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Joseph Conlon

Committee on Energy and Commerce  
2125 Rayburn House Office Building  
Washington, DC 20515-6115

Dear Members of the Subcommittee on Oversight and Investigations:

Pursuant to your request to provide answers to member's questions generated by my testimony before the Subcommittee, the following are provided for the record:

### The Honorable Tim Murphy

- 1. Now that the Zika Action Plan Summit on April 1, 2016 in Atlanta, GA has passed, do you have any additional concerns or issues that you would like to raise – and that you believe have not been adequately covered thus far – to improve the federal response to mosquito-borne illness?**

Clinicians and epidemiologists were the featured parties at the Plenary Session. There was no entomologist as a speaker for any of the plenary sessions, so basic bionomic and control issues related to *Aedes aegypti* and *Aedes albopictus* were presented by Lyle Peterson, a physician and Director of the CDC Division of Vector-borne Disease in Fort Collins, Colorado. CDC has a number of superb medical entomologists on staff that could have made valuable contributions towards educating the public health officials sorely in need of their input to facilitate making informed decisions on preparedness and control response. In addition, mosquito control specialists from the American Mosquito Control Association were invited to attend, but were not given the opportunity to speak at the Plenary Sessions.

The breakout workshop sessions in the afternoon included two identical vector control sessions of 1.5 hours, which addressed questions from participants at three separate tables, but which was of insufficient length to allow each table to share its discussion topics with the others. In all, vector control received short shrift throughout the one-day conference. Future summits should allow for adequate time for vector control issues to be discussed before the entire assemblage so that decision-makers are aware of the complexities involved that could profoundly influence prevention/control strategies.

The focus on Zika virus as a neonatal problem is understandable, but more time should have been taken to outline priorities with regard to how we intend to contain

American Mosquito Control Association

1120 Route 73, Suite 200, Mount Laurel, NJ 08054

Phone: 856-439-9222 • Fax: 856-439-0525 • E-mail: amca@mosquito.org • www.mosquito.org

the virus should it begin to appear in force during the summer, when mosquito populations are expected to surge. It was also quite evident that the public health officials present were in need of considerable education of the idiosyncrasies attendant *Aedes aegypti* and *Aedes albopictus* which might profoundly influence planning. It should be remembered that, while Zika is the current threat, it may fail to emerge and spread to the extent of our fears in the U.S. as in the case of chikungunya last year. We will have thus wasted much time and energy that could have been better spent bringing more comprehensive and universally applicable control options to the table in terms of new active ingredients, control strategies, vector control capabilities and the like that could be used to prevent/counter a variety of mosquito-borne disease challenges. Regardless, Zika certainly provides the springboard for us to begin to address gaps in knowledge of vector distribution and control preparedness (resources available/needed, nature of their deployment), but we shouldn't lose sight of the long-term picture beyond Zika.

I fear that the lions share of resources will ultimately be allocated to public health officials epidemiologists tracking the occurrence and (potential) spread of Zika in the U.S. (as happened with West Nile virus), while funds involving actual intervention strategies for training increased numbers of vector control personnel, comprehensive public education campaigns, development of memoranda of agreement, etc. will remain an afterthought.

To be sure, Zika is the latest in a series of mosquito-borne viruses to challenge our control capacity. More (Mayaro virus and Oropouche virus come to mind) are most certainly on their way in the future. Preventing their introduction and/or controlling their spread will entail eliminating their vectors or at least keeping their numbers below transmission threshold. To the extent we can prepare our public health infrastructure to control *Aedes aegypti* and *Aedes albopictus*, we will have saved considerable time in playing our usual game of catch-up after the fact.

### **The Honorable Marsha Blackburn**

#### **1. In light of the Olympics later this summer, should Brazil be more aggressively deploying innovative solutions, such as genetically modified mosquitoes, to slow the spread of Zika virus?**

The risk of infection by Zika virus attendant to the Olympics is difficult to quantify. The vast preponderance of infections, to date, have been in areas of depressed socioeconomic conditions involving overcrowding, lack of screening, inconsistent trash removal, non-functional potable water distribution systems, problematic sewerage, among others.

Olympic athletes will be exposed to mosquito bites to varying degrees while staying in the hotels in Olympic Village or in resort areas. Whether this presents a true risk of acquiring the disease is open to question. Dining out in cafes or bars is definitely a potential risk. Effective EPA-registered repellents should be made available to the athletes and they should be encouraged to use them, providing the ingredients in the

repellents do not compromise them in drug testing. I'm unaware of any conflicts in this regard, but the potential is there and should be thoroughly investigated with the manufacturers prior to use by the athletes.

Public education programs are in effect countrywide. Many private enterprises are supporting governmental public education campaigns. Billboards, bus flyers, flyers in elevators, airports, etc. are very evident everywhere according to sources in country. In a survey where participants were asked about their knowledge of dengue and Zika vectors, 91% were knowledgeable, which is a very high percentage of the population. An identical survey here in the United States involving Zika or West Nile, would, in all likelihood, not approach that percentage. The problem remains, though, that even though 91% know what to do, less than 55% actually do it, according to the survey.

Should the Brazilian government be deploying more innovative strategies? It's a more complex question than it might seem at first. We must remember that ongoing outbreaks of mosquito-borne disease require intervention measures that kill infective adult mosquitoes in the here and now. This is provided by the proper use of approved pesticides to which the mosquitoes are susceptible. On the other hand, GMO/*Wolbachia*/etc are rather slow to take effect compared to pesticides, which provide immediate reduction of infective mosquitoes on the wing. The vector population suppression that GM technologies provide, while critical in the long term, are clearly not effective in reducing ongoing transmission.

In my opinion, they should be both investigating and judiciously employing GM mosquitoes, while emphasizing tactics with a proven history of efficacy such as source removal and effective interior sprays/exterior barrier treatments. It appears they are doing this, but whether this will be sufficient to prevent any and all transmission remains to be seen. In particular, they should be testing for insecticide resistance and adjusting their chemical use to ensure the products they use are actually working. This is problematic at present. According to public health sources in-country, governmental approval is required for product use and deployment. This can impede timely delivery of control interventions. Many mosquito control/public health agencies (Secretarias Municipais de Saude) are trying to use both innovative and tested approaches, but are hindered by regulations issued from other federal government agencies. Furthermore, the availability of only one or two approved insecticide products makes rotation of chemistries for resistance prevention extremely difficult. In effect, at times they are forced to utilize certain pesticides that they already know are ineffectual due to resistance by the mosquitoes, because of a lack of approved alternatives. This is not a public health agency problem, but a regulatory agency bureaucracy issue.

Genetically modified mosquitoes using the Release of Insects with a Dominant Lethal gene (RIDL) are only one facet of a program that should include public education focusing on comprehensive removal or modification of container breeding habitat around residences and businesses, space sprays indoors, provision of bednets and repellents in addition to training on their proper use. The developers of the RIDL technology recognize that it's most effective in isolated, widely dispersed small outbreaks. Thus,

they too, recommend it be part of a more comprehensive program integrating source removal and adulticide sprays where appropriate.

RIDL shows promise and the Brazilians are using it already in some areas. Use of *Wolbachia* bacteria, CRISPR gene drivers and the like, while certainly innovative, are in their nascency and shouldn't be relied upon in lieu of established technologies – but they should be actively investigated and employed in due time – particularly in light of pesticide resistance issues. If employment of these technologies is not in the offing, at least immediate approval of a greater range of pesticides per WHO recommendations is warranted.

### **The Honorable Gus Bilirakis**

#### **1. What role does the federal government play, or should it play, in mosquito control given that most programs are designed and implemented at a local level?**

The federal government is most adept at appropriating and distributing funds during emergencies to the states, which are in the best position to determine how they should be allocated at a local level. This is best done through the CDC, which is keenly aware of shortfalls in local mosquito control capacity that could be successfully addressed by funds duly allocated by state agencies according to identified needs. This could take the form of augmenting local vector control staff through federal volunteer organizations in locating breeding habitat, for example. It could also take the form of reimbursements to local districts loaning personnel/chemical/equipment to other jurisdictions within the state needing assistance. The federal government could also assist by funding contracts let by local jurisdictions to commercial companies specializing in comprehensive mosquito control services already on the books as part of contingency plans.

The CDC Division of Vector-Borne Disease is in a prime position to offer consultation and resistance testing and/or training to local districts to assess efficacy of various product chemistries both before and during control operations. This would be invaluable to the local agencies and would reap substantial benefits in all future control scenarios.

The federal government is uniquely positioned to engage in a national effort to educate the public about their role in control of the particular mosquito species that transmit Zika and a number of other viruses. A national public relations campaign along the lines of those against smoking, the “Buckle Up” program promoting seatbelt use, the “Don't be a litterbug” and the “Smoky the Bear” campaigns to prevent forest fires were exceptionally effective and have become iconic in their influence on public behavior. A similar national program whose aim is to make harboring mosquito habitat on one's property socially unacceptable would be a critical component of a Zika control campaign having salutary effects with respect to future mosquito-borne disease challenges long after the current issue with Zika fades from the public's memory.

**2. My home state of Florida has one of the best mosquito control programs in the country. However, you mention that ports of entry throughout the U.S. have little to no mosquito control. Can you specify where in the country you are referring to? Does this include ports in those states that have more advanced and integrated mosquito control programs?**

By ports of entry I mean those transportation venues/hubs in the United States where passengers from international travel ultimately end up, as in their residences or businesses – not merely a seaport or international airport with immigration/customs jurisdiction. As a resident of Florida, myself, I'm fully aware of the extraordinary nuisance mosquito and vector control capabilities of the mosquito control entities within the state. Potential initial ports of entry in major metropolitan areas via international air travel in Florida and elsewhere have robust vector control capability, to be sure.

However, control of *Aedes aegypti/albopictus* is exceedingly manpower-intensive and will entail significant upgrades in numbers of field mosquito control personnel beyond cadre should an outbreak due to virus imported through international air travel or cruise line occur. Furthermore, incubating cases coming through those large ports of entry can easily be transported afield to any of a number of communities within the geographic range of both vectors via connecting flights or automobile/train while the victims are still infective to the mosquitoes. This is most likely to occur in poorer rural communities along the Gulf coast of Texas, Louisiana, Mississippi, Alabama and Florida in addition to economically-challenged rural communities along the Atlantic seaboard up to Virginia, but, in fact, may potentially occur anywhere within the geographical range of the two vector species.

The wide range of potential final ports of entry make it impractical to maintain functioning vector control programs in each to contain an outbreak, however limited. Local tax bases are insufficient to support sustained programs in these areas. Thus, rapid response teams deployed and coordinated through the state agency having jurisdiction over public health mosquito control programs would be the most effective, efficient and timely rapid response vehicles. Any federal funding for these interventions would need to be earmarked for vector control to prevent redirection to other public health programs, whether Zika-related or not. All states within the range of the two putative vectors should be drafting action plans for rapid response teams to cover these minor ports of entry.

Highest regards,



Joseph M. Conlon  
Technical Advisor  
American Mosquito Control Association

