NEW ZEALAND BIOSECURE

A DIVISION OF SMS SOUTHERN MONITORING SERVICES LIMITED

BORDER HEALTH NEWSLETTER – May 2014

WELCOME!

Welcome everybody! It is getting cold in New Zealand, 22cm of snow in the south recently and not surprisingly the mosquito numbers are decreasing locally. But mosquito species and the diseases they carry continue to spread worldwide due to global warming and climate change and events like the football Worldcup 2014 in Brazil have the experts on alert and should remind us all of the importance of ensuring our surveillance is ongoing.

INCURSIONS/INTERCEPTIONS

There were two interceptions during May. These events happened at the end of the month, the first involving a native *Culex pervigilans* and one *Culex quinquefasciatus*, both found in containers with fresh fruits in Auckland.

SAMPLES

During May 751 samples were collected by staff from 12 District Health Boards with 129 positive. Samples collected, including positives, were slightly below numbers of last month but slightly above this time last year. The number of adults and larvae were well below last month and similar to May last year. Striking: the low number of *Ae. notoscriptus* adults compared to last year.

Species	Adults		Larvae	
New Zealand Mozzies	**May 2014**	**May 2013**	**May 2014**	**May 2013**
Aedes antipodeus (winter mosquito)	Nil	4	1	NIL
Ae. australis (saltwater mosquito)	Nil	NIL	6	NIL
Ae. subalborostris	Nil	NIL	1	NIL
Ae. notoscriptus (striped mosquito)	7	106	708	851
Culex astilae	Nil	NIL	33	NIL
Cx pervigilans (vigilant mosquito)	24	3	175	107
Cx. quinquefasciatus (southern house mosquito)	89	23	466	388
Opifex fuscus (saltpool mosquito)	Nil	NIL	29	3
Total	**120**	**136**	**1419**	**1350**

Introducing NZBEL Taxonomists

Matthew Chaplin studied marine biology in New Zealand at Victoria University. Since then he has worked at Te Papa for 5 years as a collection technician working with all the Natural Environment collections, though the majority of his time was working on fish and algae. His experiences at Te Papa have provided him with a very broad knowledge of New Zealand Fauna and Flora.

Dr Julia Kasper studied biology in Germany and has worked at the Museum of Natural History Berlin, where she examined dung beetles of livestock. Julia specialized as a medical Entomologist and has worked in the field of Dipterology and Forensic Entomology in Hamburg and Wellington. She worked at Te Papa in the Insect collection with fleas and moths before she joined the NZB Lab.

Training

Don't forget to apply for the National Border Health and Ship Sanitation Certificate course at Blue Skies Conference Centre, Kaiapoi on 28 July -1 August 2014. For those wanting to be nominated for the Border Health & SSC course at Kaiapoi please check the SMS website for details of pre-course requirements and pre-course reading. Everyone wishing to attend the course this year needs to register for the on-line training package through ihrhrt@who.int.

NZBEL Contact Details

BUSINESS HOURS – 7.30am-4.30pm

Phone: NZBEL 021 522 476 or 021 0299 7503
Email: taxonomy@nzbiosecure.net.nz

NZBEL staff member details

Julia Kasper (021 0299 7503) - julia.kasper@smsl.co.nz
Matthew Chaplin (021 104 6293) - matthew.chaplin@smsl.co.nz
Monica Singe (021 220 9556) - monica.singe@smsl.co.nz

AFTER HOURS

For suspected exotic mosquitoes after hours
Call "0800mozzie" – Refer EH Manual Procedures
Oncall Entomologist – 021 522 476

Postal Details for NZBEL

New Zealand BioSecure
2-4 Bell Road South
Gracefield Lower Hutt

NZB Entomology Laboratory
PO Box 38 328
Wellington Mail Centre 5045

PHOTO OF THE MONTH

Credit: Shea Gunther

Did you know?

Genetically modified (GM) in a laboratory with a gene designed to devastate the non-GM *Aedes aegypti* population and reduce dengue's spread, the newly hatched *Aedes aegypti* mosquitoes called "Franken-skeeters" were released in Jacobina, a farming town in Bahia state.

INSECT-BORNE DISEASES

Brazil 2014: World Cup dengue fever risk predicted

Arena Pernambuco in Recife, Brazil - one of the areas at higher dengue fever risk

"Travellers, particularly those attending matches in high-risk cities might return home with dengue"

Scientists have developed an "early warning system" to alert authorities to the risk of dengue fever outbreaks in Brazil during the World Cup. The analysis, published in "The Lancet Infectious Diseases", estimates the chances of an outbreak of the mosquito-borne infection disease.

They say the risk is high enough to warrant a high-alert warning in three venues - Natal, Fortaleza and Recife. If they come top of their group, England will play in Recife on 29 June. About a million fans are expected to travel to the 12 different cities hosting matches during the World Cup, which runs from 12 June to 13 July. Brazil recorded more cases of dengue fever than anywhere else in the world between 2000 and 2013, with more than seven million cases reported.

Aedes aegypti mosquito - the carrier of dengue fever

Dengue is a viral infection that is transmitted between humans by mosquitoes. It can cause life-threatening illness and there are currently no licensed vaccines or treatments. Screens, air-conditioning and using insecticides can all reduce the risk of being bitten. The early-warning system covers 553 "microregions" across Brazil. The team looked at rain and temperature data from 1981 to 2013 as well as population density data and altitude. The risk of dengue fever is low in Brasilia, Cuiaba, Curitiba, Porto Alegre, and Sao Paulo. However, they predict that there is some chance of dengue risk exceeding medium levels in Rio de Janeiro, Belo Horizonte, Salvador and Manaus. The three cities with the greatest chance of high dengue risk are Natal, Fortaleza, and Recife.

Dr Rachel Lowe from the Catalan Institute of Climate Sciences in Barcelona, Spain, who led the research, said: "Recent concerns about dengue fever in Brazil during the World Cup have made dramatic headlines, but these estimates have been based solely on averages of past dengue cases. "The possibility of a large dengue fever outbreak during the World Cup, capable of infecting

visitors and spreading dengue back to their country of origin, depends on a combination of many factors, including large numbers of mosquitoes, a susceptible population, and a high rate of mosquito-human contact." The researchers say being able to plan in advance can give local authorities the time to implement measures to reduce or contain epidemics in their areas and to deal with the mosquito populations there. Writing in the same journal, David Harley and Elvina Viennet from the Australian National University in Canberra say: "Travellers, particularly those attending matches in high-risk cities, might return home with dengue. "Those who return home unwell will seek treatment. Doctors must be aware of causes for febrile illness in World Cup spectators."

David Harley and Elvina Viennet, Australian National University in Canberra
BBC News Health 16 May 2014

INTERESTING NEWS

The Next Big Thing You Missed: This Mosquito-Dissecting, Malaria-Killing Robot Needs Your Help

Dr. Stephen Hoffman has done what many considered to be the impossible.

As the founder and CEO of the biotech company Sanaria, Hoffman created a vaccine that offers 100 percent immunity from malaria. While vaccines for viruses like polio and bacteria like tetanus have been around for decades, his vaccine is the first that completely protects you from the malaria parasite, the leading cause of death in many developing countries. After ten long years of work on the vaccine, Hoffman published his findings this past August, and the vaccine is currently under trial. But while his historical discovery may seem like the end of a long journey, it's really just the beginning. The vaccine isn't yet ready for market, and Hoffman must now figure out how to make enough of the stuff to truly put a dent in the world's malaria problem.

According to the Centers for Disease Control, there are 3.4 billion people around the world who are currently at risk of contracting malaria. In 2012 alone, says the World Health Organization, 207 million people contracted the disease, and 627,000 died from it. Hoffman's vaccine certainly has the potential to reduce these numbers, but there's a catch. The vaccine is made up of tiny malaria parasites that have been treated with radiation while living in the salivary glands of mosquitoes, and today, extracting these parasites involves a powerful microscope and a highly trained human hand to dissect the mosquito. It's an almost artisanal process, one that Hoffman knows could prevent the vaccine from reaching a truly large number of people.

That's why he and his company are building the SporoBot. Developed in partnership with the Harvard Biorobotics Laboratory, the SporoBot is a robot that can do all the delicate work that goes into making the vaccine, with one crucial difference: It can do it 20 to 30 times faster. That could be the secret to finally bringing Hoffman's vaccine to the people who need it most.

Hoffman is currently raising $250,000 on the crowdfunding site Indiegogo to develop a working prototype. That's an unorthodox move from a company that has spent some $120 million developing the vaccine and has received millions of dollars in grant funding from the likes of the Gates Foundation and the National Institute for Health. But grant funding can be slow. Hoffman hopes the crowd is quicker. "Between 1,000 and 3,000 children will die today of malaria," he says. "We have to leave no stone unturned in getting this done and getting it done as fast as possible."

Yaroslav Tenzer and the SporoBot, a robot that could produce the world's most potent malaria vaccine. *Image: Sanaria*

Three Decades in the Making

Hoffman has been working on the malaria problem for nearly three decades, starting as a Naval doctor in Jakarta, Indonesia, specializing in tropical diseases. For years, he treated patients and watched "many, many, many young Indonesians die" in his care from malaria. Passionate as he was about treating patients, though, he eventually realized that he could have a much bigger impact if he could develop a vaccine to eradicate the disease altogether.

Hoffman has resorted to extreme measures in the name of this mission. Once, he subjected himself to the bite of 3,000 mosquitoes, after discovering an unusual method of vaccination that first arose in the 1970s. At the time, researchers found that after volunteers were bitten by 1,000 malaria-infected mosquitoes that had been treated with radiation, they developed immunity to malaria. When Hoffman tested the theory with 3,000 mosquitoes, not only did it make him immune to malaria, but it became the basis for Sanaria's current vaccine.

Rather than forcing people to endure thousands of mosquito bites, Hoffman figured there must be a way to grow these parasites and inject them into the body. In 2002, he founded Sanaria from his kitchen table to figure out how to do just that. It wasn't easy. First, the team had to figure out how to make sterile mosquitoes, how to make them live long enough, how to make them feed,

and how to extract the parasites, purify, and preserve them. At the same time, Hoffman had to find a way to raise money for this research at the height of the global recession and in the face of a barrage of criticism from the scientific community.

'A Gift From Heaven'

By 2010, Sanaria launched its first clinical trial of the vaccine and found–to Hoffman's utter disappointment–that it didn't offer subjects the level of protection he was looking for. "We come to work every single day with the idea that we're working on something that, when we succeed, will save millions of lives," he says. "It's an incredible way to live your life, but at the same time, when it doesn't work, it can be really problematic."

The vaccine failed primarily because it was being injected into the skin. Hoffman guessed that if it were given intravenously, it would be more potent. He was right. In 2012, Sanaria launched its another trial, during which the vaccine was given intravenously, and by the end of it, the trial subjects were still 100 percent immune. "It was a gift from heaven," he says, remembering that day. "It was a treasure."

The vaccine is still undergoing clinical trials and will be tested on some 500 volunteers in seven sites around the world this year. If successful, Sanaria will still have to wrestle with substantial logistical problems. For instance, the vaccine must be preserved in liquid nitrogen, which could pose a delivery challenge. The intravenous method of delivery could also make mass vaccination campaigns a challenge, says Dr. Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases. "It would be important to determine if the vaccine can be administered in a different and less difficult form, such as intramuscularly, with similar good results," he says.

Sanaria, he says, must also prove that its vaccine is as effective in the field as it is in highly controlled experiments. "If the high degree of efficacy of the Sanaria vaccine holds up under ongoing field trials, then this would be very important and encouraging," Dr. Fauci says.

But the biggest hurdle, in Hoffman's opinion, will be scale.

Enter the Robot

That's why, about two years ago, he began working with Harvard Biorobotics Lab to begin developing a robot that could produce mass quantities of the vaccine. That too, says Yaroslav Tenzer, who helped design the SporoBot, was a major technological undertaking. "Mosquitoes are very small and fragile," he says. "Dissecting them and extracting the saliva glands in a sterile environment is a big manipulation challenge."

But over the course of two years, Tenzer and his team managed to design working prototypes for each step of the process. First, the machines must restrain the mosquito. Then they pick it up, dissect it, extract the saliva gland, and collect it. Each step requires sophisticated image processing technology to ensure the right parts are being dissected and extracted. Now, Sanaria is trying to raise the money to put all the pieces together to build the SporoBot, a machine that wouldn't be much larger than a microwave.

Once a basic prototype is built, Tenzer expects other roboticists will join in and help optimize the SporoBot. "But first, basic research needs to be done," he says, "and that's what we're doing."

As of Monday, Sanaria had raised just over $35,000 of its $250,000 with just four days left, a testament to just how difficult it is to crowdfund a product that you can't give away as a perk for donating. Still, Hoffman says even if Sanaria can't meet its crowdfunding goal, he won't stop until he finds the funding somewhere. It is, he says, quite literally a matter of life or death. "I'm envisioning total success," he says. "I won't be in a situation where we can't produce enough of this vaccine in the most rapid period of time because we don't have robots doing this one part of the process."

ISSIE LAPOWSKY 06.03.14 PERMALINK

Mosquito Control Association of Australia 2014 Conference 07/09/2014 to 10/09/2014

For the first time, the Mosquito Control Association of Australia takes its 2014 conference to the west coast!
The 11th Mosquito Control Association of Australia Conference will be held in Mandurah, Western Australia on the 7-10 September 2014. The conference will be held at The Sebel Mandurah and is shaping up to be an exciting forum. Mandurah is located an hour south of Perth and plays an important role in mosquito ecology, being located on the Peel and Harvey estuaries with large areas of tidal saltmarsh habitat.

MOSQUITO CONTROL
ASSOCIATION OF AUSTRALIA INC