Now there's an (S)-methoprene insecticide from Valent BioSciences, the global leader in biorational insect control. Through its advanced Triple Release Technology™, MetaLarv™ S-PT Mosquito Growth Regulator can be applied prior to flooding and control adult mosquito emergence for extended periods after flooding. MetaLarv™ S-PT's spherical pellet is virtually dust-free and allows for more effective low-rate applications, improved aerial application swaths, and greater point-source coverage for greater application flexibility.

Contact our Public Health Team by calling 877.696.4201 or visiting us at www.valentbiosciences.com/WBS12 MetaLarv™ to learn more.
Editorial Update from the Wing Beats Editors .......................... 5
by Jack Petersen and Stephen Sickerman

Insecticide Resistance Surveillance in Harris County, TX .............. 6
by Pamela M Stark, Jennifer H Wiggins, Kyle L Flatt and Rudy Bueno Jr

Florida Mosquito Control Association’s Annual “Fly-In” ............ 17
by Mark Latham

Thermal Fog of Anvil 10+10 against Culex quinquefasciatus
in Storm Drains in St Augustine, FL ............................. 27
by Rui-De Xue, Michael L Smith, Whitney A Qualls and Marcia K Gaines

The Untold Story of Sir Ronald Ross ................................. 32
by Stanton E Cope

Founding Mothers: Women and the Origins
of the Florida Anti-Mosquito Crusade .............................. 39
by Gordon Patterson

From Where I Sit: Notes from the AMCA Technical Advisor ........ 45
by Joe Conlon

About the Cover: Emergence from the pupa is an intricate process happening at the water’s edge. The cover photograph shows one instant in the emergence of a female Culex quinquefasciatus, taken from a series of photographs as the pupa eclosed into the adult female. Mosquito photo by James Newman, Florida Medical Entomology Laboratory, University of Florida - IFAS.
Your Partner in Mosquito Control.

With a fully stocked arsenal of products, from larvicides and adulticides to barriers and equipment, an expert staff, innovative technology and educational resources, Univar Environmental Sciences is your one source for mosquito control.

UnivarES.com | (800) 609-9414
One Source. Countless Resources.™
Editorial Update from the Wing Beats Editors
by Jack Petersen and Stephen Sickerman

The Wing Beats editors have several very significant editorial staff changes that should be reported to the readership:

Dennis Moore has served Wing Beats longer than any other individual. He continued beyond Charlie Morris’ service as the founding Editor of Wing Beats, working exceedingly well with several managing editors through the years. He put up with a chaotic mailing list. But after 18 years of dedicated service to Wing Beats in various capacities including Editor, Managing Editor, and, most recently, Director of Advertising, Dennis Moore has announced his intention “to pass on the reins.” Marin Brouillard is the new Wing Beats Director of Advertising. Marin is no stranger to Wing Beats, having served as Editor-in-Chief from 2003 to 2005, signed on as Circulation Editor last year, and even graced the cover of the Summer 2012 issue!

Dennis has done more to maintain the life of Wing Beats than any other individual. We sincerely thank Dennis for almost two decades of service. We wish Dennis well and welcome back Marin!

Please direct all future inquiries for advertising in Wing Beats to:

Marin Brouillard
Collier Mosquito Control District
600 North Rd
Naples, FL 34104
239-436-1000
marin@cmcd.org

In order to focus attention on his duties as AMCA President, Tom Wilmot has resigned as Wing Beats Associate Editor and has been replaced by Eric Schreiber, Director, Sarasota County Mosquito Control District, Sarasota, FL. We thank Tom for years of excellent editorial review and welcome Eric’s truculent reviews!

The Wing Beats Editorial Review Board (ERB) has seen some changes as well. Wayne Kramer has stepped down from the ERB after several years of service. His replacement is Scott C Crans, Senior Program Coordinator, Satellite Office of Continuing Professional Education at the Center for Vector Biology, Rutgers, the State University of New Jersey. John J Smith of Norwood, MA, recently retired and his replacement on the ERB is David Lawson, Director of the Norfolk County Mosquito Control District, Norwood, MA. We heartily thank Wayne and John for their dedicated service to the AMCA and we welcome Scott and David.

The Editorial Review Board will continue to function as a regionally representative board charged with the task of determining the “suitability for publication” of manuscripts submitted to Wing Beats.

New Product Announcement

HIGH EFFICIENCY, WIDE SPECTRUM DROPLET SAMPLER

This new spinner (Model 319) was developed by Dr. Jane Barber and others at Florida A&M for measuring droplet size spectrum from the newer Microair and Bete impinger nozzels producing smaller emission spectra (DV0.5’s of 12-30 µm). For more details see web.

7409 NW 23rd Avenue, Gainesville, FL 32606
(352) 378-3209 V (352) 372-1838 F JWHock@JohnWHock.com www.JohnWHock.com
The Harris County Public Health Services (HCPHS) Mosquito Control Division performs applied research on disease-bearing mosquitoes especially *Culex quinquefasciatus* Say due to its proclivity to become infected with St Louis encephalitis (SLE) and West Nile virus (WNV) and transmit these diseases. Since 2004, emphasis has been on monitoring the effectiveness of the ground ultra low volume (ULV) adulticide program, assessing insecticide resistance of feral mosquito populations from specific mosquito control operational areas relative to the in-house susceptible Sebring colony strain. Insecticides tested are ones commonly used in ULV operations in Harris County as well as other potential adulticides. That was the first year the operational program and other potential materials were assessed in what has evolved into the Insecticide Resistance Surveillance program (IRS). This served as the foundation for the development and the establishment of the Insecticide Resistance Management program (IRM).

The goal in 2004 was to assess the program rate of synergized resmethrin (0.003 lb ai/acre) and test malathion (at the maximum label rate of 0.055 lb ai/acre). Malathion had been used for disease suppression from 1965...
Swingfog – the optimal machines for Vector and Pest Control.
Plant Protection in Greenhouses and Plantations.
Disinfection in Food Processing and Animal Production. Stock Protection in Warehouses.
Anti-Sprouting Treatment of Potatoes.

Jasmic
Distributor USA and Canada:
www.jasmic.net
Call Toll Free:
(888) 4–JASMIC
(888) 4–527642

Swingtec GmbH, Postfach 1322, 88307 Isny, Germany, Tel. +49 7562 708-0, Fax +49 7562 708-111, Email: info@swingtec.de, www.swingtec.de
until 1994 and in a more limited capacity for pest mosquito operations from 1994-2001. It was determined that in selected areas from traditional SLE treated areas that the operational rate of resmethrin (0.003 lb ai/acre) did not provide satisfactory results in disease situations. The rate of 0.007 lb ai/acre was then added for testing. Interestingly, the most efficacious results were from applications with malathion. The data obtained guides the rotational strategy of alternating an organophosphate (malathion) and synthetic pyrethroid insecticides (resmethrin, permethrin) in order to maintain the efficacies of the insecticides as well as implementing any cost saving measures in these tough economic times.

The information we present here focuses on the data accumulated on malathion and resmethrin from 2005 through 2010. The map shows the 7 areas that were tested each of the 5 years of effective IRS; see Figure 1. Testing during 2008 proved impossible due to the impacts of Hurricane Ike. Other areas were tested, but not throughout the years, thereby preventing them from being reported cumulatively as part of our continual IRS program. It should be noted that the resulting mortalities from those tests were similar to mortalities observed in mosquitoes from the permanent primary resistance study areas.

Fifteen areas were selected each year for field cage testing. However, during 2010 only the permanent primary resistance study areas were tested due to budgetary constraints. Egg samples were collected from three areas at a time using fermented hay water in black bus tubs placed strategically for high Cx quinquefasciatus activity and the high numbers of egg rafts needed to rear F0 generation adults in the field insectary. The Sebring susceptible colony strain was tested as a negative control [baseline] in comparison with the 3 pre-designated treatment areas. The test equipment and unique wind vane multi-cage used during testing are described in Vessey et al (2007). An additional innovation for quickly and efficiently handling the volume of cages and tests/night was the CO2 anesthetizing system used in the field as described in Vessey et al (2008). We relied on a 100 ft equi-distance 3x3 plot design with upwind positive controls.
Since the highest label rate (0.007 lb ai/acre) of resmethrin was being used from individually designated trucks in 2005 and 2006, the dual use operational truck rate (0.006 lb ai/acre) was not introduced until 2007. This is reflected in Table 1 and is referred to in future text as “the high rate” of resmethrin.

RESULTS

Three key components were used for an area’s assessment for efficacy and resistance using cage testing:

1) The overall percentage mortality, corrected by Abbott’s formula (1925), from a test;
2) The average percentage mortality of the feral area mosquitoes where the adjacent Sebring mosquito mortality was total; and
3) The “coverage component” i.e., the number of stakes where Sebring mortality was 100%.

The subsequent results follow these criteria.

Sebring Colony Strain: Looking at the test results for both malathion and resmethrin throughout the study period, there was an overall increase in the mortality in the susceptible Sebring in each year, especially for resmethrin. This was a strong indicator of achieving better, more consistent coverage in the field.

Malathion: The overall mortalities in the 7 areas as presented in Figure 2 were encouraging in some areas and less than optimal in others in 2005. This was the result of substandard tests that were not able to be rescheduled. Consequently, Areas 109 and 205 have always been viewed with that knowledge. However, Area 225 was retested and showed signs of resistance. Both of these outcomes in 2005 can be seen in Table 2 where the number of 100% Sebring mortality stakes indicated the coverage in the plot for each test for every year.

Resmethrin: The high label rate for this adulticide has been used operationally since 2005 and exclusively since 2006 after further testing demonstrated

Figure 3: Resmethrin overall mortality trends through five years of successful field cage testing.
ADULTICIDE | A.I. LBS/ACRE | FLOW RATE OZ/MN | MMD | DILUTION RATE
--- | --- | --- | --- | ---
FYFANON ULV 96.5% malathion | 0.055 | 4.3 | 11 - 15 µm | RTU
SCOURGE 18 + 54 18% resmethrin + 54% PBO | 0.006 - 0.007 | 4.8 | 18 - 22 µm | 1.0 : 0.35 – 2.0 : 1.0 (Scourge : mineral oil)

Table 1: Adulticide material and application information for 2005 through 2010.

the lower rate was ineffective against Cx quinquefasciatus feral populations in the test areas. The overall average of averages decreased slightly through 2007; conversely, 2009 and 2010 results showed a marked increase in efficacy.

From 2005 to 2010, the percent mortality in the permanent primary resistance study areas decreased initially in 2006, but gradually increased the remainder of the study period with the mortality being highest in 2010 overall as can be seen in Figure 3.

The advantage of using mortality averages where Sebring strain mortality was 100% helps to reduce test variability. This way of utilizing data also demonstrates the importance of “complete” coverage at any given plot location. Table 3 shows higher mortalities in all the areas in 2010 than in any previous year.

One of the interesting observations from 2010 was that the results of resmethrin and malathion were similar in overall mortality as well as the results of 100% mortality side-by-side Sebring cages for the first time in the years of field cage testing. Malathion continued to maintain its high rate of effectiveness, whereas resmethrin, initially leveled off then showed improved efficacy in the past two seasons; see Tables 2 and 3.

CONCLUSIONS

HCPHS Mosquito Control has developed an effective monitoring system implementing IRS. It has significant impact on the operational, economical, and environmental aspects of mosquito control.

Operationally, routine insecticide surveillance of adult mosquito populations yields extremely vital information required in operational decisions regarding insecticidal applications. This has resulted in the development and implementation of IRM which involves a rotational strategy of an organophosphate (malathion) and a synthetic pyrethroid (resmethrin)

<table>
<thead>
<tr>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sebring</td>
<td>46</td>
<td>100.0</td>
<td>Sebring</td>
<td>45</td>
<td>100.0</td>
<td>Sebring</td>
<td>43</td>
<td>100.0</td>
<td>Sebring</td>
<td>39</td>
<td>100.0</td>
<td>Sebring</td>
<td>25</td>
<td>100.0</td>
</tr>
<tr>
<td>51</td>
<td>9</td>
<td>94.2</td>
<td>51</td>
<td>8</td>
<td>85.5</td>
<td>51</td>
<td>9</td>
<td>94.0</td>
<td>51</td>
<td>8</td>
<td>98.5</td>
<td>51</td>
<td>9</td>
<td>98.2</td>
</tr>
<tr>
<td>55</td>
<td>9</td>
<td>95.0</td>
<td>55</td>
<td>9</td>
<td>94.5</td>
<td>55</td>
<td>9</td>
<td>88.4</td>
<td>55</td>
<td>8</td>
<td>99.4</td>
<td>55</td>
<td>9</td>
<td>98.8</td>
</tr>
<tr>
<td>93</td>
<td>9</td>
<td>91.8</td>
<td>93</td>
<td>8</td>
<td>91.7</td>
<td>93</td>
<td>9</td>
<td>97.9</td>
<td>93</td>
<td>7</td>
<td>98.5</td>
<td>93</td>
<td>9</td>
<td>97.7</td>
</tr>
<tr>
<td>109</td>
<td>1</td>
<td>66.7</td>
<td>109</td>
<td>3</td>
<td>100.0</td>
<td>109</td>
<td>7</td>
<td>97.2</td>
<td>109</td>
<td>8</td>
<td>100.0</td>
<td>109</td>
<td>7</td>
<td>98.9</td>
</tr>
<tr>
<td>205</td>
<td>1</td>
<td>65.0</td>
<td>205</td>
<td>9</td>
<td>93.3</td>
<td>205</td>
<td>9</td>
<td>97.3</td>
<td>205</td>
<td>8</td>
<td>100.0</td>
<td>205</td>
<td>7</td>
<td>98.8</td>
</tr>
<tr>
<td>225</td>
<td>9</td>
<td>71.2</td>
<td>225</td>
<td>9</td>
<td>83.3</td>
<td>225</td>
<td>9</td>
<td>89.1</td>
<td>225</td>
<td>8</td>
<td>99.5</td>
<td>225</td>
<td>7</td>
<td>97.3</td>
</tr>
<tr>
<td>904</td>
<td>9</td>
<td>96.3</td>
<td>904</td>
<td>8</td>
<td>91.0</td>
<td>904</td>
<td>9</td>
<td>95.5</td>
<td>904</td>
<td>9</td>
<td>99.2</td>
<td>904</td>
<td>9</td>
<td>97.8</td>
</tr>
<tr>
<td>Mean</td>
<td>6.7</td>
<td>82.9</td>
<td>Mean</td>
<td>7.7</td>
<td>91.3</td>
<td>Mean</td>
<td>8.7</td>
<td>94.2</td>
<td>Mean</td>
<td>8.0</td>
<td>99.3</td>
<td>Mean</td>
<td>8.1</td>
<td>98.2</td>
</tr>
</tbody>
</table>

Table 2: The comparative results for malathion (0.055 lbs/acre) against Culex quinquefasciatus strains where Sebring mortality was 100 percent.
Mosquito abatement policies can be customized to provide specific coverage to all your business needs, including fixed wing and rotor wing aircraft, as well as general liability. We stand ready to improve your program today!

To learn more, contact
Bob Cox
800-327-2222
rcox@nationair.com
AMCA

79th Annual Meeting

February 24 - 28, 2013 • Atlantic City, NJ

Celebrating the New Jersey Mosquito Control Association’s 100th Anniversary

AMCA
THE AMERICAN MOSQUITO CONTROL ASSOCIATION
www.mosquito.org
to treat areas where WNV or SLE have been detected. The rotational strategy of using a pyrethroid and an organophosphate has enhanced the effectiveness of both materials as assessed by the resistance and efficacy study. This strategy is further supported by the aims and objectives of the Insecticide Resistance Action Committee (IRAC). For more information, see http://www.irac-online.org/about/irac.

Economically, control measures can be adjusted in order to reduce insecticide selection pressure on vector mosquito populations. These adjustments have led to cost saving measures, since approximately 50% of the treated acreage is with malathion (~$40/gallon) and the other 50% with resmethrin (~$400/gallon). Because Cx quinquefasciatus populations were resistant to malathion for many years it is very likely that if IRS had not been implemented, resmethrin would have continued to have been used exclusively resulting in a higher cost as well as a higher level of resistance and less control of WNV/SLE.

Environmentally, greater restrictions and regulations are being placed on the use of insecticides by the Environmental Protection Agency. These pertain to the spray frequency in a given area as well as compliance to the Clean Water Act through the National Pesticide Discharge Elimination System (NPDES). In Texas, the program responsible to oversee compliance is the Texas Commission of Environmental Quality and was implemented on October 31, 2011. One of the components of the NPDES is to conduct insecticide resistance tests to insure that insecticides are used as judiciously and safely as possible. The IRS program is essential and will continue to enable our program to work within the guidelines of these new restrictions and regulations in order to continue to provide effective control of diseases such as WNV and SLE.

In summary, testing since 2005 indicate these program insecticides have maintained and possibly increased their effectiveness at the highest operational rates. Unfortunately, resmethrin may not be available after 2012. [The registrant is looking at rescinding their voluntary cancellation, in part, due to AMCA and IR-4 efforts, but this is not a done deal]. In preparation for the possible loss of resmethrin as an operational insecticide, a 2:1 ratio of permethrin was tested in 2 consecutive years in the course of the project to date as a likely replacement should one be needed. It performed the best of all the materials tested currently not utilized in the program (HCPHS Mosquito Control unpublished data).

Much has been learned in the years of practical field testing. Tending to all the detailed components required to pull together the comprehensive project as noted previously has integrated this knowledge into guiding programs and processes in real time. The comprehensive aspects of these efforts have assured that we are preserving our abilities to effectively control mosquito vectors in the future and protect the local community from mosquito borne diseases.

Table 3: Comparative results for resmethrin (0.006-0.007 lbs/acre) against Culex quinquefasciatus strains where Sebring mortality was 100 percent.

<table>
<thead>
<tr>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
<th>Strain</th>
<th>Plot cages in sample</th>
<th>Percent Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
<td></td>
<td></td>
<td>2006</td>
<td></td>
<td></td>
<td>2007</td>
<td></td>
<td></td>
<td>2009</td>
<td></td>
</tr>
<tr>
<td>Sebring</td>
<td>35</td>
<td>100.0</td>
<td>Sebring</td>
<td>44</td>
<td>100.0</td>
<td>Sebring</td>
<td>30</td>
<td>100.0</td>
<td>Sebring</td>
<td>38</td>
<td>100.0</td>
</tr>
<tr>
<td>51</td>
<td>5</td>
<td>93.1</td>
<td>51</td>
<td>5</td>
<td>72.1</td>
<td>51</td>
<td>5</td>
<td>76.5</td>
<td>51</td>
<td>4</td>
<td>86.5</td>
</tr>
<tr>
<td>55</td>
<td>5</td>
<td>94.3</td>
<td>55</td>
<td>7</td>
<td>48.4</td>
<td>55</td>
<td>5</td>
<td>85.7</td>
<td>55</td>
<td>4</td>
<td>92.1</td>
</tr>
<tr>
<td>93</td>
<td>5</td>
<td>92.4</td>
<td>93</td>
<td>5</td>
<td>60.2</td>
<td>93</td>
<td>6</td>
<td>84.4</td>
<td>93</td>
<td>9</td>
<td>85.4</td>
</tr>
<tr>
<td>109</td>
<td>4</td>
<td>81.6</td>
<td>109</td>
<td>7</td>
<td>92.2</td>
<td>109</td>
<td>3</td>
<td>76.6</td>
<td>109</td>
<td>9</td>
<td>97.1</td>
</tr>
<tr>
<td>205</td>
<td>4</td>
<td>95.5</td>
<td>205</td>
<td>7</td>
<td>90.0</td>
<td>205</td>
<td>8</td>
<td>77.6</td>
<td>205</td>
<td>9</td>
<td>83.2</td>
</tr>
<tr>
<td>225</td>
<td>5</td>
<td>48.1</td>
<td>225</td>
<td>7</td>
<td>80.5</td>
<td>225</td>
<td>8</td>
<td>73.8</td>
<td>225</td>
<td>9</td>
<td>95.5</td>
</tr>
<tr>
<td>904</td>
<td>9</td>
<td>89.2</td>
<td>904</td>
<td>5</td>
<td>77.1</td>
<td>904</td>
<td>6</td>
<td>87.4</td>
<td>904</td>
<td>7</td>
<td>95.1</td>
</tr>
<tr>
<td>Mean</td>
<td>5.3</td>
<td>84.9</td>
<td>Mean</td>
<td>6.1</td>
<td>74.3</td>
<td>Mean</td>
<td>5.9</td>
<td>80.3</td>
<td>Mean</td>
<td>7.3</td>
<td>90.7</td>
</tr>
</tbody>
</table>
“Our goal in using GeoPro is to streamline data management by putting our programs and data online with highly secure backup systems. As employees come and go, having this information on the web takes a longer-term view of data management. It’s assuring to know it’s backed up off site and nothing that happens to us physically is going to affect our data. GeoPro is a valuable product that we’re able to use because of its affordable subscription cost…that's the bottom line.”

Jim David, Director of St. Lucie County Mosquito Control District, Fort Pierce, Florida
Bti + Sand = FourStar SBG

FourStar Microbial Products is pleased to introduce your latest tool: FourStar SBG. By formulating on high density sand with patented Dual Action Release technology, we’ve created a better Bti granule.

FOURSTAR SBG OPERATIONAL BENEFITS INCLUDE:

- Better vegetation penetration
- Wider application swath from the air and on the ground
- Reduced bulk allows more acres per load with less ferry time
- Applications at higher wind speeds and higher altitudes
- Uniform, highly spherical sand is easy to calibrate
- Less off target drift

To learn more about FourStar SBG, contact ADAPCO toll free by phone at (800) 367-0659 by email at info@myadapco.com, or visit us at www.fourstarmicrobials.com.

REFERENCES CITED


Helping Clients
Incorporate
New Technologies

Data Management Systems
GIS Mapping
Consulting
Guidance Systems
Surveillance
Software Design
Imagery
GPS Tracking
Customization

Leading Edge...
guidance and direction
for your technology needs.

info@LeaTeam.com
Bill Reynolds  407.468.0008
www.LeaTeam.com
(828) 926-6525
Mike Reynolds  828.246.2111
Each January since 1995, the Florida Mosquito Control Association (FMCA) Aerial Training Subcommittee has sponsored the annual “Fly-In” meeting at the Lee County Mosquito Control District, Ft Myers, FL. What started in 1995 as a State-level training course designed to help pilots become certified and maintain certification for Florida’s aerial applicator’s license has evolved into one of the best annual meetings for operational mosquito control folks available today. The Fly-In provides not only a forum for pilots and aerial application specialists, but also training and an avenue for discussions for managers and biologists in the mosquito control industry.
control profession. This meeting allows government and private mosquito control professionals to come together to share new ideas and concerns that ultimately lead to improved aerial application methods. Moreover, aircraft from around the region are flown in and are on display throughout the 3-day event allowing participants to observe and question what neighboring professionals are doing to their spray platforms.

The Fly-In generally starts at noon on Tuesday where a large lunch is provided – thanks to the crew at Lee County MCD who always provide a great meal. After lunch, pilots, mechanics managers and biologists hold a “group meeting” to discuss topics of common interests; see Figure 1. These topics vary year to year, but examples include spray cloud dynamics, chemical

Figure 3: Droplet collection and calibration demonstration.

Figure 4: Experiment being setup to evaluate device collection efficiency for larvicides.
Always read and follow all label directions and use precautions.

Dibrom® Concentrate and Trumpet® EC are registered trademarks of AMVAC Chemical Corporation.

©2012 AMVAC Chemical Corporation.

DIBROM® CONCENTRATE
TRUMPET® EC

Protecting public health for more than 50 years.

Used all season long where serious mosquito control is required.

For decades, Dibrom® Concentrate and Trumpet® EC have been the known as the premier aerial adulticides after disastrous hurricanes occur. The fact is that these products effectively control nuisance and disease vectoring mosquitoes all season long. Contact your AMVAC/AEP distributor today or AMVAC at 1-888-GO AMVAC (1-888-462-6822) and visit www.amvac-chemical.com.
deposition, penetration and ef-
cficacy, GIS in mosquito control,
automatic droplet size measur-
ing and disease and nuisance
suppression; see Figure 2.

Wednesday morning is generally
reserved for “field demonstra-
tions” where aircraft are used to
graphically illustrate the theoreti-
cal discussions that often take
place the previous day; see
Figures 3, 4 and 5. More group
meetings take place following
the demonstration, where “lively”
discussions often ensue. Again
an ample lunch is provided; see
Figure 6. Wednesday afternoon
is devoted to further group pre-
sentations, an opportunity for
industry representatives to give
brief updates on products and
a “flight-line visit,” where pilots
and mechanics are available
to explain their unique aircraft
spray system setups; see Figures
7 and 8.

Thursday mornings are usually
dedicated to separate break-
out sessions, one for pilots and
mechanics and the other for
managers and biologists. Pilot
sessions allow “like-minds” to
share ideas, problems and con-
cerns such as night vision goggle
training, aircraft modifications,
spray system design, chemical
safety and aircraft maintenance
and repair. Typically hands-
on training is offered to the
pilots, such as flight simulators,
Figure 7: Beaufort County, South Carolina, brought their newly acquired OV-10, modified for mosquito control adulticide spraying, one of many aircraft on display.

Figure 8: Fly-In attendees examine mosquito control helicopters placed along the “flight-line.”
Keeping our Customers Mosquito & Disease Free
World Wide for over 40 years!

Our line of defense

18-20
High output ULV machine.
Most popular ULV aerosol generator in the world.

XKE
Large area coverage ULV.
Very simple to operate from truck or trailer.

MAG
Medium area ULV.
Indoor and outdoor coverage from ATV or cart.

COLT
Portable ULV for indoor and outdoor application.

LONDON FOGGERS
505 Brimhall Avenue · Long Lake, MN 55356
TF: 800-448-8525 - P: 952-473-5366 - F: 952-473-5302

www.londonfoggers.com
Mosquito, Vector, Pest, and Odor Control
© Copyright London Foggers 2011. All Rights Reserved
inadvertent instrument meteorological conditions response and water egress procedures. The manager and biologists session usually revolves around industry-relevant issues of legislative and regulatory importance.

The FMCA Fly-In is a national and international event, with professionals from all over the United States, as well as England, Canada, Greece and Cayman Islands, plus occasional visitors from Australia, Germany, France, Italy and Guatemala.

The next Fly-In is scheduled for January 15-17, 2013. Registration costs will likely be $150, which will include two breakfasts and three lunches, all served on site. Daytime temperatures are generally in the 50s to low 70s, so this is a great opportunity for many of you to escape the snow and ice for a few days of Florida sun. Annual attendance is about 125 to 150 individuals. We’d like to have your participation this year as well. Registration information can be found at the FMCA web-site, www.floridamosquito.org. Please plan on attending next year!

The author thanks Peter Connelly for contributing the photographs for this article.
NOTHING REMAINS THE SAME.... EVEN IN MOSQUITO CONTROL
From an idea to reality – evolution is happening.

WHERE WOULD WE BE WITHOUT CHANGE?
We don’t have to look far— either in our daily lives or in our industry— to answer that question. Whether change comes from an idea, a vision or need, new products and practices are improving mosquito control.

PUTTING IDEAS INTO ACTION
Product innovation isn’t just about researching new products and new actives. It’s also about improving upon what we have… and willingly shelving products or practices that are outmoded by comparison. It’s striving to make sure everything we do is better than what preceded. A few examples:

- **Natular™**, five OMRI-listed larvicide formulations and the 2010 U.S. EPA Presidential Green Chemistry Challenge Award winner
- **Duet™**, two unique active ingredients achieving new adulticide performance levels
- **AquaAnvil™ & AquaHalt™**, water-based adulticide formulations that use Droplet Optimization Technology to maximize performance

PEOPLE ... SPARKING CHANGE AND COMMITMENT
Our greatest resource has always been the people of Clarke. And while we may have evolved in the way we work, our commitment to serving the needs of our customers is unwavering.

GIVING BACK ... CHANGING FOR GOOD
Clarke has long supported community efforts and student scholarship opportunities. But even in giving back, we’ve discovered new ways to touch more lives around the world. For example, thanks to your help, thousands of bed nets have been donated to areas in Nigeria that are stricken with mosquito-borne disease.

*Clarke: Changing today for a better tomorrow.*
Looking for a fogger?  
The choice is clear.

Extended warranty coverage.  
Manufacturer prices.

Rechargeable battery backpack fogger.
- All-electric, emission-free ULV fogger.
- Lithium-ion battery recharges like a cellphone.
- Droplet size / flow control on the handle.
- 2 year warranty.

Thermal foggers from $969
- Powerful and reliable pulse-jet engines.
- Choose compact or full-sized form factors.
- 2 year warranty.

Truck-mounted foggers.
- Installs on a flatbed truck.
- Remote control from cabin.
- Battery- or gasoline-powered.

Inquire at sales@pestgoaway.com

Order online www.pestgoaway.com 415-830-9494 9-5 PST

Copyright © 2012 American Longray Company. All rights reserved.
Thermal Fog of Anvil 10+10 ULV against Culex quinquefasciatus in Storm Drains in St Augustine, FL by Rui-De Xue, Michael L Smith, Whitney A Qualls, and Marcia K Gaines

Storm drainage systems provide excellent harborage and the ideal habitat for *Culex quinquefasciatus* Say (Strickman and Lang 1986, Su et al 2003, Rey et al 2006). Control of *Cx quinquefasciatus* adults in storm drain systems includes using a physical barrier (Mulligan III and Schaefer 1982), attractive toxic sugar baits (Müller et al 2010), ultra low volume spray and thermal fogging (Miladin 2004, Fredregill et al 2011).

Anvil® 10+10 ULV is a commercially available adulticide produced and distributed by Clarke Mosquito Control Products. The active ingredients of Anvil® 10+10 ULV are 10% sumithrin and 10% piperonyl butoxide (PBO); the product is registered for ULV and thermal fogging against adult mosquitoes. Based on laboratory bioassays, Duet® Dual-Action Adulticide, another Clarke formulation containing sumithrin, is an effective adulticide against several species of Florida mosquitoes including *Cx quinquefasciatus* (Qualls and Xue 2010).

In order to evaluate the efficacy of thermal fog applications in St Augustine, FL storm drains against *Cx quinquefasciatus*, we used caged sentinel *Cx quinquefasciatus* female mosquitoes (5-7 day old laboratory-reared colony) and a hand thermal fogger (provided by American Longray, San Francisco, CA) with a modified extension hose connected to the nozzle; see Figure 1. Study sites included a new residential subdivision which contained 9 storm drains connected to the same storm drain line and an industrial park which contained 8 storm drains connected to the same drain line; see Figure 2. Air temperature was 78-80 °F and ground wind speed was 0-5 mph.

Three mosquito cages at 15 mosquitoes per cage were placed separately in three storm drains for 15 minutes as a control. Before the thermal fog application eight mosquito cages were placed separately in 8 storm drains; see Figure 3. The distance from the treatment point (1st drain) to the 2nd drain was 10 m, 60 m to the 3rd drain, 100 m to the 4th drain, 180 m to the 5th drain, 200 m to the 6th drain, 250 m to the 7th, and 300 m to the 8th drain in the storm drain line in the new subdivision. The ninth storm drain was blocked due to construction. The 7th and 8th drains were full with water. Fog application was initiated at the 1st drain lasting 3 minutes; see Figures 4 & 5. The fog was slow moving from the 1st drain toward the 6th drain in the storm...
drain system line, taking about 20 minutes to travel to the 6th drain; see Figures 6 & 7. Cages were collected from each drain after 15 minute exposure; see Figure 8. All treatment cages showed 100% mortality after 15 minutes.

Control cages were brought to the laboratory and the mosquitoes provided a cotton ball impregnated with a 10% sugar solution. After 24 hours, only one control mosquito had died.

Fredregill et al (2011) reported that thermal fog with Pyrocide® Fogging Concentrate 7192 (5% pyrethrins and 25% PBO) and mineral oil was ineffective at controlling Cx quinquefasciatus in storm drains, and discontinued thermal fog operations in Harris County, TX. However, we used Anvil® 10+10 ULV for the thermal fog application and achieved 100% mortality of caged mosquitoes in storm drain system line after 15 minute exposure. The insecticides used could be the difference between the Harris County report and our experiment results.

There are many factors influencing the population of the species in storm drains (Rey et al 2006) and the efficacy of thermal fogging, such as rainfall, type of structure setting, presences or absence of predators or competitors on drain covers, wind direction and speed, and full water in the drain system. Based on our experiments, thermal fog of Anvil® 10+10 ULV in storm drain system line provided effective control of caged mosquitoes, but the open drain covers limited the distance of fog movement in
the storm drain system line. For this reason, thermal fog seems to be an impractical control method in storm drain systems in St Augustine, FL. However, this application may provide useful control when we need to target the vector *Cx quinquefasciatus* when there are number of sentinel seroconversions or human cases of West Nile or St Louis Encephalitis.

We believe that Integrated Mosquito Management (IMM) is the best strategy for control of the species of mosquitoes which inhabit storm drain system through larval control, physical barriers, toxic sugar baits, sticky traps, ULV spray and thermal fogging.

**REFERENCES CITED**


**Figure 7:** Test site after thermal fog application.

**Figure 8:** Collecting mosquito cages from the drains.
Why is ADAPCO

Is not getting products on time causing delays in your operation?

“...My customers always come first. We work together as a team to accomplish the same end goal: to deliver a quality product when you need it. It’s a good feeling to know that I play a part in keeping customers’ operations running smoothly.

Wendy Decorah,
Customer Service & Inside Sales

Have you ever been forced to shut down a mission because you lacked immediate support with chemicals or equipment?

“...My customers can trust they are getting unbiased expert advice from a dedicated partner when they need it. I follow the Golden Rule: I treat my customers the way I would want to be treated.

Chris Pederson,
Outside Sales Consultant

ADAPCO is the name you trust in the mosquito control industry.

A best-in-class customer service team to
My customers can trust they are getting unbiased expert advice from a dedicated partner when they need it. I follow the Golden Rule: I treat my customers the way I would want to be treated.

I make sure my customers’ equipment is up and running with unique service programs to ensure little or no downtime. I also help them access technology for a more efficient and compliant operations.

I listen to my customer’s needs in order to develop real-life, innovative solutions that ensure their compliance with regulations, reduce liability exposure and improve the efficiency of their operation.

Wendy Decorah, Customer Service & Inside Sales
Chris Pederson, Outside Sales Consultant
TJ Leibee, Service Team Member
Derek Wright, National Technology Manager

ADAPCO is the name you trust in the mosquito control industry. Contact us toll free: 800 367-0659 or on the web: www.MyADAPCO.com

Has a down piece of equipment hampered your ability to protect the public?

Do you fear you don’t have sufficient documentation in the event your operation was sued?

I make sure my customers’ equipment is up and running with unique service programs to ensure little or no downtime. I also help them access technology for a more efficient and compliant operations.

TJ Leibee, Service Team Member

I listen to my customer’s needs in order to develop real-life, innovative solutions that ensure their compliance with regulations, reduce liability exposure and improve the efficiency of their operation.

Derek Wright, National Technology Manager

support all of your mosquito control needs.

Contact us toll free: 800 367-0659 or on the web: www.MyADAPCO.com
It is highly likely that many of you have heard the name Ronald Ross, and perhaps you even know a bit about him. In the history section of almost any medical entomology class or textbook, we learn that Ross, a British physician of Scottish descent, is credited with the first successful demonstration of the transmission of malaria parasites (in birds), and that he was guided in his studies by Sir Patrick Manson, generally considered the Father of Tropical Medicine.

But who was this person? What did he really want to do with his life? And how did the confused son of a dominant father end up a Nobel Prize winner in a profession he avoided and loathed as a young man? Let’s find out. This article will not regurgitate all of the scientific and professional accomplishments of Ross, but instead, is intended to provide a snapshot of the unique and fascinating foundation upon which his career was built.

Ronald Ross was born in Almora, India, on the fringe of the Himalayan Mountains, on May 13, 1857. He was the eldest of 10 children of whom 9, remarkably, survived to adulthood. His father, Brigadier General Sir Campbell Clay Grant Ross, was stationed in India where the Ross Family had connections for over a century. Ross’s mother was Matilda Charlotte Elderton, of whom he wrote “like all mothers...ours was the best in the world.” Judging from his own account in his Memoirs written in 1923, Ross appears to have experienced the typical life of a British child in India.

In April of 1865, when he was nearly 8 years old, Ross was sent back to England for schooling. He lived with his father’s sister and her husband, also an Army officer. For the next 9 years, Ross attended various schools, including a boarding school, where he was grounded in the classics, became proficient in mathematics, and studied drawing and music. He also indulged his interest in natural history, starting a book “which should contain a description of every known species of animal.” He read the Bible and studied noted authors such as Pope, Milton and Shakespeare.

By age 17 (1874), Ross’s career goals focused on being an artist or joining the Army or Navy. However, his father had other ideas for his eldest son. In Ross’s own words, “my father had set his heart upon my joining the medical profession and, finally, the Indian Medical Service, which was then well paid and possessed many good appointments….but I had no predilection at all for medicine and like most youths, felt disposed to look down upon it.”

Ross enrolled in medical school at St Bartholomew’s Hospital in London after being delivered to the front door by his father personally, but his academic efforts were diluted with writing drama and poetry, composing and playing music, and teaching himself to play the piano. In 1879, after 5 years of insincere effort, Ross failed to qualify in medicine. Then, he made a fateful decision. Threatened with losing his father’s financial support to continue his medical school efforts, Ross instead took a job as a Ship’s Surgeon, something that he had qualified for while in school.
During the next two years while crisscrossing the Atlantic, he was able to study for his medical exams while engaging with a cross-section of humanity bound for a better life in the United States. At one point, he performed an above-elbow amputation without any skilled help. Ross was so moved by this whole experience that he started writing a tale called 'The Emigrants' but he never finished it.

MARRIAGE AND EARLY STUDIES ON MALARIA

Ross finally joined the Indian Medical Service and served in India and Burma until 1888. By this time, pay in the Service was average or below and opportunities for promotion were scarce due to a plethora of junior officers. Also, the medical work was slow so Ross had plenty of time to devote to tennis, golf, writing dramas and studying mathematics and philosophy. This was not, however, Lieutenant Ross’s ‘cup of tea,’ and depression set in. In 1888 he returned to England on furlough. His life was about to change drastically.

Ross met and married Rosa Bessie Bloxam in 1889. After a brief honeymoon in Scotland, he really began to apply himself to his chosen profession and concentrated more and more on sanitation, as he had seen first-hand its importance in India. He received a Diploma of Public Health from a newly-established curriculum in London, the first member of the Indian Medical Service to do so. Also, he took a two-month course in the fledgling discipline called 'bacteriology.'

Ross saw 1889 as a turning point in his life. Even though he was a romantic, he did not attribute it in any way to the presence of his new bride in his life. In fact, Ross rarely mentions her in his Memoirs. Instead, writing about the years immediately before he met Rosa, he states "for six years, I had toiled outrageously at almost everything, sparing neither body nor mind; solitary toil which I never mentioned to my friends. Now [referring to his depression in 1888] had come the reaction…I could work no more – nor even play; my ponies browsed unsaddled, my books rested unread. Then, moreover, my faith died – the greatest of all faiths, the faith in labour; and I was overcome with the horror of the cui bono. What was the use of anything?" Cui bono is Latin for ‘to whose benefit.’ The marriage produced 4 children; 2 boys and 2 girls. The eldest child, Campbell Ross, was killed in battle at age 19, shortly after the start of World War I.

With his new wife, new diploma and new training in tow, Ross returned to India with renewed enthusiasm, and he dove right in. He took with him several bacterial cultures and he began to study mosquitoes. One of Ross’s weaknesses, however, was his ignorance of the published literature. In 1880, a French Army physician named Alphonse Laveran first observed malaria parasites in human blood, and his discovery was widely known.

Strangely, Ross soon began to preach on two themes regarding malaria: (1) that the vast majority of supposed malarial fevers were really intestinal in origin (referred to by Ross as ‘intestinal auto-intoxication’); and (2) that Laveran’s so-called ‘parasites’ were really nothing more than blood cells misshapen by faulty techniques used to examine them! This was quite a brash statement from one who only recently became relatively proficient at microscopy.

The year 1894 arrived, and with it a year’s furlough to London for Ross, his wife, and two daughters. On April 10th, Ross met Sir Patrick Manson. It was the beginning of a relationship in science and friendship that both men needed and from which the world benefitted. Manson’s contributions to Ross’s efforts may be summarized as follows:

Figure 3: Lady Rosa Bessie Bloxam Ross, 1902.

Figure 4: Alphonse Laveran.
First, he convinced Ross of the correctness of Laveran’s observations, even showing him malaria parasites on several occasions. Second, he spoke with Ross many times about his theory that malaria parasites were somehow transmitted by mosquitoes. Third, and most importantly, through an extensive and well-preserved series of letters between the men, which in their own right are a literary epic, he helped to sustain, guide and challenge Ross through more than three years of frustrations, discoveries and difficult conditions in India.

Manson harnessed Ross’s unique talents, curiosity and insatiable appetite for work to a significant purpose, and kept him focused on the ‘main thing.’ Also, he knew that others were close to revealing the secrets of malaria transmission, and he pushed Ross to succeed, and soon. The following quotation from one of Manson’s letters illustrates this nicely:

“I was terribly disappointed for I thought you had fallen sick, or that you had got a check, or that you had given up the quest. Above everything, don’t give it up. Look on it as a Holy Grail and yourself as Sir Galahad, for be assured you are on the right track. The malaria germ does not go into the mosquito for nothing, for fun or for the confusion of the pathologist. It has no notion of a practical joke. It is there for a purpose, and that purpose, depend upon it, is its own interests – germs are selfish brutes.”

THE GREAT DISCOVERY AND THE NOBEL PRIZE

After leaving Manson and returning to India, Ross began his quest with a handicap that would have easily overtaken a lesser man – ignorance of almost everything he needed to know! As previously mentioned, he had taken a short course in bacteriology. He was self-taught in microscopy and did not know the literature so he was unaware of a new staining procedure that would have likely saved him hundreds of hours. As serious as these deficiencies were, they were trivial compared to his total lack of knowledge concerning mosquitoes!

His task was simply stated – to study Plasmodium, not in humans, but in mosquitoes – but incredibly complicated, and he encountered almost every possible obstacle. His major contributions over the next three years may be summarized as follows:

First, he demonstrated that volunteers who drank water contaminated with infected mosquito adults and larvae failed to contract malaria. Second, on August 20, 1897 he observed developing human malaria parasites and their characteristic black pigment in the stomach wall of Anopheles mosquitoes, which he called “dapple-winged.” For years after, Ross referred to this date as ‘Mosquito Day.’ The third and most significant contribution made by Ross came about courtesy of the British Army, for about one month after Mosquito Day, he received orders to an area where there was no human malaria. Ross was incredibly disappointed and frustrated by this at first. Some months later, however, this ever-resourceful scientist was able to demonstrate the full avian malaria life cycle using sparrows and Culex mosquitoes.

Ross’s experimental career ended in 1899 when he retired from the Indian Medical Service, perhaps so that he would not have to be away from his daughters, who likely would have been sent back to England for schooling. I shall have more to say about this later.

Ross was nominated for the Nobel Prize in Medicine in 1901, but he did not win. He was nominated again in 1902, and it was suggested by some that he...
For over 25 years, fast-acting Summit B.t.i. Briquets have been the industry standard in extended release B.t.i. formulations. Few products match their record of reliable and environmentally compliant performance. Now Summit B.t.i. Briquets are available through your AMVAC distributor as part of our balanced product line which includes the adulticides; Dibrom® Concentrate and Trumpet® EC.

Contact your AMVAC/AEP distributor today or AMVAC at 1-888-GO AMVAC (1-888-462-6822) and visit www.amvac-chemical.com for more information.

USE OVER ORGANIC CROPS!

The larvicide you know from the company you trust

Summit

B.t.i. BRIQUETS

AMVAC now offers Summit B.t.i. Briquets
share the award with Laveran, but Laveran did not receive his Nobel Prize until 1907. Ross was one of 42 well-qualified candidates, a list that was pared to 3 finalists. They were Ross, Pavlov of ‘Pavlovian response’ fame, and Niels Finsen, who worked on phototherapy of tuberculosis. Ross won, and his monetary award amounted to 141,846 Swedish crowns, then equivalent to about 7,880 pounds sterling, which was a considerable sum in 1902. Ross received his Nobel Prize on December 10, 1902, in Stockholm from the King of Sweden, Oscar the 2nd.

ROSS vs GRASSI

I would like to briefly examine the rift (to put it mildly) that developed between Ross and the Italian investigators, particularly Giovanni Battista Grassi. The Italians began work on transmission of human malaria in the middle of July 1898. By this time, Ross’s proof was complete and partly published. The Italians were well aware of what he had done and they knew that two main tasks remained: (1) demonstrate that the parasite of human malaria had a cycle in the mosquito similar to what Ross had shown; and (2) identify the mosquito that transmits human malaria parasites.

Essentially, the Italians followed Ross’s exact line of investigation, but used Anopheles mosquitoes and human parasites. When their work was published, Ross was stung to anger as he felt he was not given adequate credit. And in my opinion, he was right. But once the quarrel escalated, the simple truths were cloaked and twisted by passion and jealousy. Here is the essence of the turmoil: 1) Ross might have completed his proof with human malaria, but he did not – the Italians did. 2) Ross speculated that the “dapple-winged” mosquito probably was the culprit – the Italians proved it. 3) Ross was the first to demonstrate the entire life cycle of the malaria parasite. 4) Ross is not entitled to the whole credit for the whole proof because he did not finish it in humans.

To quote Gordon Harrison from his book ‘Mosquitoes, Malaria and Man,’ “…it makes no sense or justice to couple the names of Ross and Grassi together as co-discoverers – as is often done – without noting the very large difference between the explorer at the helm and those who rode his decks and helped make a landing.”

Sir Ronald Ross passed away on September 16, 1932, at the age of 75. The cause of death was listed as “illness.” Imagine that! He outlived all 6 of his younger brothers and one of his 3 sisters. Lady Ross died from heart disease almost one year before her husband. Ronald did not attend her funeral, as he was likely distraught and definitely very feeble, having suffered a stroke. Sir Ronald and Lady Ross were interred in Putney Vale cemetery in southwest London.

SUMMING UP

So how should the world remember Ronald Ross? How should we, in the mosquito control profession and field of public health, think of him? The answer, although complicated, is clear in my opinion. He was a dedicated, highly intelligent scientist who made great discoveries. He was a renaissance man, for sure, schooled in the arts and music. He was passionate, inquisitive, and romantic. He could be cantankerous and difficult with
friends and others, without a doubt. Even his relationship with Manson cooled over the years, in part due to Ross’s feud with Grassi.

Rightly so, he fiercely defended his character and scientific achievements. Despite receiving many awards and honors during his life, he felt embittered that he did not receive monetary reward from his country for his malaria work and he petitioned the British government on this subject and on behalf of other scientists. He wrote three novels, numerous poems, dramas and other literary works. He was a mathematician, a musician, and he loved nature.

He was an epidemiologist and sanitarian. Sir Ronald Ross found his professional niche later in life, and once comfortable there, he excelled in his work and sought affirmation of what he had accomplished. Likely, we would all do the same under similar circumstances.

I would like to end with the poem that Sir Ronald drafted on Mosquito Day, and finalized a few days later, after realizing the importance of what he had just seen under the microscope:

This day relenting God
Hath placed within my hand
A wondrous thing; and God
Be praised. At His command,
Seeking His secret deeds
With tears and toiling breath,
I find thy cunning seeds,
O million-murdering Death.
I know this little thing
A myriad men will save.
O Death, where is thy sting,
Thy victory, O Grave!

REFERENCES


All quotations are taken from this book except where noted.

Disclaimer: The views contained herein are solely those of the author and do not necessarily reflect the views of the Department of Defense or the Department of the Navy.

ACKNOWLEDGEMENTS

I thank Dr Graham White for providing much of the background literature and FB for encouragement in completion of the manuscript.

Captain Stanton E Cope
Medical Service Corps
United States Navy (Retired)
captaincope3@gmail.com
240-478-5821
Cost-effective, long-lasting, and easy-to-use Altosid® larvicide has been the professional choice for mosquito control for over 30 years. To learn more about how each of Altosid® larvicide’s formulations can help you to be vectorious in a variety of mosquito breeding environments, visit altosid.com or call 800-248-7763.

High efficacy, reduced risk, and quick and permanent knockdown have helped make Zenivex® adulticide the professional choice for adult mosquito control. To learn more about how Zenivex® adulticide and its unique active ingredient, Etofenprox, can help make you vectorious against adult mosquitoes, visit zenivex.com or call 800-248-7763.

*Always read and follow label directions. Altosid and Zenivex are registered trademarks of Wellmark International. The Central Life Sciences logo is a registered trademark of Central Garden & Pet Company. ©2011 Wellmark International.*
Founding Mothers: Women and the Origins of the Florida Anti-Mosquito Crusade by Gordon Patterson

On Thursday, March 2, 1905 Harrison Dyar, editor of the New York Journal of Entomology and honorary custodian of Lepidoptera at the United States National Museum was in Jacksonville on a collecting mission. The weather had not cooperated. The previous night the temperature plunged to 36°F. Doubtful that he would find anything, Dyar chanced upon some “recently dug holes” left by railroad workers filled with “dirty water.” Despite the overnight chill, the holes contained mosquito larvae. Two days later Dyar found more of the larvae in “temporary pools” in near-by Green Cove Springs and Magnolia Springs. By the end of his Florida sojourn, Dyar had collected 61 specimens of what he initially identified as Aedes sollicitans.

Weeks later Dyar announced that he had erred. The larvae were from a new species of mosquitoes that Dyar designated Aedes mitchellae. “It gives me great pleasure,” he explained, “to name this species in honor of Miss Evelyn G Mitchell” (Dyar 1905). Evelyn Mitchell was at that moment at work on a book which would be published two years later in 1907. Mitchell’s Mosquito Life was the first book written by a woman on mosquitoes and mosquito control. In his book review, John B Smith described Mitchell’s work as “very accurate and as nearly complete as a work on a living topic on which many persons are engaged can ever be” (Smith 1908). Harrison Dyar, however, continued to worry about the accuracy of his description of Aedes mitchellae. Seventeen years after his Florida visit, Dyar revised his entry on Aedes mitchellae in his Mosquitoes of the United States. He observed, “This species is very seldom met with, and then in small numbers” (Dyar 1922).

Dyar’s observation about Aedes mitchellae was not, however, to be the case for women in the anti-mosquito movement in Florida. Women social activists in general and a woman named Vida Lester MacDonell in particular played a crucial role in the creation of the Florida Anti-Mosquito Association in 1922. Three years later MacDonell and her confederates were instrumental in securing the Florida legislature’s passage and governor’s signature on a bill authorizing the formation of the mosquito control districts. A decade later, Vida MacDonell used her connections in the Federated Women’s Clubs of Florida to rally support for mosquito control in the midst of the Great Depression.

It is necessary at this point to say a word about sources. A history is only as good as the documents and sources on which it is based. Lamentably, there is scant evidence concerning Vida Lester MacDonell. All that has survived of MacDonell’s career as a mosquito crusader is a handful of newspaper clippings, reports, and the text of a single speech. What is known about Vida Lester MacDonell comes “through a lens darkly” by reading between the lines and tracking her work through the career of her husband, William MacDonell, as Jacksonville’s Health Officer between 1917 and 1925.

Vida MacDonell’s active engagement in the anti-mosquito crusade began in 1917. In 1917, the MacDonells left St Augustine and moved to Jacksonville where William MacDonell assumed the position as the city’s health officer. In their first weeks in Jacksonville, the MacDonells struck up a friendship with George Simons, who led the State Board of Health’s Bureau of Engineering. Simons was also new to Jacksonville. In July 1916, Joseph Porter, Florida’s State Health Officer, recruited Simons to serve as the state’s first sanitary engineer. When Simons arrived in Jacksonville, Porter charged him with winning public support for mosquito control and with organizing a program to eliminate the breeding places of mosquitoes. Six months later, Simons reported to Porter on his progress. He had spent his first weeks in Jacksonville organizing and staffing the newly formed Bureau of Engineering, persuading Arthur Shuey, a friend and fellow MIT graduate, to lead the Bureau’s water and sewage laboratory, and making 22 surveys of cities and towns (Patterson 2004).

America’s entry into World War I led Porter and Simons to redouble their anti-mosquito efforts. It was essential that the troops be protected against the mosquito menace. Simons and the MacDonells joined forces in organizing malaria control work at Camp Johnson outside of Jacksonville. No state, an anonymous contributor to Florida Health Notes observed, “has as much cause to enter whole-heartedly..."
into this mosquito warfare as any people on earth.” Mosquitoes had brought a “reign of terror” to Florida. World War I made it clear that the time had come to make the “chronic malaria carrier...” a thing of the past (The Entente Mosquitoes 1917).

The armistice in November 1918 did not end Simons and the MacDonells’ anti-mosquito alliance. During the winter and spring of 1918 and 1919, the Spanish influenza pandemic was Simons and MacDonell’s major concern. Still, the success of the Camp Johnson anti-malaria campaign was not forgotten. “Nowhere in Florida,” the Florida Health Notes reported, “has the importance of Malaria Control Work been realized as much as in the territory surrounding the US Government Reservation in Jacksonville” (Malaria Control Work 1918). By 1920, the anti-mosquito forces were able to launch a malaria control project in Perry, FL.

Located in the heart of Florida’s timber country, Perry’s 2,000 residents found themselves at an epidemiological crossroads. The surrounding flat pine woods and cypress swamps in Taylor County were both a blessing and a curse. Perry’s economy was based on sawmills and lumber companies. The same low, wet woods, however, made for an ideal habitat for Anopheles quadrimaculatus. Malaria was endemic. Health conditions in Taylor County were abysmal. A survey revealed that fully 65% of the county’s school children showed evidence of malaria (Patterson 2004).

Simons formulated a plan that called for both immediate and long term measures. Ponds should be treated with oil while local workers stocked the county’s creeks, ditches, and any standing water with minnows. All houses should be screened and 170,000 doses of quinine were stockpiled for the residents. Success entailed eliminating the swampy areas which formed an ideal habitat for An quadrimaculatus. The solution lay in improving the flow of two creeks and lowering the water level in the pine flatwoods. By November 1920, workers had excavated more than 46,000 cubic yards of earth, opened three miles of creek beds, and cleared fifteen acres of land (Simons 1923).

The Perry project transformed mosquito control in Florida. The project dwarfed earlier undertakings. One year after the work’s completion, Simon’s inspectors canvassed the community. They were astonished. There had been a 90% reduction in the malaria infection rate (Patterson 2004).

The anti-mosquito work was not limited to malaria. The next year during the summer of 1921 there was a state-wide dengue outbreak. Looking back a decade later, Vida MacDonell maintained that the 1921 dengue epidemic had proved a blessing in disguise. As the rest of the state suffered from the pangs of “break bone fever,” Perry escaped the peril. This led Vida MacDonell, her husband, and George Simons to launch a state-wide effort for mosquito control.
In the next ten months Simons organized an anti-mosquito program in Miami. William MacDonell launched a similar effort in Jacksonville. Vida MacDonell realized that there needed to be a state-wide coordination of these initiatives if the public were to be drawn into the anti-mosquito movement. Using her position as the Chairperson the Florida Federated Women’s Clubs Health Committee, Vida MacDonell campaigned for the women’s clubs throughout the state’s adoption of the anti-mosquito cause.

The summer of 1922 brought a massive outbreak of dengue fever which spread across the Gulf Coast from Texas to Florida. Some have estimated that as many as 500,000 cases of dengue occurred (Medical News: Texas 1922). In Jacksonville, William MacDonell reported to the Journal of the American Medical Association that there were 20,000 cases of dengue in a population of 100,000 (Richardson 1933). In September, Dr MacDonell himself fell victim to dengue (Medical News: Florida 1922). When skeptics publicly doubted that mosquitoes vectored the disease, MacDonell published an invitation to any doubter to come to his office where they could be bitten by an Aedes aegypti mosquito which had fed two weeks earlier on the blood of someone suffering from dengue. The insect’s bite was free (Captive Mosquitoes 1922).

In October and November 1922, Vida MacDonell rallied support among the state’s women. MacDonell reported that during this period 49 women’s clubs had discussed mosquito control; 12 had set a date on their agenda when they were going to discuss the topic; 10 had endorsed the idea of mosquito control and called on local authorities to adopt a program; 28 had begun active work; 23 were involved in educational initiatives, and 49 had participated in mosquito clean-up days (MacDonell 1932).

When Joseph LePrince, General Gorgas’ sanitary engineer in Panama, learned of Vida MacDonell’s campaign on behalf of mosquito control, he declared that the report of this work “Should be broadcast by the Associated Press all over the country as it would help the Public Health Service in the mosquito program as nothing else would” (MacDonell 1932).

Later, George Simons would describe the fall of 1922 as the “psychological moment” for advancing mosquito control. In a series of speeches he called for the creation of a state wide anti-mosquito crusade. Vida MacDonell used her connections in the Women’s Clubs of Florida to find a location for the first meeting of the anti-mosquito forces. She asked her friend Dr Josie Rogers if it would be possible for the mosquito warriors to meet in Daytona. Rogers, a medical doctor who chaired the Child Welfare Committee for the Federated Women’s Clubs, offered the Palmetto Club House in Daytona for the meeting.

On December 6, 1922, roughly 150 anti-mosquito crusaders gathered in Daytona. Josie Rogers, who had recently been elected the city’s first female mayor, welcomed the delegates. The platform party included the venerable Joseph Porter and Ralph Turck, the current state health officer. Turck declared that this was “the natal” hour for mosquito control in Florida. George Simons was adamant in his conviction that “had it not been for the wholesome, enthusiastic cooperation of the organized women’s Clubs of Florida, it is questionable how far the association would have progressed, and what achievements could be reviewed at this time” (Patterson 2004).

Two years later on December 3, 1924 the Florida Anti-Mosquito
Association elected Vida Lester MacDonell its first woman president. Her election came at a critical moment. The association hoped to win approval in the spring legislative session a bill allowing the formation of mosquito control districts.

At this moment a personal tragedy occurred which reveals much about Vida Lester MacDonell’s determination and will. On January 17, 1925, her forty-four year old husband killed himself. Two days later George Simons and Ralph Turck led the casket’s pall bearers. That morning The Florida Times-Union reported on the funeral and concluded that for some time MacDonell had made “fighting mosquitoes one of his hobbies.” During the next six months following her husband’s suicide, Vida MacDonell made his “hobby” her commanding passion. Enactment of a mosquito abatement act would be a tribute to her husband. In late May, Governor John Martin signed into law a bill authorizing the formation of Florida’s first mosquito control district in Indian River County.

Vida Lester MacDonell lived another 44 years, dying in May 1969. In the 1930s she helped revitalize the Florida Anti-Mosquito Association. By that time a new generation of professionally trained women entomologists were emerging as leaders in the anti-mosquito movement. In Jacksonville, a young woman from Indiana named Nina Branch had joined the State Health Board; see Figure 1. At the same time, Lucille Logan began work at the Rockefeller Malaria Treatment Station in Tallahassee with Mark Boyd; see Figure 2. In the early 1940s, Logan and Boyd recruited a young college student named Elisabeth Colvin, later known as Beth Beck, to work as their entomological assistant; see Figure 3. Later Branch, Logan, and Beck would all serve as presidents of the Florida Anti-Mosquito Association. In February 2013, Roxanne Connolly, another past president of what is now known as the Florida Mosquito Control Association, will become the president of the American Mosquito Control Association.

Women played a critical role in the development of Florida’s anti-mosquito crusade. Harrison Dyar was undoubtedly right about the habits of *Ae mitchellae*. They are, in fact, few in numbers and rarely seen. That is not the case with women in mosquito control in Florida. “Women,” the headline for a story reporting Vida MacDonell’s election as president of the Florida Anti-Mosquito Association declared, “achieved victory through Mrs MacDonell.” Today, to paraphrase the 12th century figure Bernard of Chartres, “If we have seen farther than others, it is because we have stood on the shoulders of giants” – the founding mothers of mosquito control.

REFERENCES CITED


Dr Croft to Be Named as Acting Health Officer. 1925, Jan 19. Florida Times-Union. Sec A.


Dyar, HG. 1922. The Mosquitoes of the United States.


Gordon Patterson
Professor of History
patterso@fit.edu
Humanities Department
Florida Institute of Technology
150 West University Blvd
Melbourne, FL 32901
321-674-7382
**FFast® Bti reaches the mosquito larvae that others don’t.**

Introducing FFast® Bti, a new larvicide that uses Bayer’s FFast technology to control larvae up to 300 feet from your spray vehicle.

- Controls container-breeding mosquitoes including *Aedes albopictus* and *Aedes aegypti*
- Use it in your ULV equipment night and day
- Saves time and labor each time you spray
Extend the effectiveness of your mosquito control program with Ultra Low Volume Concentrate Insecticide

- A proven adulticide that can significantly delay pyrethroid resistance development
- Approved for use on rangeland and pastureland, unlike most adulticides
- Available in five-gallon pails, 55-gallon plastic drums, and 260-gallon mini-bulk containers
- Proudly manufactured by Cheminova since 1968

1.919.474.6600 | www.FyfanonFacts.com

For use only by Federal, state, tribal or local government officials responsible for public health or vector control, or by persons certified in the appropriate category or otherwise authorized by the state or tribal lead pesticide regulatory agency to perform adult mosquito control applications, or by persons under their direct supervision. Not for application to people. Fyfanon ULV is registered for use by ground or air and can be used in both rural and urban areas.

© 2011 CHEMINOVA, INC. Always read and follow label directions. FYFANON is a registered trademark of Cheminova. Contact your local distributor for complete information.
By the time this article hits the press, there is a good chance that our efforts to get the provisions of HR 872, the so-called Reducing Regulatory Burdens Act will have either been passed out of conference as part of the Farm Bill or remanded to the dustbin of good legislation made hostage to the vagaries of politics. Whichever the outcome, a colossal amount of effort has been expended over the past few years to bring this important bill to fruition. To be sure, AMCA’s estimable legislative advocate, Ed Ruckert, has exercised his considerable legal expertise and beltway savvy on our behalf far beyond our capacity to properly recompense. His contacts in the legislative and regulatory loop are quite simply beyond the reach of our membership and have been invaluable assets in this lengthy endeavor. We owe Ed a great deal, for he has fought the good fight. He firmly believes in our cause, but more so, he believes in the rule of good law – would that some of our legislators feel likewise.

While I’m doling out the kudos, Dave Brown is first in line for our association’s gratitude. He has put in an enormous amount of time and energy shepherding a wide array of issues of critical importance to mosquito control through the maze of governmental legislative and regulatory schemes. In fact, the entire Legislative and Regulatory Committee deserves credit for attending to matters that quite simply would shut us down if left unattended to fall through the cracks. We are continually being challenged by court and Agency/Services rulings regarding pesticide use restrictions, ESA, and a host of other ancillary problems that never make it into association proceedings and discussions, but are dealt with before they become critical. Bill Meredith, Karl Malamud-Roam, Mike Hudon and their committee staffs are doing the footwork and gatekeeping so the rest of us have freedom to serve our public. Never take their efforts for granted.

The work of these dedicated individuals certainly does not preclude the rest of the AMCA membership from taking part in the legislative and regulatory process. If it affects you (and it does), you should become involved out of enlightened self-interest – because your job is most definitely at stake. It never ceases to amaze me how disengaged from national and state legislative processes some AMCA members claim to be. A number of surveys AMCA has conducted have produced a dismaying number of comments to the effect that the member is not interested in legislative issues or doesn’t think that they are that important. That is extremely myopic and reflects a profound ignorance of the manifest threats posed by activists and others who decry pesticide usage for any reason. Believe me, there are individuals and organizations out there that want to see us go away – and they frankly don’t care about the consequences. What’s worse, they have enlisted the assistance of the court system and arcane congressional procedures to bypass the will of the people to see us compromised – as in the case of the recent National Pollution Discharge Elimination System (NPDES) ruling and the political shenanigans that have kept a legislative fix from even being discussed in the Senate.

To counteract these tactics, AMCA needs to mobilize at all levels. District managers and commissioners are generally the most engaged, but district staffs and their constituents should be also. Frankly, one’s position in the district hierarchy does not abrogate one’s right to seek redress from one’s elected official as an American citizen. Regardless of strictures against lobbying in some organizations, there is nothing preventing you from informing your fellow citizens of the issues and measures they can take to enlist congressional support. It is your right and all should be encouraged to do so.

Don’t count on your program’s manifest public health benefits as providing you some unsailable niche protected from activist challenge. If the NPDES debacle hasn’t convinced you that judicial rulings can often trump common sense, then you’ve not been paying attention. We will increasingly need to defend what, up till now, has been self-evident – that mosquito control activities regulated under FIFRA and endorsed by CDC, EPA and the vast majority of your constituents are part and parcel of a healthy populace.
and environment, where vectorborne diseases are a thing of the past. Indeed, at some point in the future, public health pest control may not survive judicial challenge when interpretations of the law and regulatory intent come into play. Think it can’t happen? Think again. It certainly won’t be an easy defense, either. Sadly, we mosquito control advocates have to come out with detailed studies proving our claims, while all the activists need do is fashion fraught descriptions and offer disingenuous intimations of some outrage to “environmental justice” – and even then, the detailed studies only work in a climate where people care more about facts than they do about appearances. The seemingly perpetual issue involving methoprene use and its putative (not to say farcical) relation to lobster population declines in the northeast is unfortunate testimony to this.

As you can tell, I’m very passionate about legislative and regulatory issues, because I’ve seen up close how very tenuous our positions are and how easily we could be regulated or legislated out of existence if we cannot make a strong case for our profession. I’m even more passionate about our duty (and I do mean duty) to participate in the process. Never forget – a great many men and women have died over the years to provide you that right and you cheapen their sacrifice through inaction. Believe me, I’ve heard the whole range of excuses for remaining disengaged, and I cannot and will not accept any of them. One doesn’t have to register as a lobbyist to exercise this right. Educating your fellow citizens so that they are informed is also invaluable, as they can then ensure their respective legislators can make informed choices on their behalf. At any rate, no one is required to do the legislative footwork in your stead – in the end it’s your job. Thankfully, certain individuals in the AMCA choose to do so because they can appreciate the stakes and have chosen to do something about it. Those of you choosing to remain on the sidelines, allowing others to do the heavy lifting are, frankly, part of the problem. So, get off your duff and defend that which you know to be right. We are saving lives and we should be willing and able to make that case to both legislators and the media. Goodness knows that the activists certainly have no compunction about making their views known to legislators and anyone else who will listen. Is their message more important than ours?

Joseph M Conlon
AMCA Technical Advisor
conlonamcata@gmail.com
1500 Millbrook Court
Fleming Island, FL 32003
904-215-3008

The Florida Mosquito Control Association will hold the 29th Dodd Short Courses on January 28 - February 1, 2013 at the Ocala Hilton, 3600 SW 36th Avenue, Ocala, FL 34474. For more information, visit the FMCA website at www.floridamosquito.org.

The Michigan Mosquito Control Association’s 27th Annual Meeting will be held February 6-7, 2013 at the DoubleTree by Hilton, 1 Wenonah Park Place, Bay City, MI 48708. For any questions, please contact Planning Chairman Rebecca Brandt at brandtr@baycounty.net or visit the MMCA website www.mimosq.org.

The 10th Arbovirus Surveillance and Mosquito Control Workshop will be held at Anastasia Mosquito Control District, St Augustine, FL, March 26-28, 2013. Visit AMCD's website at www.amcdsjc.org or contact Jessica Phillips at 904-471-3107 or jessicaamcd@bellsouth.net for more information.

The 3rd International Forum for Surveillance and Control of Mosquitoes and Mosquito-borne Diseases will be held at Suzhou, Jiangsu Province, China, May 27-31, 2013. The forum will be sponsored by the Asian Society of Vector Ecology and Mosquito Control, Entomological Society of China, Beijing Institute of Microbiology and Epidemiology, and Jiangsu CDC. Contact Dr Tong-Yan Zhao ataedes@263.net and Dr Rui-De (Rudy) Xue at xueamcd@gmail.com or call 904-471-3107 for more information.
Scalable GIS Software Solutions

Field Solutions For Small to Large Enterprise Operations
Electronic Data Solutions provides complete solutions for recording, mapping, managing, and reporting data for all sizes of mosquito control operations.

Powerful.
Ready-to-use applications built on core Esri® ArcGIS® platform leveraging advances in web, mobile computing, and cloud technology.

Dedicated.
We’ve been supplying and supporting field data collection solutions for over 25 years.

Proven.
Our software is used at over 360 mosquito control agencies in the U. S. and Canada.

Elecdata has acquired the Clarke® DataMaster® & Quicklog™ software.
Contact us for support and upgrade information.

FieldSeeker™ GIS
for Mosquito Control
Esri® ArcGIS® for Server, ArcGIS® for Mobile and web applications.

Sentinel™ GIS
Applications based on Esri® ArcGIS® for Desktop and ArcPad® Software.

Map, Track, and ATTACK

Electronic DATA SOLUTIONS®

208-324-8006  |  Call for a demo today!  |  www.elecdata.com

In partnership with: Juniper Systems® Inc., Field Computers,  Esri® GIS Software and Trimble® GPS Receivers
Sentinel GIS Sales Representatives:  Univar USA and Clarke  -  FieldSeeker GIS Sales Representative: Clarke

Copyright 2012 © by Field Data Solutions, Inc. All rights reserved worldwide. DataPlus, HydroPlus, Sentinel, VCMS, Vector Control Management System, DataMaster, FIELDBRIDGE and Electronic Data Solutions are registered trademarks of Field Data Solutions, Inc. FieldSeeker, Everglade, DataLink and Quicklog are recognized trademarks for Field Data Solutions, Inc. Trademarks provided under license from Esri. All other trademarks are registered or recognized trademarks of their respective owners.
WHAT IS THE PRICE FOR PEACE OF MIND?

Having a Contingency Emergency Aerial Contract in place for any type of emergency mosquito control application is priceless. Being prepared brings confidence that you have taken a proactive approach in protecting public health.

No other contract team has done more aerial applications than Clarke and Dynamic Aviation. With a contingency contract in place you’ll have the support of an expert team and a quality plan that includes preliminary area mapping, a pre-approved FAA plan, public notification procedures, appropriate licenses and certificate of insurance (with additionally insured clause) completed and on file.

The best part….there is no cost for a contingency plan.

To learn more about securing peace of mind for your program give us a call at 1-800-323-5727 or email your request to clarke@clarke.com.