Alabama Vector Management Society

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Message From The AVMS President
Dr. GaryMullen

This has been a very active year for mosquitoes and mosquito-borne viruses in Alabama, due in no small part to a particularly warm early spring and above-average rainfall throughout the spring and early summer. Not only did mosquitoes get off to an early start, but also conditions have been ideal for their continuous development ever since. This has led to early amplification of both West Nile and Eastern Equine Encephalitis viruses among wild birds and record-setting early reports of both equine and human cases of WN and EEE cases in South Alabama. As of the end of July, at least 19 equine cases (15 EEE, 4 WN) have been confirmed in 10 counties, with one fatal human case attributed to EEE in Escambia County. A second, non-fatal human case of EEE has been reported in Baldwin County. West Nile-positive mosquitoes were detected at Auburn as early as June 20, more than a month earlier than in any previous year. All of this is to say that there is already a lot of virus activity in the State as we move into the major encephalitis season between now and early October.

The AVMS Board of Directors met on July 7 at the Alabama Power General Services Complex in Shelby County. Particular appreciation is expressed to our treasurer Jim Austin who provided a detailed financial report and comparative financial data on our income and expenditures during the past five years. This information will be invaluable to the board in making sound financial decisions and in developing future budgets. Another topic of discussion was the planning for our next annual meeting to be held at the Bryant Conference Center in Tuscaloosa, March 14-16, 2006. Leigh Salter, AVMS president-elect and program chair for the 2006 meeting, has done an great job in making arrangements for the meeting site and conference facilities. Invitations have already been extended to prospective speakers as the program itself begins to take shape.

Also noteworthy in recent weeks is the first detection of the mosquito *Ochlerotatus japonicus* in Alabama, collected by TVA personnel in Jackson County. A brief report of that discovery and an accompanying article on how to recognize the adult female can be found in this issue.

To keep our membership informed, everyone is encouraged to submit articles for future issues of the AVMS Newsletter. Any article of general interest to public-health personnel involving animal-related problems, arthropod pests of humans, and vector-borne diseases is welcomed. In addition, reports on operational programs and activities at the municipal level and in county health departments throughout the State are especially encouraged. Let us know what you are doing! Or if you have questions, or suggestions of topics that you would like to see addressed in future issues, let us know. All items should be forwarded to our newsletter editor, Jeff Beck, at admin@alabamavms.org .

Inside this issue:

Dates To Remember

- January 30-February 3, 2006 FMCA Dodd Short Courses Gainesville, Fla.
- Feb. 26-Mar. 2, 2006 AMCA 72nd Annual Meeting Detroit Michigan
- March 14-16, 2006 AVMS Annual Meeting Tuscaloosa, Alabama

FIRST REPORT OF *OCHLEROTATUS JAPONICUS* IN ALABAMA

The first documented occurrence of the mosquito *Ochlerotatus japonicus* in Alabama was reported in Jackson County by Kristy Gottfried, medical entomologist with the Tennessee Valley Authority, Muscle Shoals, AL. A single adult female was collected in a gravid trap on June 21, 2005, on Raccoon Creek near the Guntersville Reservoir.

This Asian mosquito was first detected in the United States in New York and New Jersey in 1998. Since that time it has spread to southern New England and southward to Georgia and Tennessee, and now into the extreme northeastern part of Alabama.

Ochlerotatus japonicus breeds in a wide range of natural and artificial containers, including water-filled tree holes and tires. The larvae closely resemble *Aedes atropalpus*, whereas the adults are more easily distinguished from other container-breeding species (see accompanying article on how to recognize *Oc. japonicus* adults). This mosquito does not generally attack humans and is not readily attracted to light traps. However it represents a potential vector of West Nile virus (WNV), based on experimental vector-competence studies conducted at the U.S. Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD. It may be a significant vector of WNV in the transmission cycle among wild birds.

"This mosquito does not generally attack humans and is not readily attracted to light traps. However it represents a potential vector of West Nile virus (WNV)….."

International Journal recognizes Auburn University Professor

Thirty plus years of significant contributions to the study of mite and ticks have earned Auburn entomologist Gary Mullen recognition from the International Journal of Acarology. The journal presented Mullen its Acarology Research Award during the publication's 30th anniversary celebration this summer in Columbus, Ohio. Presenters acknowledged

Mullen's research contributions relating to mites and ticks of medical and veterinary importance, including his work with ticks and Lyme disease in Alabama. In addition to his research program through the Alabama Agricultural Experiment Station, Mullen has taught acarology, or the study of mites and ticks, as part of the AU Department of Entomology's graduate level curriculum for the past 22 years. He is a charter member and past president of the Acarological Society of America and currently serves as a member of its executive committee. Along with Mullen, acarologists from Canada, Brazil, Egypt, India, Pakistan and Japan also merited research awards from the journal.

West Nile research springs a surprise UTMB scientists find mosquitoes infect each other, perhaps explaining its deadly spread

The discovery of West Nile virus in New York six years ago divided the scientists who study infectious diseases. Many believed the virus would spread slowly across America; others thought it wouldn't survive at all. Few predicted a wildfire-like march across the continent that culminated with cases in California just four years later, in 2003. Now, scientists at the University of Texas Medical Branch at Galveston may have discovered one reason why — their earlier understanding of how mosquitoes become infected was very likely flawed. Birds, which can have high levels of the virus in their blood, serve as its natural hosts. Certain kinds of mosquitoes, such as Culex, bite the birds and become infected. These mosquitoes, in turn, bite and infect humans. What the UTMB scientists have discovered — to their amazement — is that mosquitoes also can pass the virus to each other without an infected bird. "We certainly didn't expect this," said Stephen Higgs, an associate professor at UTMB and lead author on the research, to be published this week in the Proceedings of the National Academy of Sciences. This kind of transmission has never been seen in mosquitoes, although it has been observed in ticks for other viruses.

Tests on lab mouse

For their experiment, Higgs and his colleagues exposed a sedated, West Nile virus-free lab mouse to hungry, infected mosquitoes. Five minutes later the researchers exposed the same mouse to a separate group of uninfected mosquitoes, to allow for simultaneous feeding for an hour. After trying the experiment five times, the researchers found that between 2 to 6 percent of the uninfected mosquitoes became infected with the virus each time. During the last experiment, a single infected mosquito was allowed to bite a lab mouse, and the virus still was transmitted to other mosquitoes. This meant that the virus was being transmitted between the insects before it had a chance to enter the mouse's bloodstream. For the real world, the implication is that mosquitoes can pass the virus to each other through a host of different types of animals, from mice to horses, instantaneously. Normally, after a mosquito bites an uninfected bird, it takes three to five days for the virus to enter the bloodstream and multiply. Only at that point, scientists had believed, could the virus spread to other mosquitoes. Higgs and his colleagues cannot explain why the uninfected mosquitoes were acquiring the virus in their lab.

"Snap Shots from around the State"
Mobile County
By Matthew Smith
Entomologist MCHD Vector Control Program

It has been said that Mobile is one of the rainiest city in America. This summer has definitely proven that true. Several extended periods of intense rain in the spring, followed by two tropical storms and one hurricane have set the stage for heavy mosquito activity. This problem is exacerbated by the daily deluges that occur in at least part of the county and frequently the county in total. This has been of particular concern since trapping data has shown an increase in Aedes vexans mosquitoes which are thought to be bridge vectors for Eastern Equine Encephalitis. These increased populations can be attributed to the fact that several areas that were dry throughout last season have remained filled with flood water for months. Unfortunately, the rain is also becoming a problem in the fact that it hampers successful mosquito trapping thus affecting arboviral surveillance.

So far this year I am far behind my goal of testing mosquito pools. I had hoped to have tested over 250 pools of mosquitoes by August, but only managed 143 pools to date. Much trapping effort has been wasted due to weather. However, I do plan to trap aggressively in the coming weeks. The detection of Eastern Equine Encephalitis in the southwestern area of Mobile County has been alarming and warrants increased control efforts. Fortunately, no human cases of EEE have been detected.

The first detection of EEE was on June 12 when it was confirmed by a Veterinarian that a horse in Grand Bay had died as a result of EEE. The horse was not vaccinated. Next, on July 18 lab results confirmed that a chicken from our sentinel flock in Grand Bay had sera converted with EEE. During the first week of August a sentinel chicken sera converted with EEE in the south part of the City of Mobile. During the period between mid June and late July trapping was done in the Grand Bay area on 5 separate occasions. However, only 1 trap night was successful. Four nights of trapping were ruined by heavy downpours. Also, the one successful trap night collected few mosquitoes. None of the mosquitoes tested positive for any virus.

I prefer to perform as much urban trapping as possible since WNV tends to manifest more in urban areas. I also find the greatest numbers of Culex quinquefasciatus, the most common vector of WNV, in these urban settings. This is of course due to the fact that they readily breed in Mobile's sewers. Also there are large scale problems in some areas with containers holding water for long enough periods of time to stagnate and become suitable breeding sites for Culex mosquitoes. For this reason it is common to collect several hundred gravid Cx. quinquefasciatus per trap. Such high numbers allow 25 to 50 mosquitoes per pool to be tested, maximizing the overall number of mosquitoes tested with fewer pools tested. I estimate that so far this year approximately 4500 mosquitoes have been tested, the majority of which were Cx. quinquefasciatus. To date all mosquitoes have tested negative for EEE, WNV and SLE. Also, there have been no known human cases of any of these diseases so far in Mobile County. The only other arboviral activity detected so far in Mobile County has been a Blue Jay which tested positive for WNV on July 14. It should also be noted that the number of birds submitted for testing has decreased this year. Hopefully this is a sign of a less active season than Mobile County experienced last year. Aggressive arboviral surveillance and control activities are ongoing, and, we will continue to inform the public of noted activity and provide personal preventative techniques and public health education.

CODE OF ETHICS FOR MEMBERS OF THE ALABAMA VECTOR MANAGEMENT SOCIETY

Preamble: The purpose of the Alabama Vector Management Society is to promote the management of public health pests and arthropod vectors of disease, provide for the educational and scientific advancement of members, encourage scientific research in vector management and public health pests, promote an exchange of information among members, and to extend and develop public awareness and interest in the discipline.

Public health pest and vector management provides services that are extremely important to the health, welfare and progress of society. Those employed in the public health pest and vector management profession have the responsibility to render effective and professional service to humanity, in keeping with high standards of ethical conduct. Therefore, in striving to advance and maintain the honor and dignity of the profession, the Alabama Vector Management Society (AVMS) has established the following code to define the conduct and ethics due the profession. This code is binding on the membership of the AVMS.

- AVMS members will use their knowledge and skill for the betterment of human welfare.
- Members will, at all times, strive to maintain the public trust, and advance the standards and principles established by the AVMS.
- Members will cooperate in the exchange of information and technology for the growth and progress of the public health and vector management profession and the AVMS.
- Members will not cause dishonor to the Society through their actions while representing the AVMS.
- Members will comply with all laws and regulations that apply to our science and profession.
- Members will promote solidarity, harmony and support among members and fellow workers. They will not undermine, vilify, berate or otherwise intentionally injure the work, accomplishments, efforts or professional reputation of another.
- Members will not conduct or in any way participate in a fallacious review of the work of a fellow worker or other member.

Send us your interesting articles, comments or suggestions to:

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We are in the process of making the Newsletter available electronically and hope to speed delivery of the Newsletter and eventually reduce printing and mailing costs. Please let us know if you would like to receive the electronic version or not by sending us your e-mail. admin@alabamavms.org

The AVMS is grateful to have the support and sponsorship from industries. Below is a list of sustaining members.

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Valent Biosciences	Wellmark International
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State-wide Survey of Tire-breeding Mosquitoes in Alabama, 2004-2005

Whitney Qualls and Gary Mullen

Auburn University

Since the introduction of *Aedes albopictus* (Skuse) into North America in tire shipments from Asia in the early 1980s, the significance of tires as an important mosquito breeding site has drawn increased attention by public health officials. The tendency of discarded tires to hold water throughout the year promotes the proliferation and dispersal of certain container-breeding mosquitoes. This in turn contributes to the potential of public health problems ranging from an increase in nuisance complaints to a greater risk of transmission of mosquito-borne diseases.

There has not been a statewide survey of tire-breeding mosquitoes in Alabama since the first detection of *Ae. albopictus* at Cullman in 1986. Prior to that time, the yellow-fever mosquito *Aedes aegypt,* was the dominant tire-breeding mosquito in the State. However, collections of *Ae. aegypti* in the last 17 years have been scarce.

This study was conducted in 2004 and 2005 as a cooperative effort between the Department of Entomology and Plant Pathology, Auburn University, and the Alabama Department of Public Health to determine the distributions of mosquito species utilizing tires as a larval habitat in Alabama. With the assistance of ADPH area administrators and county environmentalists, the goal was to sample discarded tires for mosquito larvae in every county in the State.

Tire sites ranged from a couple of tires per site to huge disposal dumps, some containing over 50,000 tires. In 2004 two or more tire sites per county were sampled twice a month from May to October, with one collection being taken during the first half of the month and the second collection during the latter half of the month. Larvae were collected with a sampling kit, following a protocol provided to each county health department. The kit included a dipper and turkey baster to collect larvae from the tires, an aquarium net to filter out excess water, and alcohol in which to preserve the specimens. Larvae were then transferred into small glass vials and sent via the Alabama Department of Public Health courier system to the medical entomology lab at Auburn University for identification. Counties which were not sampled in 2004 were subsequently visited in 2005 to collect larvae from tires at 1 or 2 sites.

A total of 12,022 mosquito larvae, from 169 sites, was identified in this tire survey, representing 12 mosquito species in 7 genera (Table 1). The mosquito species most frequently collected from tires were *Ae. albopictus* (71%), *Culex territans* (8%), and *Oc. triseriatus* (7%). The following species were also collected: *Cx. restuans, Cx. salinarius*, *Orthopodomyia signifera*, *Cx. quinquefasciatus*, *Oc. atropalpus*, *Toxorhynchites rutilus*, *Anopheles punctipennis*, *An. quadrimaculatus, An.* spp., and *Psorophora columbiae*. The statewide distributions of each mosquito species collected in this survey, excluding *Anopheles* species, are represented by county in Figure 1.

Table 1. Total numbers and percentages of mosquito species collected from tires in Alabama in the 2004-2005 larval survey.

Mosquito Species	Totals	%
Aedes albopictus	8481	71.0
Culex territans	906	7.5
Ochlerotatus triseriatus	854	7.1
Culex restuans	625	5.2
Culex salinarius	430	3.5
Orthopodomyia signifera	326	2.7
Culex quinquefasciatus	145	1.2
Ochlerotatus atropalpus	109	0.9
Toxorhynchites rutilus	89	0.7
Anopheles spp.	23	0.2
Psorophora columbiae	21	0.2
Anopheles punctipennis	10	< 0.1
Anopheles quadrimaculatus	3	< 0.1

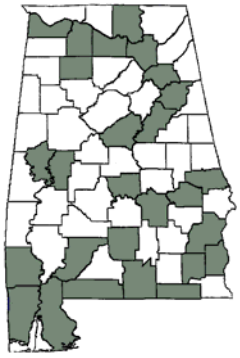
Aedes albopictus was collected from all 169 tire sites indicating that it is established in every county in Alabama. *Ochlerotatus triseriatus* was collected from 39 of Alabama's 67 counties. In each of these counties it was collected in the same tire yards as *Ae. albopictus*. No larvae of *Aedes aegypti* were collected from tires during this study, nor were larvae of *Oc. japonicus*.

This survey could not have been conducted without the generous cooperation and support of the Alabama Department of Public Health. We would like to thank everyone who assisted in the sampling of tires and submitting mosquito larvae for identification, with special thanks to the ADPH area directors and county environmentalists, many of whom braved the attack of mosquitoes as they collected larvae from their respective tire sites.

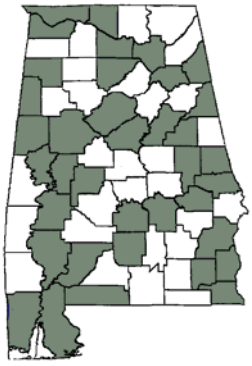
Aedes albopictus

Culex quinquefasciatus

Culex restuans

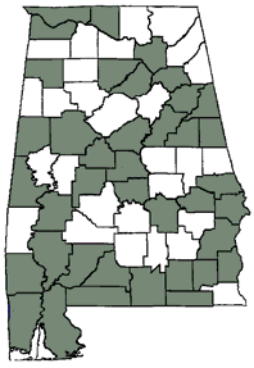


Culex salinarius



Culex territans

Ochlerotatus atropalpus



Ochlerotatus triseriatus

Orthopodomyia signifera

Psorophora columbiae

Toxorhynchites rutilus

Figure 1. Distributions by county of tire-breeding mosquitoes in Alabama, based on 2004-2005 larval survey.

MOSQUITO REPELLENTS: THREE COMPOUNDS RECOMMENDED BY CDC

Gary R. Mullen

Auburn University

With a number of new insect repellents appearing on the market, it is a good opportunity to comment on some of the more effective products as personal protectants against mosquitoes.

There are two general categories of insect repellents: (1) synthetic chemicals, and (2) natural products in the form of plant extracts, typically plant-derived essential oils. The latter are also referred to as botanical or herbal products. The most widely used synthetic-chemical repellent is **DEET** (diethyltoluamide) which continues to serve as the standard against which most other insect repellents are compared. Among the natural products are a variety of essential oils extracted from the following plants: cedar, citronella, eucalyptus, geranium, lemongrass, peppermint, and soybean. Contrary to popular belief, however, neither garlic nor vitamin B_1 (thyamine) have been shown in scientifically conducted studies to be effective in repelling mosquitoes.

Earlier this year the Centers for Disease Control and Prevention (CDC) revised its recommendation for mosquito repellents by adding two relatively new products to DEET as alternative, safe and effective personal protectants. They are **picaridin** and **oil of lemon eucalyptus**. Both compounds are now registered for use in the U.S. under the product names Cutter Advanced® and Repel® Lemon Eucalyptus, respectively. The following is a brief overview of these compounds and some of their properties.

DEET (N,N-diethyl-m-toluamide, or N,N,-diethyl-3-methylbenzamide). Having first appeared on the market in 1957, this compound has a long history as a safe and effective mosquito repellent. It is sold under a number of different names, with products containing anywhere from 4.75% to 100% DEET. Products containing more than 40% DEET generally are not any more effective than products at lower concentrations, although the period of protection may be greater. The cost and duration of protection from biting mosquitoes are directly proportional to the concentration, i.e., the higher the concentration, the higher the cost and the longer the protection. Studies have shown that the lowest concentrations of DEET (ca 5%) provide protection for about 1.5 hours, whereas concentrations of 24% provide protection for about 5 hours, with some of the highest concentrations providing at least some repellency up to 12 hours. The duration of protection, however, drops off sharply at concentrations above 50%. A good rule of thumb is to apply DEET at lower concentrations (e.g., 15 to 25%) and simply reapply as needed.

Like most products applied to the skin, DEET can loose its effectiveness due to perspiration or rain, and does not repel mosquitoes as well at higher air temperatures. Some individuals do not like the odor or feel of DEET on the skin, whereas others may have reservations about using DEET because of its tendency to dissolve plastics (e.g., eye-glass frames, watch crystals) and certain synthetic fibers. Particularly noteworthy is the advisory by the American Academy of Pediatricians that DEET not be used on infants less than 2 month old. Although relatively few cases have been documented, the concern is that DEET is readily absorbed by the skin and can potentially cause neurologic damage in developing babies and infants.

Picaridin (1-Piperidinecarboxylic acid, 2-(2-hydroxyethyl)-1-methylpropylester). Also known by the commercial names KBR 2023, Bayrepel® and AUTAN®. This synthetic compound has been available since 1998 and has been widely used as a mosquito repellent in Europe, Asia, and Australia before recently being registered for use in the U.S. as Cutter Advanced®. The latter product is being marketed in a 6-oz spray can, offering protection up to 4 hours. In some field tests it has been shown to be comparable to similar concentrations of DEET in repelling mosquitoes. Among its advantages are its being odorless and the fact that, unlike DEET, it does not dissolve plastics.

Oil of lemon eucalyptus (p-menthane-3,8-diol). This compound is a natural plant product that provides protection about equal to low concentrations of DEET (e.g., 5%). Tests have shown repellency of mosquitoes lasting from 1 to 3.5 hours, with an average protection time of about 2 hours. However, the promotional information for Repel® Lemon Eucalyptus, containing 26% oil of lemon eucalyptus as the active ingredient, claims that it is effective against mosquitoes for up to 6 hours. It is also available as the product Fite Bite Plant-based Insect Repellent®. Users should be aware that the CDC cautions that this compound not be used on children under 3 years of age.

One should keep in mind that the effectiveness of any repellent is dependent on a number of factors, including different temperatures and environmental conditions, different species of mosquitoes, and individual differences in the relative attractiveness of people to mosquitoes in general. As a result, the choice of a repellent product is a personal matter, taking into account the degree of protection provided, how long it effectively lasts, and individual sensitivities to odor and comfort of the product on one's skin. All three of the above repellent compounds that CDC recommends are both safe and effective in repelling most mosquitoes. The differences in duration of protection can be compensated for simply by reapplying the repellent more frequently in the case of the shorter lasting compounds.

For additional information on mosquito repellents, visit the CDC website on questions and answers about insect repellents at http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent and see the following two references:

Barnard, D. R. and R. D. Xue. 2004. Laboratory evaluations of mosquito repellents against *Aedes albopictus*, *Culex nigripalpus*, and *Ochelrotatus triseriatus* (Diptera: Culicidae). Journal of Medical Entomology 41: 726-730.

Fradin, M. S. and J. F. Day. 2002. Comparative efficacy of insect repellents against mosquito bites. New England Journal of Medicine 347: 13-18.

ALABAMA VECTOR MANAGEMENT SOCIETY

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For more information about AVMS, or to join as a regular or sustaining member, contact:

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I UNDERSTAND THAT, AS A MEMBER OF THE AVMS, I AM EXPECTED TO ADHERE TO THE AVMS CODE OF ETHICS.

*Registration/Membership dues are for AVMS membership year 2006.

Alabama Vector Management Society

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