career in the Maryland/DC area. The full article recounting Harold's fascinating life can be accessed at: http://www.pctonline.com/pct1012-leadership-awards-harold-harlan.aspx.

AVAILABLE MID-DECEMBER 2012
THE CICADAS (HEMIPTERA: CICADOIDEA: CICADIDAE) OF NORTH AMERICA NORTH OF MEXICO

The Cicadas (Hemiptera: Cicadoidea: Cicadidae) of North America North of Mexico by Allen F. Sanborn and Maxine S. Heath is expected to be available from the Entomological Society of America (ESA) in mid-December 2012. This monograph is a comprehensive review of the cicada fauna (170 species and 21 subspecies) of continental North America north of Mexico. The publication provides information on synonymies, type localities, and type material, and contains 211 figures with each species color photographed. It will sell for $79.95 (ESA members) and $99.95 (nonmembers). This new monograph in the "Thomas Say Publications in Entomology" series is not yet listed on the ESA website, but is expected to be listed around mid-December and will be found at http://entsoc.org/pubs/books/thomas_say/ThomasSays.