

# News from Academia

A Compendium of New Scientific Publications Relevant to the Pest Management Industry

Compiled by Stephen L. Doggett and David Lilly

## TESTING SULFURYL FLUORIDE FUMIGATION FOR BED BUG CONTROL Controlling bed bugs in densely packed

belongings and vehicles can be extremely difficult to achieve. One option is to use fumigation, although research in this area has been notably lacking. Scientists from Virginia Tech in the US investigated the efficacy of sulfuryl fluoride (marketed as 'Vikane') against the common bed bug, *Cimex lectularius*. They used vehicles and minivans that were filled to around 85% capacity with books, furniture and other household belongings. Contained bed bugs were placed throughout the items and vehicles. The researchers then placed tarps over the lot and introduced the fumigate, such that 1.9x label rate was achieved. After the required period and aeration, the bed bugs were removed and examined for mortality. All bed bugs were killed regardless of life stage. The use of fumigants may provide a more logistical means of effective bed bug management in densely packed belongings.

**Source:** *Journal of Economic Entomology* (11/Mar/2021), <https://academic.oup.com/jee/advance-article/doi/10.1093/jee/toab033/6168217>

## MOSQUITOES AND MIDGES UNABLE TO TRANSMIT SARS-COV-2

Many articles have suggested that mosquitoes and other biting flies are unable to transmit SARS-CoV-2, the virus that causes COVID-19, however to date no one had actually tested this. Now a group of researchers from the US has tested the ability of mosquitoes and midges to transmit SARS-CoV-2. The researchers fed the insects blood laced with the virus and none of the mosquitoes or midges tested were able to support the virus and thus are not vectors of SARS-CoV-2.

**Source:** *Journal of Medical Entomology* (4/Mar/2021), <https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjab013/6158874>

## WHAT'S BITING ME???

This is question often asked by clients to pest managers. But to solve this, you will need the skills of Sherlock Holmes and the patience of Job. Sadly, in many if not most cases, there will be no simple answer found. Recently, the Chief Editor's Department at Westmead Hospital in Sydney, Australia reviewed all the specimens sent to the laboratory over a 30 year period. Note that we are the state reference and *de facto* national reference laboratory for the identification of insects of medical importance. This is the first time anywhere in the world that a medical entomology laboratory has

attempted to review the submissions to their facility over an extended period. The paper was published in early March and can be freely downloaded from the link below. Note there is quite a lot of supporting information including images that highlight the differences between commonly misidentified pests. We hope that everyone in the pest management fields finds this a useful resource.

**Source:** *Austral Entomology* (3/Mar/2021), <https://onlinelibrary.wiley.com/doi/10.1111/aen.12480>

### INDIA: DENGUE RISK LINKED TO ACCESS TO TAP WATER

A study undertaken in Dehli has identified a link between the risk of dengue virus and the availability of tap water. It was found that those areas that a reticulated water supply had lower levels of dengue compared with areas without the supply. Presumably those without a constant supply of drinking water via taps, hoarded water around the home providing suitable breeding habitat for *Aedes* mosquitoes.

**Source:** *PLOS Neglected Tropical Diseases* (11/Feb/2021), <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0009024>

### MOSQUITOES BRED TO BE RESISTANT TO ZIKA VIRUS

Researchers in the US, using gene technology, have bred a line of the Dengue Mosquito, *Aedes aegypti*, which is unable to transmit Zika virus. According to the researchers involved in the study, the character is inheritable so that future generations of the mosquito would be unable to transmit the virus. Large numbers of these genetically modified mosquitoes would need to be bred up and released to see a reduction in viral activity.

**Source:** *Lab+Life Scientist* (2/Feb/2021), [www.labonline.com.au/content/life-scientist/news/mosquitoes-genetically-modified-to-be-resistant-to-zika-908186178](http://www.labonline.com.au/content/life-scientist/news/mosquitoes-genetically-modified-to-be-resistant-to-zika-908186178)

### NOVEL MOSQUITO CONTROL; PYRIPROXYFEN IN SUGAR BAITS

Previous research has shown that mosquitoes

can transfer the insect growth regular, pyriproxyfen, via their tarsi to larval habitats, thereby adversely affecting developing larvae. This is a process known as 'autodissemination'. It was suggested that perhaps the adult could acquire pyriproxyfen via sugar meals and the insecticide could be released in the faeces. An investigation was undertaken to examine this potential mode of insecticide application. Adult mosquitoes were fed pyriproxyfen laced sugar and the insecticide was found to be excreted for up to 96 hours. There was a significant reduction in adult emergence with water tainted with the faeces of pyriproxyfen fed adults. Fecundity and fertility of the adults were also considerably reduced. Now field trials need to be undertaken to see if such effects could be paralleled in the field.

**Source:** *Journal of Medical Entomology* (28/Jan/2021), <https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjaa265/6123314?redirectedFrom=fulltext>

### HOPE FOR BETTER CONTROL OF MOSQUITO-BORNE DISEASES

A study lead by a team from Australia tested the effectiveness of 'emanators' in the control of *Aedes aegypti*. Emanators are devices that slowly release insecticides, many of these are plastic based units that release the pyrethroid, metofluthrin. By having the emanators in the home, the number of *Aedes aegypti* was reduced by 60% and the biting rate reduced by 90%. The benefits beyond the reported efficacy is that the emanators are fast to deploy, easy to use, low cost, and do not use electricity. These devices are already available to purchase in most parts of the world.

**Source:** *PLOS Neglected Tropical Diseases* (26/Jan/2021), <https://journals.plos.org/plosntds/article?id=10.1371/journal.pntd.0009036>

### FACTORS INFLUENCING HOUSE FLY CAPTURE IN ULV LIGHT TRAPS

A research project was undertaken by a researcher from the University of Florida, whereby he examined the effectiveness of ultraviolet based light traps in a supermarket.

Two types of light traps were tested; a Gardner GT-180 and a Gardner MX-360. The latter trap is a large portable unit that is placed on the floor and this captured many more flies than the GT-180 unit that was mounted 2m high on the wall. Using black, compared with white, glue boards resulted in significantly lower collections. The highest collections of flies were from the bakery, followed by the deli. Information derived from this study can be used to maximise fly monitoring operations. Note that the full paper can be downloaded from the link below.

**Source:** *Journal of Economic Entomology* (18/Jan/2021), <https://academic.oup.com/jee/advance-article/doi/10.1093/jee/toaa319/6103839>

### **MOSQUITOES AS AN EARLY WARNING SYSTEM FOR CANCER**

Japanese researchers have discovered a means of using a mosquito's powerful sense of smell to detect cancer in patients. The mosquito olfactory cells (i.e. the creature's sense of smell) can detect certain odours that only occur in the breath of a person suffering with cancer. The researchers have developed a system that mimics the mosquito's olfactory cells. The system is very low cost and will hopefully develop into a routine use devices within the next few years.

**Source:** *Science Advances* (13/Jan/2021), <https://advances.sciencemag.org/content/7/3/eabd2013> and *7 News* (19/Jan/2021), <https://7news.com.au/technology/science/mosquitoes-can-be-an-early-warning-system-for-cancer-report-finds-c-1987784>

### **THE ORIGINS OF THE INSECTICIDE RESISTANCE ACTION COMMITTEE (IRAC)**

Insecticide resistance is a concern for anyone involved in pest management. A basic understanding of resistance is necessary in order to learn how to prevent it happening, but also what to do if resistance is suspected or known to occur. In order to combat resistant, the Insecticide Resistance Action Committee (IRAC) was formed in 1984. The IRAC also developed the Insecticide Mode of Action

(MoA) Classification Scheme to help implement insecticide resistance management. A new review was just released that focused on the IRAC and MoA and the entire paper can be downloaded from the link below.

**Source:** *Pest Management Science* (9/Jan/2021), <https://onlinelibrary.wiley.com/doi/full/10.1002/ps.6254?campaign=wolearlyview>

### **CHINA: DETECTION OF TICK-BORNE PATHOGENS**

Research was undertaken in the southwest of China to detect spotted fever rickettsia in ticks. This group of rickettsia contain a number that are important human pathogens that can cause serious disease. Some 305 ticks were collected from wild and domesticated animals in Chongqing, Guizhou, Yunnan, and Guangxi provinces, and tested for the rickettsia. A number of rickettsia were found including one that was new to science. At this stage it is not known if it causes disease in humans.

**Source:** *Journal of Medical Entomology* (5/Jan/2021), <https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjaa294/6063444?redirectedFrom=fulltext>

### **NEW MOSQUITO REPELLENT DEVELOPED USING SILICONE OIL**

The Japanese cosmetic giant, Kao, has developed a new mosquito repellent containing silicone oil. Unlike most products that actually repel mosquitoes and prevent them from biting, when a mosquito lands on skin covered with the oil, the mosquitoes will rub their legs together an attempt to remove the oil that will immediately cling to their legs. They will then fly off without blood feeding. No statement has been released on the product's effectiveness against other biting arthropods.

**Source:** *Cosmetics* (5/Jan/2021), [www.cosmeticsdesign-asia.com/Article/2021/01/05/Buzzing-research-Kao-develops-new-mosquito-repellent-technology-using-silicone-oil](http://www.cosmeticsdesign-asia.com/Article/2021/01/05/Buzzing-research-Kao-develops-new-mosquito-repellent-technology-using-silicone-oil)

### **ASIAN MOSQUITO DOES NOT POSE A RISK FOR ZIKA VIRUS**

A study published in the well-known journal

PLOS Pathogens, suggests that the Asian Tiger mosquitoes, *Aedes albopictus*, does not pose a major risk for Zika virus epidemics. The main vector for this virus is the dengue mosquito, *Aedes aegypti*. However, if mosquito populations are high, then it may be involved in viral transmission [SLD: such sweeping statements from authors should always be viewed with a high degree of caution. Different strains of the mosquito can vary in its ability to transmit viruses. Similarly, different strains of virus can vary in its transmissibility as well. Plus there can be viral mutations, as seen with Chikungunya virus, which can lead to be more likely transmitted.)

**Source:** *News Medical Life Sciences* (4/Jan/2021), [www.news-medical.net/news/20210104/Asian-tiger-mosquito-does-not-pose-a-major-risk-for-Zika-virus-epidemics.aspx](http://www.news-medical.net/news/20210104/Asian-tiger-mosquito-does-not-pose-a-major-risk-for-Zika-virus-epidemics.aspx)

#### **KOREA: TESTING MIGRATORY BIRDS AND THEIR TICKS FOR PATHOGENS**

A study was undertaken in Hong and Nan Islands, Republic of Korea, to look for potential human pathogens in migratory birds and the ticks that infest the birds. The study was undertaken over 2011-2016. Some 877 ticks were collected in the study, the most common being *Ixodes turdus*. Fifteen pools of the ticks were positive for *Borrelia* (many of these bacteria are pathogenic to humans) and *Anaplasma* was detected in one pool. The study supports the role of migratory birds for the spread of tick-borne diseases.

**Source:** *Vector-Borne and Zoonotic Diseases* (24/Dec/2020), [www.liebertpub.com/doi/10.1089/vbz.2020.2629](http://www.liebertpub.com/doi/10.1089/vbz.2020.2629)

#### **BANGLADESH: RAINY DAYS AND INCREASED DENGUE**

A recently published report analysed climatic factors against hospital admissions in patients with dengue disease in a high incidence area of Dhaka, the capital of Bangladesh. It was found that dengue virus is transmitted throughout the year, however cases rise with a higher number of rainy days. Such information can be used to better time the release of public health

warnings.

**Source:** *International Journal of Environmental Research and Public Health* (18/Dec/2020), [www.mdpi.com/1660-4601/17/24/9506](http://www.mdpi.com/1660-4601/17/24/9506)

#### **CHINA: WIDESPREAD INSECTICIDE RESISTANCE IN AEADES ALBOPICTUS**

The Asian Tiger mosquitoes, *Aedes albopictus*, is an important vector of a variety of viruses including dengue. Unfortunately, insecticide resistance is a major impediment for the control of this insect. A research project was undertaken in the Hainan Province of China to examine the level of resistance in five field populations of *Aedes albopictus*. Bioassays of larvae found that all populations were resistant to the pyrethroids, while adult populations were either resistant or highly resistant to six insecticides tested (which included deltamethrin, permethrin, cyfluthrin, propoxur, malathion, and DDT). Test demonstrate that the mosquitoes exhibit a range of resistant mechanisms including knockdown and metabolic resistance.

**Source:** *Pest Management Science* (10/Dec/2020), <https://onlinelibrary.wiley.com/doi/full/10.1002/ps.6222?campaign=wolearlyview>

#### **CHINA: SUCCESSFUL MALARIA CONTROL IN CHINA**

Malaria was once a major health problem in China. With the implementation of vector control, case numbers reduced dramatically. In 1970, there were 4,333 cases per every 10,000 people. With the introduction of integrated malaria control, cases numbers dropped to 0.23 per every 10,000. Since 1997, there have now been no cases at all. This has been a hugely successful program, however the risk continues as the vector is still present in the area, and imported cases leading to local transmission may still occur. Another useful paper on the malaria risk at the China/Myanmar border can be found at: <https://idpjournal.biomedcentral.com/articles/10.1186/s40249-017-0322-2>

**Source:** *Malaria Journal* (23/Nov/2020), <https://malariajournal.biomedcentral.com/articles/10.1186/s12936-020-03501-4> ■