



Skeeter Scanner

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President's Message

It is with great pride that I get the opportunity to again serve MMCA. I've watched our organization grow from its humble beginnings in 1986 and I'm now sometimes amazed at all the programs MMCA is involved in during the year. Of course none of this would be possible if not for our members who are willing to help MMCA achieve its goals, and for that many thanks are due.



I think in general, most of us got into mosquito control by chance but in only a few years it becomes a part of your life and truly a great career! In the past 34 years I've seen a lot of changes in our industry but recently regulatory issues have come to the forefront with NPDES, Water Treatment Additive Permits, and mosquito control on National Refuges just to name a few. Thus whether we like it or not it is becoming increasingly important to develop relationships with our federal and state elected officials and staff. It is only through these relationships can we react to future threats and educate them about the benefits of mosquito control.

I've had the privilege to attend the American Mosquito Control Association's (AMCA) Washington Day numerous times and have found that the contacts made during these meetings were very valuable the past few years. I realize that a trip to Washington is not feasible for many, so this year I'd like to spearhead an effort to contact our federal legislators at their district offices in Michigan. I will have the same resource materials that AMCA uses but by going to local district offices it will allow more MMCA members the opportunity to participate. I will be scheduling appointments in May to coincide with AMCA's Washington Day. Once appointments are made they will be posted on MMCA's website and if you are interested in attending please let me know as you are more than welcome to participate. Items to be discussed will be the following:

- ▶ Funding for the National Disease Surveillance Network through Epidemiology and Laboratory Capacity (ELC) Grants from the Centers for Disease Control
- ▶ Clean Water Act NPDES Permit impacts on Mosquito Control Programs
- ▶ Endangered Species Act Considerations and Mosquito Control
- ▶ Failure to Appropriate FQPA-Authorized Funding Threatens Availability of Public Health pesticides
- ▶ Mosquito Control on National Wildlife Refuges and Federal Lands

I know that we are all busy at this time of year but trust me when I say that making these contacts now will truly benefit mosquito control in the future.

Randall G. Wopper

Examining New Ways to Control Disease-Carrying Insects

Purdue researchers are discovering the next generation of insecticides directed at disease-carrying insects like mosquitoes, ticks and tsetse flies, which could help professionals in the human health, veterinary and crop production sectors.

Catherine A. Hill, associate professor of entomology in the College of Agriculture, and Val J. Watts, professor of medicinal chemistry and molecular pharmacology in the College of Pharmacy, say vector insects - which carry and transmit infectious pathogens or parasites to other living organisms - are developing resistance to insecticides sprayed in the air or embedded in bed nets. The increased resistance makes insecticides less effective.

"The development of insecticide resistance threatens our ability to control insects that transmit diseases, like malaria and Lyme disease or parasites like heartworm, to human and animal populations in both developed and under-developed nations," Hill said. "The transmission of diseases becomes more widespread, which reduces quality of life, impacts mortality and puts enormous pressure on health-care professionals."

Hill's background in vector insect biology and Watts' specialization in molecular pharmacology led them to create an approach that focuses on specific insect genomes, or hereditary information encoded in insect DNA.

"The genome of most of these vector insects already is mapped out, and each is unique. We have used genomic approaches to identify key receptors, or molecules, found on a cell's surface, on these insects' central nervous systems," Watts said.

They began with receptors that are involved with feeding. When larvae of the *Aedes aegypti* mosquito mature, they carry and transmit infectious pathogens or parasites to other living organisms. Purdue researchers have developed a method to discover the next generation of insecticides based on specific insect genomes, or hereditary information encoded in DNA.

"Targeting these receptors leads either to killing the insect or stopping it from feeding, which is how pathogens and parasites are spread," Hill said.

Because the approach focuses on vector insects' DNA, insecticides created through this method may be safer for humans and non-targeted organisms like companion pets and non-vector insects like honey bees. They also may have less impact on the environment than other insecticides.

Hill's and Watts' research teams are revisiting drugs previously approved by the U.S. Food and Drug Administration to look for insecticidal effects. Their paper, "A 'Genome-to-Lead' Approach for Insecticide Discovery: Pharmacological Characterization and Screening of *Aedes aegypti* D1-like Dopamine Receptors," which appears in the peer-reviewed PLoS Neglected Tropical Diseases journal, identifies a commonly used antidepressant as a larvicide.

"Amitriptyline has been prescribed for more than 50 years, and we know human physiology handles it very well: physicians, pharmacists and nurses interact with it without personal protective equipment," Watts said. "But it kills larvae of the mosquito that spreads yellow fever and dengue fever in the tropical and subtropical regions of the world. There may be other FDA-approved drugs we didn't realize can also be insecticides."

The next steps to develop the genome-centric method are to explore other drugs through an *in vivo* assay to discover insecticidal or larvicidal properties and identify novel chemicals that affect the targeted receptor of disease-carrying insects. Hill and Watts also are looking to develop private-public partnerships to determine the most effective methods to deliver these insecticides.

UCR Studies Birth Control for Mosquitoes

A research team at the University of California, Riverside, has received a five-year \$2.8 million grant from the National Institutes of Health to study the molecular basis of hormonal regulation of mosquito reproduction.

Female mosquitoes require energy for their egg development, which they acquire from vertebrate blood. But by sucking on blood, they become vectors of numerous disease pathogens of human and domestic animals. If the mechanisms that govern their egg production are better understood, novel approaches to controlling the reproduction and population of mosquitoes can be devised.

Now a research team led by Alexander Raikhel, a distinguished professor of entomology at the University of California, Riverside, has received a five-year \$2.8 million grant from the National Institutes of Health to study the molecular basis of hormonal regulation of mosquito reproduction.

The researchers will focus on deciphering the genes involved in mediating the action of hormones involved during egg production in mosquitoes — specifically, *Aedes aegypti*, the mosquito that spreads dengue and yellow fever.

“What we are setting out to do is introduce birth control, based on hormones, in mosquitoes,” said Raikhel, an expert in the molecular biology of mosquitoes and a member of the National Academy of Sciences. “Our task is to find a way to interrupt the host-seeking behavior of mosquitoes by manipulating their hormones and thus interrupting their egg development. With egg development halted, the population of mosquitoes would eventually collapse.”

Nearly 2.5 billion people are at risk for contracting dengue fever. Each year, there are 100 million cases of dengue in the world. Yellow fever results in 30,000 deaths per year; about 200,000 cases are reported each year.

Raikhel explained that a hormone unique to insects, called the “juvenile hormone,” plays a key role in transforming a young female adult to a mature one that is capable of blood feeding, egg development, and thus spreading pathogens. The absence of this hormone in the body of the female mosquito impedes the growth of the mosquito to the adult stage. For the mosquito to reach the adult stage, levels of this hormone must first rise and then drop. “This hormone is crucial for egg development,” Raikhel said. “If we can figure out how its levels can be manipulated so that egg development is

prevented, we can reduce the number of mosquitoes.”

Each mosquito cell has a receptor for the juvenile hormone. The exact nature of this receptor, however, has eluded researchers for many years. “In this project, we plan also to understand the structure and function of this receptor,” Raikhel said. “One reason this receptor has been very difficult to study is that, unlike other receptors like it, it does not lie on the surface of the cell. Instead it lies inside the cell.”

Raikhel’s lab will attempt to block the action of the juvenile hormone’s receptors. “Several levels of interception can be designed in the lab so that no egg development in mosquitoes results,” he said.

While his lab will focus in this project on only *Aedes aegypti*, the methods developed can be applied also to other disease-spreading mosquitoes. Raikhel is recognized internationally for his significant contributions to insect science and vector biology. A leader in insect and mosquito reproduction and immunity, he is the author or coauthor of more than 160 research papers in international peer-reviewed scientific journals and books.



“Are you allergic to anything? I mean, aside from whatever it was that bit you?”

EPA Denies Petition on 2,4-D Pesticide

In a petition filed on November 6, 2008, the Natural Resources Defense Council (NRDC) requested that EPA cancel all product registrations and revoke all tolerances (legal residue limits in food) for the pesticide 2,4-dichlorophenoxyacetic acid, or 2,4-D.

After considering public comment received on the petition and all the available studies, EPA is denying the request to revoke all tolerances and the request to cancel all registrations.

By way of background, in 2005, as part of the regulatory process to ensure pesticides meet current regulatory standards, EPA completed a review on the registration and on the safety of the tolerances for 2,4-D. EPA determined that all products containing 2,4-D are eligible for reregistration, provided certain changes were incorporated into the labels and additional data were generated and submitted to the EPA for review.

During the recent review of the petition from NRDC to revoke the tolerances, EPA evaluated all the data cited by NRDC and new studies submitted to EPA in response to the reregistration decision.

Included in the new studies is a state-of-the-science extended one-generation reproduction study. That study provides an in-depth examination of 2,4-D's potential for endocrine disruptor, neurotoxic, and immunotoxic effects. This study and EPA's comprehensive review confirmed EPA's previous finding that the 2,4-D tolerances are safe.

EPA also carefully reviewed NRDC's request that the Agency cancel all 2,4-D product registrations. Based on studies addressing endocrine effects on wildlife species and the adequacy of personal protective equipment for workers, the Agency concluded that the science behind our current ecological and worker risk assessments for 2,4-D is sound and there is no basis to change the registrations.

2,4-D is a phenoxy herbicide and plant growth regulator that has been used in the U.S. since the 1940s. It is currently found in approximately 600 products registered for agricultural, residential, industrial, and aquatic uses. There are 85 tolerances for 2,4-D. EPA published the NRDC petition for public comment on December 24, 2008.

Below are EPA documents responding to NRDC's petition on 2,4-D including a pre-publication copy of the agency's Federal Register Order. These documents are also available on EPA's website at www.epa.gov/pesticides. When the Federal

Register document is published in mid-April, it will be available with the related documents in docket EPA-HQ-OPP-2008-0877 at www.regulations.gov. A 60-day period for filing objections and requests for a hearing on the order runs from the date of publication in the Federal Register.

Note – We are happy to see that scientific research and data are being taken into consideration in the registration and re-registration process.

A Virus May Make Mosquitoes Even Thirstier for Human Blood

The dengue virus may actually make mosquitoes thirstier for human blood, new research has found. In a study published last week in PLoS Pathogens, (<http://www.plospathogens.org/article/info%3Adoi%2F10.1371%2Fjournal.ppat.1002631>) mosquito experts at the Johns Hopkins Bloomberg School of Public Health found that the dengue virus altered the production of proteins made by 147 different genes. Some changes appeared to make the antennae more sensitive to odors — making them better at hunting humans, the virus's only known mammalian host. Other changes in salivary gland genes appeared to make it easier for the virus to get into a mosquito's saliva, ready for injection.

Those tests were done on a genome microarray — snippets of the DNA of *Aedes aegypti* mosquitoes coating a glass slide. But when the researchers tried to replicate the results in live mosquitoes, they could not prove they were hungrier.

“Since we can't infect humans for our experiments, we think it's a problem with the model,” said George Dimopoulos, lead author of the new study. In his laboratory model, mosquitoes had to drink infected blood from a balloon like membrane and then were offered mice to bite.

“Mosquitoes will feed on other animals if they get hungry, but it isn't their favorite dish,” Dr. Dimopoulos said.

Up to 100 million people are infected with dengue each year; it is known as “breakbone fever” for the joint pain it causes. Up to 15,000 die of it annually,

Michigan Mosquito Control Association 26th Annual Conference Troy, Michigan



H. Don Newson
Distinguished Service Award
Michael G. Kaufman, Ph.D.



Keynote Speaker, Harry M. Savage
Division of Vector-Borne Diseases
Centers for Disease Control and
Prevention



Student competition participants



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William J. Lechel, II Memorial Scholarship - Student Paper Competition Winner



"Insect Timing and Succession on Buried Carrion"

Emily Pastula, Michigan State University

Emily Pastula is currently a second year master's student in the department of entomology at Michigan State University, with her primary focus being forensic entomology. She is working with Drs. Richard Merritt, Michael Kaufman, and Todd Fenton. She is a member of the Entomological Society of America, North American Forensic Entomology Association, and the American Academy of Forensic Sciences.

Human Swallows Pill. Mosquito Bites Human. Mosquito Dies.

Scientists have proposed an intriguing new way to fight malaria: turning people into human time bombs for mosquitoes.

A cheap deworming pill used in Africa for 25 years against river blindness was recently shown to have a power that scientists had long suspected but never before demonstrated in the field: When mosquitoes bite people who have recently swallowed the drug — called ivermectin or Mectizan — they die.

The new study, published last week by *The American Journal of Tropical Medicine and Hygiene*, was carried out by scientists from Senegal and Colorado State University. They vacuumed mosquitoes from the walls of huts in three villages whose inhabitants had recently been given ivermectin and three whose had not, and tested to see how many mosquitoes contained malaria parasites. The ivermectin villages had almost 80 percent fewer.

The drug was shortening the mosquitoes' lives, explained the lead author, Brian D. Foy, a Colorado State mosquito expert. Only older insects transmit malaria, since they must get it from humans first.

Dr. Peter Hotez, president of the American Society of Tropical Medicine and Hygiene, was enthusiastic about the study, saying it showed that deworming drugs “could have a lot of collateral effects.”

Dr. Lee Hall of the National Institutes of Health, which helped finance the study, was more cautious, saying a clinical trial might be warranted once more is known about how long ivermectin kills. But a worm expert from the Carter Center in Atlanta was very skeptical.

At present, millions of free doses are given out to fight onchocerciasis, or river blindness, which is caused by tiny worms migrating into the eye.

“We hand it out once a year,” said the parasitologist, Dr. Frank O. Richards Jr. (Keynote Speaker 2011 MMCA Conference). “I’m pushing for twice a year, and people want to kill me. It’s

very difficult to imagine a once-a-month program anywhere.” It might be useful, he suggested, in areas with brief, intense malaria seasons.

Also, when people with lots of worms are treated, they suffer fever and intense itching as the worms die. Though that might be bearable once a year, it discourages people from seeking treatment more frequently. And ivermectin is dangerous for a few people — those infested with large numbers of a relatively rare West African worm, the loa loa. These worms circulate in the blood and lungs and may jam capillaries when they die, potentially causing coma or death. Detecting them means drawing blood and viewing it under a microscope. “It’s very difficult to say, ‘Let’s treat a million people’ — and then have to test each one for loa loa,” Dr. Richards said.

AMCA Free Webinar on using Twitter

Earlier this year the Mosquito and Vector Control Association of California (MVCAC) had great success with a Twitter campaign that resulted in increased media attention as well as responses from legislators. Their “story and tweet reached a vast audience, inspired decisive change and elevated the conversation to the level needed for legislative change, most occurring in a single day.” http://library.constantcontact.com/download/get/file/1102078751985-124/MVCAC_Newsletter_Spring.pdf

Based on the 2011 Membership Survey, only 8% of AMCA's members are using Twitter. The AMCA Board of Directors, after hearing the success of MVCAC, realized how important it is to educate the members of AMCA on the use of social media for education and public relations. As a result, AMCA will be offering a FREE webinar on how to use Twitter. This webinar will include the basics of getting started, how to follow the right people, examples of messages, and additional resources to help with Twitter execution and metrics. Basically, we will guide you on how to tweet, what to tweet, and who to tweet to. You will be increasing your arsenal of tools to protect public health.

The date and time for this free webinar will be announced very soon. The more people we can get to participate, the more people we can reach with our messages.



News From Around The Districts

Interviews for seasonal employment were completed in February and our annual training session was held on March 23rd-24th. Due to the continuing decline in tax revenue we have had to reduce our seasonal work force by two positions, this is in addition to the 8 positions that were eliminated last year.

SAGINAW

The 2012 mosquito season got off to a fast and furious start with the first collection of spring *Aedes* larvae on March 7th. This was followed with almost two weeks of 70-80 degree weather that provided ideal larval developing conditions. Things were so far advanced that we conducted our annual aerial larviciding program from March 23rd-29th and by this time we were already finding a few isolated pupae. To put this all into perspective, we normally find our first larvae on March 22nd and begin our aerial program on April 13th, thus the spring *Aedes* are three weeks ahead of schedule. Hopefully April will be cool which will slow down development and minimize adult biting activity towards the end of the month.

Our Education Coordinator has already scheduled 213 classroom presentations at 39 schools. This year's Mosquito Abatement Challenge is a short story contest with the theme being "Mosquitoes, what's the buzz all about?" All 3rd, 4th, and 5th grade students in Saginaw County are eligible to participate in the contest.

This summer we are going to have one of our adulticiding trucks apply a water-based ULV permethrin formulation. Costs are now comparable with oil-based formulations and there is good reason to believe that in the near future water-based products will be less expensive than oil-based products. By having a truck dedicated to a water-based formulation it will give us the opportunity to conduct caged mosquito tests; become familiar with droplet characterization; see how it affects our equipment; and learn about any other nuances in regards to using this type of formulation.

After the "winter that was not" mosquito development jumped out several weeks ahead of schedule. My calendar reminders keep telling me that it is time to get ready for the start of the aerial treatment program that was completed two weeks ago. It remains to be seen if we are going to have enough larvicide or adulticide to get through an extended control season. Maybe it will snow in August and everything will be taken care of?

MIDLAND

The only thing more exciting than the 80° temperatures this winter was the completion of Michigan's new NPDES Pesticide General Permit. Be sure to check out the final version of the permit on the MDEQ website to confirm that you are in compliance. Even if you are a small enough program/business that you don't need to apply for a Certificate of Coverage, you should be following the permit guidance which basically says to maintain your equipment in good working order and use integrated mosquito management (things MMCA has been suggesting that you do for 25 years now).

We are conducting field trials in Midland County this year of Kontrol Mosquito Larvicide, a new larvicide oil. Our first experiment demonstrated very good control of *Aedes canadensis* larvae in woodland pools. We will also be looking at control of *Aedes vexans* in summer habitat. We'll maybe have a report ready for the MMCA conference 2013 in Bay City. Please remember to document interesting experiences of this summer and to take photographs of mosquitoes, mosquito control, etc. so you have something to present at the conference as well.

Enjoy your summer.

On March 13, we found larvae. On March 28, we found pupae. We began contacting seasonal technicians, and had most of these ready to begin treatment on April 2.

Already, we were two to three weeks behind. The crews were forced to use mostly oil. As temperatures have subsequently reverted to normal (whatever that is), or below normal, we have been granted something of a reprieve. Dry conditions, at least for the time being, are also helping. We will be working overtime to “hit them while they’re in the water.”

Unfortunately, adult mosquito activity may arrive earlier, as well. We are calibrating the truck mounted ULV equipment, and notifying our residents that roadside spraying could commence sooner than usual. Are these weather patterns aberrant, or will we continue to see the need to start operations earlier and earlier? In either case, we need to be prepared to respond accordingly.

Weather is always front and center in a mosquito control district, and the big news here in mid-Michigan was the mild winter and record-breaking warmth that followed for most of the month of March. As any Michigander knows, March is typically the last really cold month and we’re lucky if we experience a few warm days that give us a taste of what’s to come. March, 2012, however, saw daily high temperatures that were 30 if not 40 degrees above normal for at least half of the month. As we were monitoring larvae in spring woodland pools, we watched them grow quickly, forcing an early spring treatment on March 25. In fact, this is the earliest in our 30+ year history that we have begun aerial treatment – it’s historically occurred in mid-April.

Since announcing that applications were being accepted for seasonal employment, we have collected quite a few. We won’t begin interviewing to fill seasonal technician jobs for the 2012 season until at least the first week of April. That’s because, again, our aerial treatment occurred earlier than anticipated and we were too busy in March. While we have received over 100 applications, about two-thirds of employees from last season are returning. This has been the trend for the past several years. The current economy keeps experienced staff returning to us!

In January we applied for a Michigan DEQ Scrap Tire Cleanup Grant. February had us attending the MMCA 26th annual conference in Troy, MI. The 2012 Program Plan was compiled in February, followed by hosting the Mid-Michigan Technical Advisory Committee meeting on March 7. The comprehensive community outreach program plan was submitted to MDA, and we received our Certificate of Coverage for the NPDES permit on March 23.

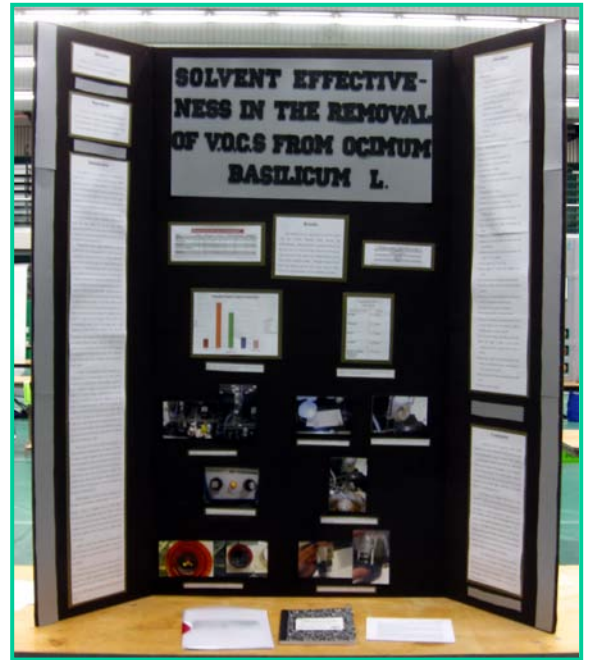
Control material bids were opened in January with prices seeing slight changes compared to 2011. The helicopter aerial contract has been renewed with Clarke for a one-year extension. We also just sent out a “Request for Proposals” for purchasing two new trucks this year.

Staff continues to update training materials, attend customer service presentations, watch AMCA webinars, revamp presentations that will soon be broadcast on our local Bay 3-TV, order supplies, continue with maintenance projects, and send announcements to media and government offices in preparation for the upcoming season. Office staff is busy sending and receiving no spray, medical, and long-driveway notices and working on contracts for the scrap tire drives.

Looking forward to a successful 2012 season!

Great Lakes Bay Region Science, Technology, and Engineering Fair

The Saginaw Science, Technology, and Engineering Fair was changed to a regional event and was moved to Delta College. Students from all Great Lakes Bay Region High Schools were invited to participate. The top 10 students represented the region at the Michigan Science and Engineering fair on March 31 at Kettering University. The top three students from Kettering will go on to compete at the Intel International Science and Engineering Fair May 13 to 18 in Pittsburgh. MMCA sponsored an award for use of the scientific method in researching and documenting their project involving studies in biology, entomology, zoology or other related fields. MMCA's award winner was Yeshkirat Kuhr.



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Spring