



BORDER HEALTH NEWSLETTER – December 2014

WELCOME!

Happy New Year to everybody and welcome to 2015. If we look back, there's no question that the big public health story of 2014 was Ebola. The African epidemic has now racked up more than 20,000 cases, according to the World Health Organization, which has put together a useful map and timeline of developments since March. But also Chikungunya and Dengue showed worrying increasing numbers last year (If you want to read a full report about the Pacific visit: <http://www.wpro.who.int/entity/southpacific/about/2014PacificReview/en/index.html>). Another worrying border health issue is the antibiotic resistance factor NDM. Since its original discovery in one person in Sweden in 2008, this snippet of DNA — which makes common infections essentially untreatable — has been carried by patients to at least 40 countries, and spread within those countries to create local hospital outbreaks. That's a lot of border-crossing.

SAMPLES

During December 800 samples were collected by staff from 12 DHBs with 155 positive. The numbers of the adults are still below those ones last year at the same time but increased significantly (from 12 to 450) compared to last month. Also the numbers of the larvae have almost doubled and are much higher than compared to last year in December. The number of *Aedes notoscriptus* larvae are lower than last year but *Culex pervigilans* have tripled from last month and doubled from last year and we are glad that the natives are increasing.

Species	Adults		Larvae	
	Dec 2014	Dec 2013	Dec 2014	Dec 2013
New Zealand Mozzies				
<i>Aedes antipodeus</i> (winter mosquito)	27	14	Nil	Nil
<i>Ae. australis</i> (saltwater mosquito)	Nil	Nil	Nil	6
<i>Ae. notoscriptus</i> (striped mosquito)	353	241	892	1900
<i>Coq. iracunda</i>	23	14	Nil	Nil
<i>Coq. tenuipalpis</i>	2	1	Nil	Nil
<i>Cx pervigilans</i> (vigilant mosquito)	11	144	3155	1548
<i>Cx. quinquefasciatus</i> (southern house mosquito)	34	302	101	432
<i>Opifex fuscus</i> (saltpool mosquito)	Nil	Nil	18	65
Total	450	721	4165	2303



NEW ZEALAND BIOSECURE

INCURSIONS/INTERCEPTIONS

We have had 6 Interceptions in December:

4.12.2014: A blood fed live *Culex pervigilans* found at the transitional facility Foodstuff Fresh Auckland Ltd in the MPI inspection room, believed to be associated with boxes of grapes from Peru.

08.12.2014: A mosquito larvae (2nd instar) found in a bottle filled with holy water from the Ganges, New Dheli during inspection of luggage from India by MPI at the Auckland Airport. The larvae was identified as Anopheles sp. most likely *An. culicifasciens* (s.l.)

19.12.2014: Three live mosquito larvae (4th instar) were found in Christchurch in a Spa pool, arriving in a container from Australia. The specimens were damaged by bleach and were identified as *Cx. sp.*

20.12.2014: A live female *Aedes aegypti* was found at the AIAL lost baggage room and was damaged by adding the specimen to ethanol.

21.12.2014: After a delimiting survey a *Cx. pervigilans* larvae (2nd instar) was found at an AIAL pond.

22.12.2014: A live male mosquito found at Mt. Wellington, Fresh Macs in Auckland on Mangoes, was identified as *Cx. quincefasciatus*.

WEBSITE

We have added information about Ross River and Barhna Forest Virus to the Laboratory's Virus section (<http://www.smsl.co.nz/Services/New+Zealand+BioSecure/Viruses.html>).

NEWS OF THE MONTH

Unapproved GM Mosquitoes Being Shipped to US for Release

By Christina Sarich, Global Research, December 16, 2014

Are you aware that genetically modified mosquitoes are being set for release worldwide? Right after GM mosquitoes were let loose in Brazil, dengue fever cases spiked. Now, the Florida Keys are in danger of facing a similar fate. The mosquitoes haven't even been officially approved, but Oxitec, the British company who created the mosquitoes, has already shipped them to Florida. The only hope is a very vocal grassroots effort to tell the Governor of Florida that these mosquitoes will ruin tourism and possibly turn the natural ecosystem there on its head.

The GM mosquitoes could be released in the Keys as early January or February of next year. Though the approval process is still underway, Oxitec is so sure they will have its way that it shipped the mosquitoes in anticipation.

So far, there are no reported cases of dengue fever in Florida this year, so why do they need GM mosquitoes meant to prevent the spread of such diseases? When they were used in Brazil, they increased dengue fever while upsetting the ecological balance of the area. They did not 'pave the way for dengue fever protection' as Oxitec propagandized. A state of emergency actually had to be



declared in the town where the GM mosquitoes were released.

Why on earth would Floridians want to be subject to the same possibility?

Not one environmental or human health study has been conducted on the GM mosquitoes. Once they are released, it isn't as if you can round them all up again if there is a problem. Just like with GM crops, they can also interbreed with non-GM mosquitoes passing on the same traits. Oxitec's own website explains:

"Oxitec's genetically sterile male *Aedes aegypti* mosquitoes will mate with the wild (non-sterile) *Aedes aegypti* females."

The company claims that its approach is different than other genetic manipulations because it is self-limiting, but how in the world could this be so? Since when can you track or alter how mosquitoes mate in the wild?

Director of the Florida Keys Mosquito Control District (FKMCD), Michael Doyle is responsible for keeping the 44 inhabited islands of the total 1,200 that spread across the Florida Straits free from *Aedes aegypti* mosquitoes. He believes that releasing male GM mosquitoes, specifically designed to pass down a suicide gene that kills their own offspring into the wild, will kill the dengue-carrying mosquito population and prevent new outbreaks.

As Aljazeera reported:

"We have tried everything from chemical fumigations to parasitic nematodes, dragonflies, everything you could think of," Doyle said.

Last summer the agency deployed a 2-pound drone, hoping the aircraft could help spot potential water breeding grounds in remote areas.

"It's very difficult to spray everywhere where this mosquito hides and breeds," said Gene Lemire, director of Martin County Mosquito Control. "It's very sneaky."

Of course Oxitec isn't the only company that assumes it can control Nature's balance with GM mosquitoes. Though it has already let GM mosquitoes loose in the Cayman Islands, and Malaysia with no success.

". . . all of these recent attempts to turn mosquitoes into malaria- and dengue-killing machines have something in common: The modified mosquitoes need to have lots of sex to spread their altered genes through the wild population. They must live long enough to become sexually active, and they have to compete successfully for mates with their wild peers. And that is a problem, because we still know surprisingly little about the behavior and ecology of mosquitoes, especially the males."

Heather Ferguson from the University of Glasgow studies mosquito ecology. She points out that in the 1970s and 1980s, several companies tried to control the mosquito population by releasing sterile males that would engage females in fruitless sex. The vast majority of the experiments failed.

While it may seem that "it's a more ecologically friendly way to control mosquitoes than spraying insecticides," at least according to Coleen Fitzsimmons, a spokeswoman for the Florida Keys Mosquito Control District, this is a presumptuous statement considering researchers have no idea how the mosquitoes affect an ecosystem or human health over the long term.

GE mosquitoes are touted as a "vital weapon against malaria," but they are really just a vital weapon against nature. Why do Oxitec's 'scientific papers' show up sneakily online without the scientific community or the public being aware until they've already released the mosquitoes into a habitat? It certainly doesn't lend to Oxitec's credibility.

Why did they secretly release GE mosquitoes that could bite humans in Grand Cayman Island? Local there had no idea that Oxitec was completing field trials and releasing these untested GM mosquitoes on their island.

What Could Possibly go Wrong with Biotech Mosquitoes?

They could cause havoc within the human genome by creating "insertion mutations" and other



unpredictable types of DNA damage by getting into the human blood stream – just as has been proven with glyphosate-resistant plants. According to the Institute for Responsible Technology, "Insertion mutations' can scramble, delete or relocate the genetic code near the insertion site." Large-scale mutations often occur with genetic modification; it doesn't matter if it was a plant or a bug that was altered with biotechnology.

A geneticist from University of Hawaii, Alfred Handler, states that the GM mosquitoes could develop a resistance to the lethal gene, and then spread it inadvertently (sound familiar?) Entomologist Todd Shelly, another expert from U of H, said that 3.5 percent of the GM mosquitoes survived adulthood despite carrying the 'lethal' gene that is supposed to render them ineffective.

Male GM mosquitoes grown in a lab are often less vital than non-GM mosquitoes that are born in the wild, so they are less likely to be able to compete with the non-GM varieties. This means that any 'sterile' offspring are likely going to die, and the non-GMO mosquitoes normally responsible for transmitting dengue or malaria will live on, possibly with mutated genes (received from their GM parents) that make them even stronger.

Because GM Mosquitoes were produced to die in the presence of antibiotics like tetracycline, and our water supplies are now infected with antibiotics, GM mosquitoes are likely going to thrive as antibiotic resistant bugs, much like 'glyphosate-resistant' crops – which have really only created super weeds. In the very least, Florida should delay the release of these mosquitoes (even if Oxitec has to lose a crop of GM bugs) in order to more accurately assess their safety.

Lindsay Lohan Diagnosed with Chikungunya: Rare and Untreatable Disease Transmitted by Mosquitoes Diagnosed with Actress after Taking Vacation in the Tropics

By KC Curay On January 2, 2015

Actress Lindsay Lohan Diagnosed with Chikungunya, a disease that is transmitted by mosquito bites. Sadly, the disease, rare as it is, is still untreatable. The actress revealed that doctors diagnosed that she most likely contracted the disease while on a tropical vacation. Thus, the 28-year old Lohan may now be feeling the multiple symptoms associated with the rare disease. She is now urging fans to always bring their bug spray or mosquito repellent when going on a vacation in a tropical country.

Sadly, Lindsay Lohan was diagnosed with Chikungunya just two days before Christmas, a very mean holiday gift for the "Mean Girls" star, who posted some sad and emotional pictures on her Twitter account after the sad news. She then tweeted that had she brought some bug spray, she could have avoided contracting the disease and would not have been bitten by a mosquito.



Actress Lindsay Lohan ANDREW H. WALKER, GETTY



However, doctors noted that the mortality rate for the mosquito-transmitted disease is only 1 in 1,000, with elderly people most likely to die. The disease though, carries symptoms such as high biphasic fever that can last up to seven days, or even more, and joint pains or stiffness that typically last weeks or months or sometimes as long as years. Rashes may break out on the skin especially in the legs. Other symptoms may include muscle pains, headaches, fatigue, nausea, vomiting, inflammation of the eyes, and some insomnia.

Since the main transmitters are two mosquito genera (*Aedes: A. albopictus and A. aegypti*) from the Caribbean, this is consistent with the vacation that Lindsay Lohan took in French Polynesia. However, some mosquito genus in Africa and Southeast Asia may also transmit the disease, though these are rare. No known treatment for the disease itself exists, though there are medications to reduce symptoms. So far, Lohan has not commented on how the disease is affecting her, though she did tweet that she isn't letting the disease dampen her spirits. She did say that she enjoyed her New Year celebration.

PICTURES OF THE MONTH



A Chikungunya patient in the USA



Pacific woman clears her backyard

VECTOR-BORNE DISEASES

Recent Local News

Sydney experiences 'one of the worst starts to mosquito season in years'
Mosquito season is off to a bad start.

JIM O'ROURKE, THE SUNDAY TELEGRAPH, JANUARY 04, 2015

The new sounds of summer are Sydneysiders trying to deal with the scourge of swarms of mosquitoes desperate for a taste of an exposed bit of skin.

Experts say prime breeding conditions developing after the warmest Spring on record, heavy rainfall in December and flooding of local wetlands by higher than expected tides has left the city in the grip of a mosquito frenzy. And they warn more buzzing pests are on the way.

"This has been one of the worst starts to mosquito season in years," Stephen Doggett, director of medical entomology at Westmead Hospital, said.



NEW ZEALAND BIOSECURE



Scientists are also predicting an unusually high risk of an outbreak of dangerous mosquito-borne diseases such as the Ross River and Barmah Forest viruses along the NSW coast.

Dr Doggett said the mosquito season has started early this summer with prime breeding conditions developing after the warmest Spring on record, heavy rainfall in December and flooding of local wetlands by higher than expected tides.

The worst flying pest will be the saltmarsh mosquito, almost black in colour with striped legs, which is breeding in colossal numbers around Homebush Bay and in the mangroves and mudflats along the Georges River between Alford's Point and Bankstown.

They normally fly between 5km to 10km from breeding sites but have been recorded up to 50km from the mudflats.

Dr Doggett said above average numbers of mosquitoes are being recorded along the east coast. Each insect can lay more than 100 eggs.

"The mosquito-borne viruses won't be a problem for Sydney because they need an animal host, usually a kangaroo or wallaby for Ross River virus," he said.

"Normally there are about 300 to 400 cases along the coastal strip each year. But because we haven't seen the viruses along the coast for several years, due to small numbers of saltmarsh mosquitoes, I think the risk is up there as one of the highest for some years.

"This will be a risk year for the viruses."



Alivia sprays insect repellent on her daughter Demi, 5, to ward against swarms of mozzies which have descended on Sydney due to warm humid weather and recent rain.

Even Sydney hospitals are not immune from the flying scourge.

A visitor to Liverpool Hospital said they had seen mozzies in the Emergency Department waiting area and in a treatment room on Christmas Day.

The same person said they also saw the insects a day later in a surgical ward and last week spoke to a new mother in the maternity ward who asked her husband to bring in a mosquito net to protect their newborn baby from mosquitoes.

A South Western Sydney Local Health District spokeswoman confirmed that an area near one of the exits to the Emergency Department at Liverpool was sprayed with insect repellent after staff noticed mosquitoes.



Pacific syndromic surveillance report

Monthly Notifiable Disease Surveillance Report – Nov 2104

Chikungunya fever: Seven cases of Chikungunya fever (5 confirmed and 2 probable) were notified in November 2014. All cases reported overseas travel during the incubation period to Samoa (4 cases), American Samoa, Antigua and Barbuda, Barbados, and French Polynesia (1 case each). One case reported travel to more than one country.

Rickettsial disease: Three cases of murine typhus were notified in November 2014. The cases were males in the 30–39 years (2 cases) and 50–59 years (1 case) age groups. Two cases were hospitalised. The occupation was recorded for two of the cases as farmer and a farm hand. One further case lives on a lifestyle block.

Pacific syndromic surveillance report

Week 52, ending 28 December, 2014

Chikungunya outbreaks are on-going in American Samoa, French Polynesia, New Caledonia, Samoa and Tokelau.

French Polynesia: As of 21 December 2014, the estimated number of cases of Chikungunya was 51,131 since 10 October 2014. There have been nine deaths.

Dengue serotype-1 outbreak is ongoing in French Polynesia. There were 13 cases confirmed for week ending 21 December 2014 including one dengue serotype-3 case. The weekly number of cases is decreasing.

Cook Islands reports four dengue-like illness cases that tested RDT negative. Samples will be sent to the Institut Louis Malarde, French Polynesia to test for Zika virus and Chikungunya. Of the four cases, only one recently travelled (from Australia).

Africa

Nigeria: Govt - We Have Case of Dengue Fever, Not Ebola Virus

By Ruby Leo

Minister of State for Health Dr. Khaliru Alhassan yesterday said the reported case of a lady dying of the Ebola virus was actually of Dengue hemorrhage fever.

The 15-year-old lady had died at the Irrua teaching Hospital, Edo state last week after she was referred there by the Gwagwalada Teaching Hospital, Abuja following aggravated symptoms, Daily Trust learnt.

Addressing journalists in Abuja, the minister insisted that Nigeria had not witnessed any case of Ebola and would remain so as several mechanisms have been put in place to stop any cross border transmission.

Alhassan explained that the misconception on the type of disease might have arisen because of some similarities in symptoms the two diseases share adding that so far only three countries in the West African region namely Guinea, Sierra Leone and Liberia have reported cases of Ebola.

"Dengue fever is caused by a virus named Dengue Fever Virus (DFV). It is transmitted by mosquitoes, mostly in urban and semi-urban areas," he said.

"The activities of the mosquitoes (*Aedes albopictus*) that transmit this virus are being closely monitored nationwide by the Arbovirus Research Centre of the Federal Ministry of Health based in Enugu."



A man washes his hands (file photo). Photo: Nancy Palus/IRIN

He said the Nigerian Centre for Disease Control (NCDC) has swung into action and upgraded its surveillance activities.

According to him all states and the nation's port health posts and medical centres have been put on high alert to screen travelers from countries with confirmed Ebola fever occurrence even as he advised "Nigerian citizens travelling to these countries to be careful and should report any illness with the above symptoms to the nearest health facility."

Also speaking, the head of the Nigerian Centre for Disease Control (NCDC), Prof. Abdulsalami Nasidi warned hunters to guide against coming in contact with bush meat killed during hunting and for Nigerians to be extra-ordinarily careful with bush and smoked meat, as the Ebola and Dengue fevers could be contacted through indiscriminate eating of smoked meat.

WORLD OF MOSQUITO-SCIENCE

Genetic study investigates how mosquitoes transmit malaria

The team gleaned clues by comparing malaria-carrying mosquitoes and their harmless cousins

The Peak, January 5th, 2015 by Anthony Bianco

By determining the genetic sequence of 16 types of mosquitoes (*Anopheles* genus), an international research team, including researchers from SFU, has contributed knowledge on how these mosquitoes adapt to humans as the primary host of malaria.

The international research team consisted of over 100 biologists, immunologists, infectious disease specialists, computational mathematicians, and geneticists, and had its findings published in Science Express.

While the presence of malaria in North America and Europe is minimal, it is endemic in several areas around the equator and has high fatality rates in sub-Saharan Africa and Southeast Asia. However, only a few dozen of the almost 500 different *Anopheles* species of mosquito can carry the disease.

By investigating the differences between these mosquito types and their harmless cousins, the team hoped to pinpoint what leads to the difference in transmission.

The project of sequencing genomes and transcriptomes of the *Anopheles* species began in September of 2008 and was funded by the National Genome Research Institute and the National Institute of Allergy and Infectious Disease of the US National Institutes of Health.



Cedric Chauve, SFU professor of mathematics, and Ashok Rajaraman, SFU graduate student in mathematics, joined the project in 2012. "The main aspect of the research by our team, whose specialty is evolutionary genomics and not health genomics, was to understand the evolution of a group of 11 *Anopheles* genomes, whose common ancestor lived roughly 100 million years ago," explained Chauve. "It will be up to our biologist colleagues now to integrate our findings on genome evolution in research on disease transmission."

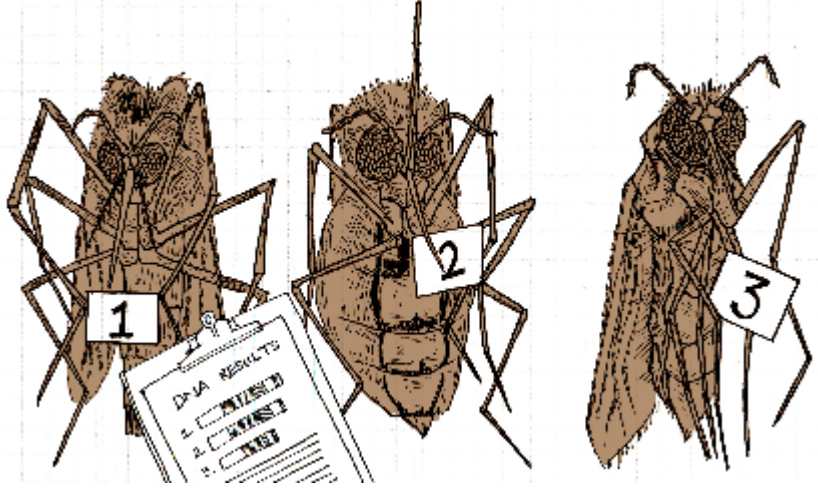


Image Credits: Serena Chan

Chauve and Rajaraman used computational methods to reconstruct ancestral mosquito genomes and analyze their chromosomal evolution over the past 100 million years. Their goal is to discover potential adaptation mechanisms that may be related to malaria transmission by understanding how the chromosomes of *Anopheles* have evolved.

Since only the *Anopheles* genus can transmit human malaria, the international research team is trying to understand what makes *Anopheles* unique.

"[What] seems to be specific to *Anopheles* genomes is a very high rate of chromosome rearrangement in the sex chromosome X that might be involved in speciation (i.e. the mechanisms by which new *Anopheles* species appear), and thus might help to explain why *Anopheles* mosquitoes are so adaptable compared to other insects," explained Chauve.

Although his and Rajaraman's research uncovers new opportunities to understand genomic and genetic factors related to malaria transmission, their work is still in a preliminary stage.

"Now that we have been involved with these data, our next goal is to refine the preliminary analysis and to understand in much greater details the evolution of *Anopheles* genomes, which includes reconstructing very detailed genome maps for extinct ancestral *Anopheles* species," said Chauve. "The Science paper was just a first analysis and there is much to do to refine it."

DID YOU KNOW?

Warm winter raises fears over deadly mosquitoes

Arab News, Tuesday, 6 January 2015, 15 Rabi'ul Awwal 1436 AH

The onset of a rather warm winter is triggering seasonal epidemics by mosquito-borne viruses and medical experts are warning residents to ensure that mosquitoes do not breed in their homes or in their neighborhoods.

A local survey has indicated that several doctors have reported a dramatic rise in the number of patients bitten by mosquitoes and presenting symptoms of fever, muscle and joint pains and headaches. Doctors are also warning of the dengue fever bug, which causes similar symptoms accompanied by a skin rash akin to measles which is considered deadly.



NEW ZEALAND BIOSECURE



Dr. Khalid Abdullah, a medical specialist at a government hospital said: "The seasonal spike in mosquitoes is playing a role in the spread of viral diseases and we have issued a notice to residents to take preventive measures to protect themselves from mosquitoes."

Aedes aegypti mosquitoes stand in a cage to be examined by scientists at the Gorgas Memorial Institute for Health Studies in Panama City, in this Sept. 26, 2014 photo. (AP)

Meanwhile, the municipality has stepped up efforts to eradicate mosquito breeding areas by spraying chemicals in residential units, schools, gardens, mosques and other public spaces. Municipal officials are also urging residents in institutions, hospitals, schools and markets to cooperate in the prevention of mosquito-borne diseases by checking their premises regularly and prevent water stagnation, unclean drains and garbage heaps lying unattended as these places are perfect breeding grounds for mosquitoes. Medical experts also said that malaria-carrying mosquitoes have been detected in the city along with a few cases of dengue fever. People traveling to infected destinations are at risk of acquiring these diseases. They are advised to check with their general practitioner and take the necessary precautions.