NEW ZEALAND BIOSECURE

BORDER HEALTH NEWSLETTER – JULY 2020

WELCOME!

Kia Ora Koutou,

Even though it was through a computer screen, it was great to meet some of you during the Border Health Course. In preparation for the course, the NZB lab created some training resources, including informative quizzes that will be available through the upcoming newsletters, starting this month with the "Adult trap processing quiz".

We hope you find these quizzes useful!

This month the NZB lab together with the MoH started the preparations to visit all PHUs. The aim of these visits includes getting to know the people involved in each team, facilitate the implementation of the 2019 Surveillance Review recommendations, exchange experiences and provide some professional development in the form of interception response exercises. The first DHB scheduled for a visit is Northland. It will take until the end of 2021 to complete the 12 PHUs visits. In preparation for the visit, managers will receive emails from the lab and the MoH. We are very much looking forward to meeting you all in person!

In the news this month, read about how insects are the source of inspiration in the development of water repellent coatings. Next, learn how mosquitoes react differently to different light colours depending on their biting mode. Following that, learn about an experimental drug that reduces the replication of the zika virus and prevents microcephaly in mice and about how researches identified a new way to induce immunity to dengue virus. Finally, learn how scientist in Japan developed a new approach to study the life cycle of *Plasmodium vivax*, a malaria parasite.

SURVEILLANCE

During July 720 samples were collected by staff from 12 DHBs (Figure 1). The samples included 45 positive larval samples and 7 positive adult samples, leading to a total of 15 adults and 4847 larvae identified over the past month (Table 1). The dominant larval species this month, this year and last year is *Aedes notoscriptus*.

Compared to this same month last year, the total number of larvae and adults has shown an increase (73% and 47% respectively, see Table 1).

In total, four mosquito species have been collected this month (Table 1), that is three less than last month.

Table 1. Adult and larvae sampled by the New Zealand surveillance program during July 2019 & 2020

Species (common name)	Adults		Larvae	
	July 20	July 19	July 20	July 19
Aedes notoscriptus (striped mosquito)	-	-	3632	1015
Ae subalbirostris (no common name)	-	-	-	5
Culex pervigilans (vigilant mosquito)	-	1	1129	116
Cx quinquefasciatus (southern house mosquito)	14	6	48	137
Culex sp. (missing their abdomens, likely to be *quinquefasciatus* or *pervigilans*)	1	1	-	-
Culiseta novaezealandiae (no common name)	-	-	-	4
Opifex fuscus (rock pool mosquito)	-	-	38	26
Total	**15**	**8**	**4847**	**1303**

Compared to last month, mosquito larval number have shown an increase (96%), while adult numbers have shown a decrease (85%) (see Table 1).

The highest number of larvae sampled this month was obtained in Northland DHB (4718) followed by Auckland DHB (59 larvae) (Figure 1).

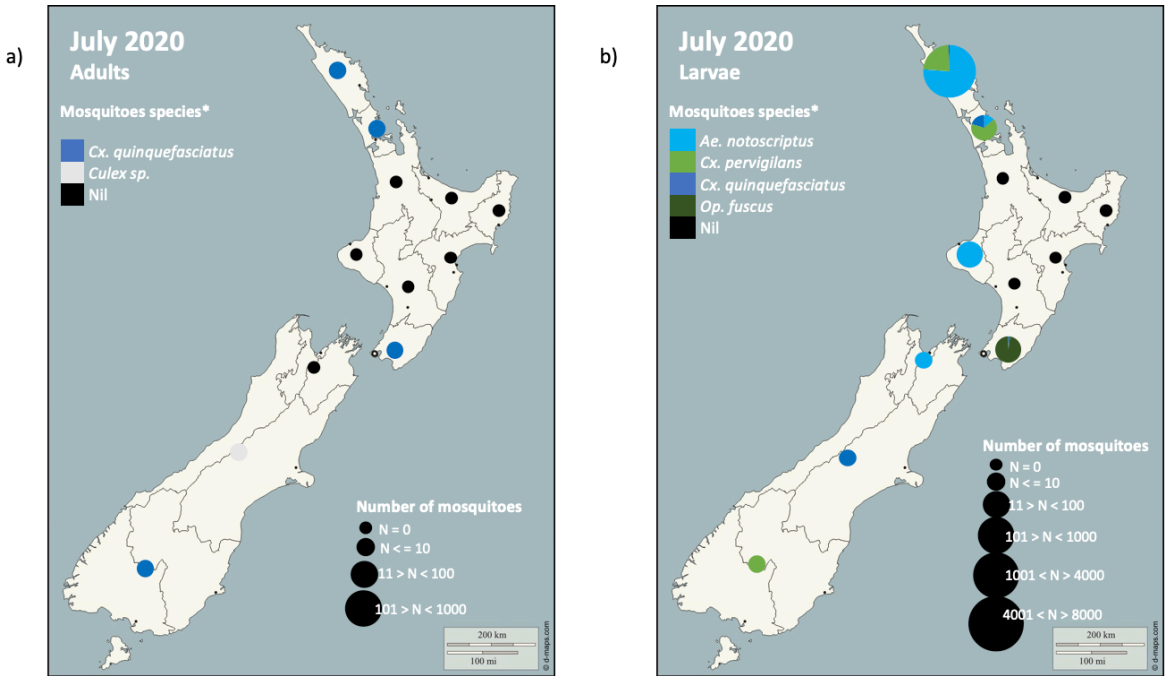


Figure 1. Total mosquito adults (a) and larvae (b) sampled in New Zealand during the July 2020 surveillance period.
* The mosquito species are listed in order from the most abundant to the least abundant.
Please note that the markers represent the DHBs and not the specific sites where the samples have been taken.

Culex quinquefasciatus larval numbers have shown a decrease in two DHBs from this same month last year. *Culex quinquefasciatus* has not been found this month in Public Health South (Figure 2).

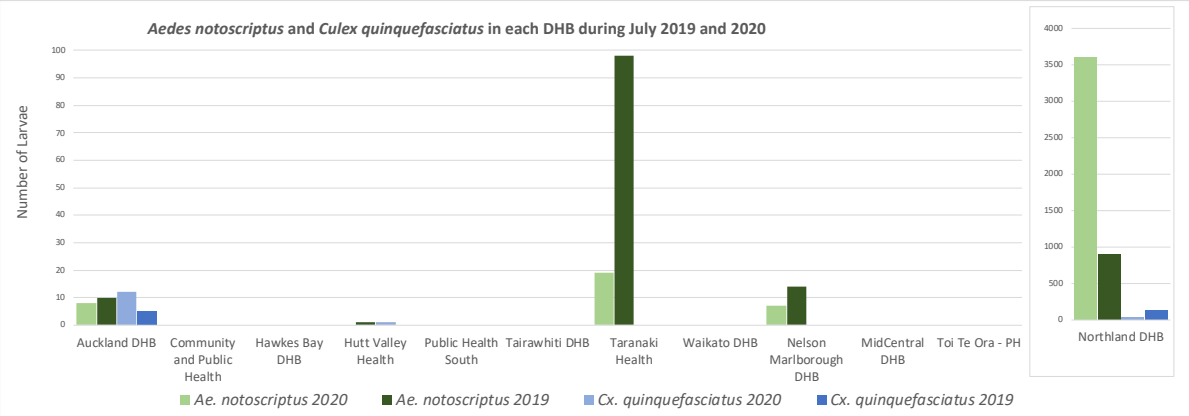


Figure 2. Comparison between introduced mosquitoes sampled in each DHB New Zealand during July 2019 and 2020.
*Please note the different scale for the number of larvae present in Northland DHB in comparison to the other DHBs.

As expected *Aedes notoscriptus* has not been recorded this month, this year or last year in Public Health South (Figure 2).

Aedes notoscriptus larval numbers have shown an increase in one DHBs from this same month last year and a decrease in three DHBs (Figure 2).

Disclaimer: Note that all comparisons made have not been statistically tested and can be due to sampling effort.

INCURSIONS AND INTERCEPTIONS

During July five suspected interception have been recorded (Table 2).

Table 2. Suspected interceptions during July 2020.

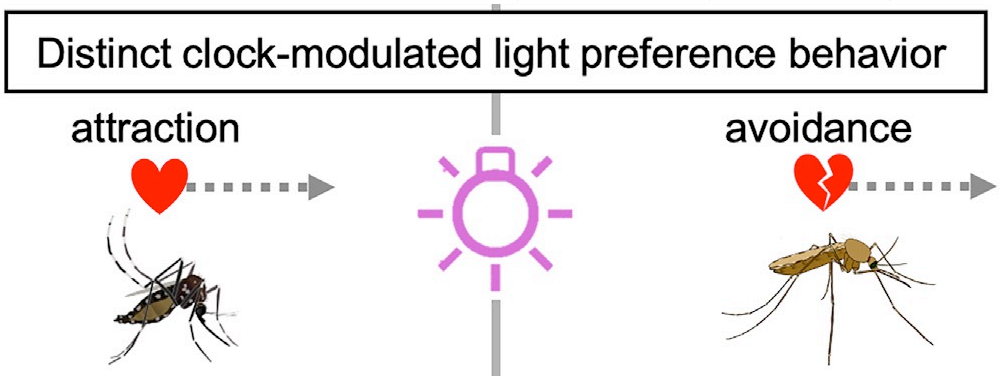
Date	Species	Location	Circumstances
07.07.2020	5 Female *Culex quinquefasciatus*	Kaans Catering Supplies LTD, Dunedin.	Found dead in container of rice from India. Container had been fumigated in India. 1 Live spider found.
10.07.2020	1 non-mosquito	Toll Global logistics, Auckland.	Found alive by MPI in container of batteries from Singapore. Container has been sprayed. No other live or dead insects found.
14.07.2020	1 non-mosquito	CentrePort, Wellington	Found dead by MPI while inspecting cars imported from Japan. Appears the vessel stopped in Australia.
27.07.2020	30 + non-mosquitoes	Tauranga Port, Tauranga.	Number of dead chironomids on a boat imported from Italy to Tauranga port. ID through video chat.
31.07.2020	1 Female *Culex* sp. likely *quinquefasciatus*	Freshmax - 25 Waterloo Rd, Hornby, Christchurch.	Found dead in a chilled container of Pears from Melbourne. Nothing else alive.

NEWS ARTICLES FROM AROUND THE WORLD

Nanostructure of Mosquito Eye Could Help Engineer Enhanced Water Repellent Coatings

Through the investigation of insect surfaces, researchers have detailed a previously unidentified nanostructure that can be used to engineer stronger, more resilient water repellent coatings. The structures found in mosquito eyes and other insects surfaces, are comprised of nanoscopic hairs that are very densely packed and are thought to be key in the insect being able to repel water droplets that are moving at a higher speed such as rain. The coating could also be beneficial for coating personal protective equipment (PPE) such as masks and face shields, as it could help repel virus laden droplets and keep surfaces germ free. Read more.

Study Reveals How Different Mosquitoes Respond to Light



Researchers at the Irvine School of Medicine (University of California) have found that mosquitoes react differently to different light colours depending if they are night biting or day biting species. They looked at the day biting *Aedes aegypti* and night biting *Anopheles coluzzi* and found that each were either attracted or repelled by certain wavelengths of light at different times of the day, depending on when they bit. Read more. Access the original article.

Experimental drug reduces replication of zika virus and prevents microcephaly in mice

Colour transmission electron microscopy of the zika virus. Credit: Cynthia Goldsmith, CDC

In an article published in the journal *Nature Neuroscience* a team of international researchers have discovered that inhibiting a protein aryl hydrocarborn receptor (AHR), which has roles in immunity regulation, stem cell maintenance and cellular differentiation, enables the immune system to fight the replication of zika virus more effectively. The study was performed in mice where the antiviral therapy prevented the mouse fetuses of pregnant mothers from developing mictocephaly and other malformations caused by the virus. Read more.

Researchers identify practical way to induce strong and broad immunity to dengue virus

Researchers from Singapore, have found that a sequential immunisation (or one serotype per dose) induces stronger and broader immunity against four DENV serotypes than tetravalent-formulated immunisation and found that sequential immunisation induced significantly higher levels of virus-specific T-cell responses than tetravalent immunisation. Read more.

New approach could illuminate a critical stage in the life cycle of *P. vivax* malaria parasite

Scientist in Japan developed a new approach which could illuminate a critical stage in the life cycle of one of the most common malaria parasites. *Plasmodium. vivax* is responsible for around 7.5 million malaria cases worldwide, about half of which are in India. Currently, there is only one licensed drug to treat the liver stage of the parasite's life cycle, but it has many side effects and cannot be used in pregnant women and infants.
Read more. Access the original article.

DISEASE OUTBREAKS

To find out where the latest disease outbreaks have occurred visit:

Epidemic and emerging disease alerts in the Pacific region - Produced by the Pacific Community (SPC) for the Pacific Public Health Surveillance Network (PPHSN).

Disease Outbreak News - World Health Organization.

Public Health Surveillance - Institute of Environmental Science and Research (ESR) - Information for New Zealand Public Health Action.

Communicable disease threats report - European Centre for Disease Prevention and Control

RISK MAPS

Dengue Map – Centres for Disease Control and Prevention
Zika Map – Centres for Disease Control and Prevention
Malaria – Centres for Disease Control and Prevention