

## **Are Mosquito Spray Pesticides Worsening the Encephalitis Problem?**

The following research provides the strongest evidence to date linking pesticide applications with increasing the incidence of encephalitis carrying mosquitoes.

We will be ordering the complete article and placing a detailed summary on this site once it arrives. We are requesting that concerned citizens read through the article and write a letter to the editor to their local paper regarding this topic.

### **Impact of naled (Dibrom 14) on the mosquito vectors of eastern equine encephalitis virus.**

SOURCE: *Journal of the Am Mosquito Control Assoc*, Dec;13(4):315-25, 1997

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In central New York, aerial mosquito adulticide applications have been used in response to eastern equine encephalitis (EEE) outbreaks and have targeted the swamp habitats of the primary enzootic vector of EEE virus, *Culiseta melanura* (Coquillett). The organophosphate insecticide Naled (also called Dibrom) (1, 2, dibromo-2, 2-dichloroethyl dimethyl phosphate) has been the insecticide of choice in this region. This study reports on analyses of 11 years (1984-94) of mosquito collection data from Cicero and Toad Harbor swamps in relation to applications of naled. Naled applications were successful in achieving short-term reductions in mosquito abundance. However, despite repetitive applications, populations of the primary vector of EEE virus, *Cs. melanura*, have increased 15-fold at Cicero Swamp. Preventive applications had no noticeable impact on the enzootic amplification of EEE virus, and isolations of virus following preventive applications have resulted in additional spraying. The possibility that applications of naled contributed to increased populations of *Cs. melanura* discredits the rationale that preventive applications of naled reduce the risk of EEE.

#### **CHEM-TOX COMMENTS:**

The above research provides strong evidence of how mosquito control pesticides (once applied to a "pristine" wildlife habitat) can then result in a dramatic increase in the incidence rate of encephalitis carrying mosquitoes in the area. While this research only shows "what is happening" - the next research would suggest investigations into "why it is happening." Current theories regarding this issue include:

## 1) Weakening of Wildlife Immune Systems

Due to the recent increase in journal articles finding that low level chemical exposures can decrease the quality of mammalian immune system function, it is quite reasonable to expect wildlife in this immune weakened state to contract encephalitis more frequently. Therefore, one would also expect to see an increase in the numbers of mosquitoes developing encephalitis (since their chance of biting encephalitis infected wildlife has also increased).

## 2) Damage to the mosquito genetic structures

Studies have shown that mosquitoes with a "leaky" stomach barrier allow transfer of the encephalitis virus from their stomach to their salivary glands (after ingesting a contaminated blood-meal). Mosquitoes which do not exhibit this "leaky" stomach condition do not appear to be able to contract encephalitis either at all - or as readily. Therefore, since chemical pesticides are well-known to induce genetic damage in tests in living cells and in animal test models, the possibility must be considered that genetic mutations could very well be occurring to the genes within the mosquito which control proper stomach integrity and that this resulting loss of integrity could be increasing the encephalitis development rate among mosquitoes.

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### Evidence Suggests a Possible Link

by Richard Pressinger (M.Ed.)  
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A new theory is coming to light which should be causing concern regarding the use of chemical pesticides for controlling mosquito populations in Florida and elsewhere. Because of the serious potential for irreparable widespread harm to human health regarding this potential problem, it is an issue that cannot be ignored and must be investigated immediately and thoroughly as it is based on the latest information we have regarding encephalitis carrying mosquitoes and human genetic function.

### New Discovery Encourages New Theory

As scientists learn more about encephalitis, along with the effects of chemical pesticides on human health, we are now able to see connections between the two that suggests pesticide use may very well be increasing the encephalitis problem it was intended to reduce. Rates of encephalitis infection among "Sentinel Chickens" in Brevard County Florida have steadily increased from zero in 1990 to three around 1995 and are now up to seven in 1999. Other Florida counties are seeing similar increases as well. Hundreds of millions of

dollars are being spent each year on mosquito control in Florida, yet, the encephalitis problem (at least according to our monitoring system), continues to worsen. A 15-fold increase in encephalitis carrying mosquitoes was found in one New York swamp habitat after beginning treatment with the pesticide Dibrom (Naled) over an 11 year period. This was reported in the Journal of Mosquito Control (1997, Vol. 13). This provides strong evidence demonstrating that current chemical treatment methods are actually making the situation worse in the long term. Common sense suggests if this trend continues - the likelihood of being bitten by an encephalitis carrying mosquito will increase dramatically as long as we choose to continue the use of chemical pesticide applications.

### **Theories are the 1st Step in Determining Scientific Fact**

In one of our opening class lectures, while a graduate student at the College of Public Health, University of South Florida in Tampa, our professor began his comments by stating - *"Whenever you begin postulating circumstances related to the causes of illness - make sure it has one important denominator - Biological Plausibility"*).

What he meant by this is that, whenever we begin making theories on public health issues, we need to first make sure there is logic and common sense driving the points in our theories. I agree with this view completely and is the reasoning which underlies what you are about to read and why it should be setting off an alarm in anyone concerned about public health.

In early November, I met with University of Florida's new genetics viral/mosquito researcher, Dr. Walter Tabachnic, at the Florida Medical Entomology Lab in Vero Beach, Florida. While discussing the latest information regarding what is known about the encephalitis mosquito, Dr. Tabachnic said something which drew my attention because of other research I had come across on the harmful effects of chemical pesticides.

### **HOW ENCEPHALITIS BEGINS**

Let me first address a few important points regarding encephalitis and mosquitoes as stated by Dr. Tabachnic: (Please note that this background information by Dr. Tabachnic is provided only to clarify understanding of the encephalitis process and does not suggest his views on this theory one way or another.)

1) Birds are the original carriers of viral encephalitis.  
Some birds are apparently more infected with the encephalitis virus (primarily "morning doves" and "crows")



The DNA molecule contains thousands of genes (the colored balls) which control every aspect of life - from how well the immune system works to how well the stomach lining functions.

2) Mosquitoes bite infected birds which transfers the virus to the mosquito.

3) Somewhere between 7 and 14 days later, the mosquito can then transmit the disease to humans, however, University of Florida researchers discovered that not all mosquitoes get encephalitis, in fact, of the thousands of mosquitoes that do bite an infected bird - only 1 or 2 even develop the disease. Interesting to say the least.

The next big question, however, is to find out what was different between the mosquitoes that became infected with encephalitis and the ones that didn't. Dr. Tabachnic said it wasn't deficiencies in mosquito immune systems (although other research suggests this could possibly be occurring with wildlife populations), however, there was one other consistent biological finding.

THE MOSQUITOES WHICH DEVELOPED ENCEPHALITIS ARE SUSPECTED OF HAVING

**"PROBLEMS" WITH PROPER FUNCTION OF THEIR STOMACH LINING** WHICH THEN ALLOWS THE VIRUS TO MOVE PAST THE LINING AND INTO THE MOSQUITOES CIRCULATION AND INTO THE SALIVARY GLANDS.

What these specific "abnormalities" are which allow the virus to leak through the stomach lining are not yet identified. However, since there is an obvious biological difference between mosquitoes that "do" and "do not" become infected with the virus, it is essential that efforts be put into explaining why this difference occurs.

## EVIDENCE FOR GENETIC DAMAGE

Since every aspect of a living organism's life is controlled by the genes on its DNA molecule, it would be logical to assume that something would be genetically wrong with the genes controlling stomach lining function (in the mosquitoes susceptible to encephalitis infection).

Before I go further, I was told by another entomologist at the UF Research Lab, Dr. Richard Baker, that it takes about 2 or 3 direct "droplet hits" from an airplane or spray truck pesticide mist to kill a mosquito. If the mosquito gets hit with only one droplet, which happens to millions of mosquitoes when the pesticides are sprayed - they will survive. However, as you could imagine, the insect wouldn't be the healthiest at this point, just like if you or I received half the dose necessary to kill us. Since both the pesticides malathion and dibrom have been found to cause genetic damage in tests of living cells (and malathion has been shown to cause premature gene loss) the mosquitoes could very likely be developing significant genetic hits due to this high level of sub-lethal pesticide exposure.

## DAMAGED DNA

Here is the key point - When these genetically weakened mosquitoes reproduce, their offspring have a potential for being genetically inferior in many subtle ways themselves. Researchers found that the pesticide malathion was able to literally cause genes to break-off the DNA molecule - called gene "deletions" (Cancer Research, May, 1996). A quick biology lesson - our chromosomes are comprised of the DNA molecule which in itself is comprised of approximately 100,000 genes.

Like all living creatures, the mosquito has genes on his DNA which control everything from how well he flies to (yes) how well his stomach lining works. AS a quick note - Brevard County had been using malathion for mosquito spraying here for many years and only stopped this year and switched to another known (and considered even more toxic) pesticide - "Dibrom" (sometimes called Naled).

### **The Theory Showing How Pesticides Could Be Increasing the Encephalitis Risk**

The bottom line - every time a mosquito spray plane or truck sprays these proven genetically damaging pesticides (dibrom and malathion) over the area, they are very likely increasing the amount of subtle genetic damage in the mosquito population, and hence, increasing the number of mosquitoes with genetic flaws which could in theory, allow the encephalitis virus to take hold and grow more rapidly.

Therefore, the chain of events which could explain the increases being seen in Brevard County's Encephalitis Animal Monitoring Program include:

- 1) Mosquito Control sprays pesticides over the area - which causes -**
- 2) More subtle genetic flaws in mosquitoes - which causes -**
- 3) More mosquitoes now vulnerable to encephalitis - which causes -**
- 4) More mosquitoes developing encephalitis - which causes**
- 5) More bites on humans by encephalitis mosquitoes - which causes -**
- 6) More humans becoming infected with encephalitis.**

So while we are given warnings about wearing long sleeved shirts and plenty of bug repellent, there may now be one more prevention strategy we can use -

Impose an immediate moratorium on pesticide spray operations until at least more research can be completed and concentrate our current energy and efforts on effective alternatives.

The theory outlined in this article is that solely of the author and is not that of any scientists who contributed background information for the article.

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For more information on the health risks of mosquito control pesticides - dibrom - naled - and permethrins - please visit - <http://www.chem-tox.com/brevard>

For more information on health effects from the pesticide malathion - visit - <http://www.chem-tox.com/malathion/research>

For more information on the health effects from all pesticides - visit - <http://www.chem-tox.com/pesticides>