BORDER HEALTH NEWSLETTER – February 2017

Welcome!

What weather for mosquitoes! We have had a record number of *Culex quinquefasciatus* with almost 15,000 larvae! NZB has been in Northland this month with Debe Anderson who kindly put up some light traps with different coloured LEDs (blue, green and red) to check the effect of light colour for those of you who don't use the incandescent light bulbs.

Worldwide it has been a quite calm month in terms of mosquitoes, which gives us some time to look at the effect of mosquitoes on other animals. There are also some interesting new research results regarding co-infections and male fertility. And watch out for bedbugs, they are spreading in New Zealand worse than ever.

SAMPLES

During December 1144 samples were collected by staff from the 12 DHBs with 329 positives. The numbers of *Culex quinquefasciatus* larvae is extraordinary high. Most of them came for Bay of Plenty were there were 6000 larvae in only one sample. Also the number *Cx. pervigilans* larvae are much higher. The mild long winter and the sudden increase of temperature promotes their breeding. The number of *Aedes notoscriptus*, however, is much lower than at the same time last year.

Species	Adults		Larvae	
New Zealand Mozzies	**Feb 17**	**Feb 16**	**Feb 17**	**Feb 16**
Aedes antipodeus (winter mosquito)	3	6	Nil	Nil
Ae. australis (saltwater mosquito)	Nil	2	12	Nil
Ae. notoscriptus (striped mosquito)	658	1455	1802	4626
Coquilletidea iracunda	17	34	Nil	Nil
Cq. tennuipalpis	Nil	Nil	Nil	Nil
Culex astilae	Nil	Nil	Nil	2
Cx pervigilans (vigilant mosquito)	26	103	4162	2689
Cx. quinquefasciatus (southern house mosquito)	1060	1378	14709	6313
Opifex fuscus (rockpool mosquito)	Nil	2	62	13
Total	**1764**	**2980**	**20748**	**13643**

INCURSIONS/INTERCEPTIONS

During February 7 suspected interceptions have been recorded.

Please note that the interceptions of live unwanted mosquitoes are highlighted in red. Exotic species in general are highlighted in light blue.

03.02.2017: Two female *Culex quinquefasciatus* were found alive at Transitional Facility Menzie – Auckland Airport, in the MPI inspection room, maybe associated to limes from New Caledonia or local.

03.02.2017: One male *Cx. quinquefasciatus* was found at Transitional Facility Menzie – Auckland Airport, in a box with plants from Netherlands, but found after

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BIOSECURITY SPECIALISTS

several days – likely to be local

06.02.2017: One female *Cx. quinquefasciatus* was found at the AIAL arrival hall flying around – likely to be local.

20.02.2017: At Wellington Centreport there were some larvae found in a small fishing vessel from Japan, which has spent quite some time at POA and Littleton. The larvae were identified as 2 (3) and 9 (4) *Aedes notoscriptus* and a *Cx. quinquefasciatus* exuviae.

23.02.2017: One female *Cx. quinquefasciatus* was found at the AIAL X ray area flying around – likely to be local.

28.02.2017: One female *Cx. quinquefasciatus* was found at the AIAL search bench flying around – likely to be local.

28.02.2017: One female *Cx. pervigilans* was found at the AIAL search bench flying around.

VECTOR-BORNE DISEASES - OUTBREAK NEWS

South Pacific

Pacific syndromic surveillance report – Week 6, ending 12 February 2017

Dengue: Solomon Islands: As of 5 February 2017 there have been 10,095 cases across all ten (10) provinces since August 2016. A total of 2,721 rapid diagnostic tests (Dengue duo Standard Diagnostics) have been conducted from Week 33, 2016 to Week 5, 2017 and 1178 (43%) were positive either NS1 or IgM. A total of 50 suspected dengue cases were admitted to the National Referral Hospital in Week 5 (30 January to 5 February, 2017) making the total number of hospitalizations since 15 August 2016 to be 680. Of the admitted cases 63% were individuals below 24 years of age. Source: Ministry of Health and Medical Services dengue situation report No. 19
Vanuatu: dengue serotype-2 outbreak ongoing with 1,638 cases as of 16 February 2017 (since Nov 2016). Source: Vanuatu MoH
New Caledonia: As of 14 February 2017 there have been 719 cases since 1 Sep 2016, a health emergency has been declared as a result of the increasing number of cases. Dengue serotype-1 has been confirmed. Source: Department of Health & Social Affairs, New Caledonia
French Polynesia: reports two cases of dengue serotype-2 with recent travel Vanuatu. Source: Personal communication with country officials.

Public Health Surveillance
Information for New Zealand Public Health Action

MONTHLY NOTIFIABLE DISEASE SURVEILLANCE REPORT - Jan 2017

Dengue Fever: Nine confirmed cases of dengue fever were notified in January 2017 compared to 15 cases notified during the same month of the previous year. All cases had been overseas during the incubation period, including one case who visited more than one country. The countries visited included Vanuatu (3 cases), Thailand (2 cases), and Fiji, Indonesia, New Caledonia, Singapore, Sri Lanka, (1 case each).

Zika

Florida reports three Zika cases in Miami as CDC says virus increased birth defects

Miami Herald BY DANIEL CHANG MARCH 2, 2017

On the heels of a new study from the Centers for Disease Control and Prevention showing that Zika has increased the rate of birth defects in the United States, Florida health officials on Thursday reported three more cases of the virus that were locally acquired in Miami-Dade — two infections dating to October 2016 and the first one of 2017.

The two Zika cases from 2016 required confirmatory testing from the Centers for Disease Control and Prevention, the health department said in a press release announcing the cases. The third case involved a person who had no symptoms but donated blood in January, leading to the discovery of a past infection.

The blood donor had "multiple exposures in Miami-Dade," the health department said, and likely contracted Zika in 2016. However, since the sample was collected this year, the health department classified it as the first local case of 2017.

There are no areas in Florida with ongoing Zika spread by mosquitoes, the health department reported.

So far in 2017, Florida has confirmed 13 cases of Zika, including four pregnant women, though all involved people who acquired the virus while traveling outside the country. In 2016, Florida's health department reported a total of 1,325 Zika cases.

Also Thursday, the CDC released a study providing more evidence that Zika causes microcephaly, a birth defect where the baby's head is smaller than expected, and other neurological disorders in babies born to women infected with the virus during pregnancy.

The study said, based on limited data from three states, that the U.S. saw a 20-fold increase in certain types of birth defects in 2016, the first year Zika was confirmed in the United States, compared with prior years.

The types of birth defects included microcephaly, brain malformations, eye defects, and other central nervous system problems.

Chikungunya

Chikungunya reported in Pakistan

REPORT from World Health Organization, Relief Web 27 Feb 2017

Pakistan's Ministry of National Health Services, Regulations and Coordination has reported cases of Chikungunya in the country for the first time.

A total of 803 cases have been reported since 19 December 2016 in the Sindh province, including 29 cases reported in various towns in Karachi during the week of 10-16 February 2017. Of the 92 samples sent to the National Instituted of Health for testing, 71 have been laboratory-confirmed positive for Chikungunya virus.

WHO is in close coordination with the Ministry of Health and partners in response efforts. Capacity-building has been conducted and instructions issued to district and town health officers, primary health care providers and hospitals on Chikungunya treatment and preventative measures.

The community has been advised through a door-to-door campaign through the Lady Health Workers programme. Affected areas have been fumigated and high-risk areas have been treated with insecticides using indoor residual spraying.

Philippines: Dozens infected with chikungunya in North Cotabato town

Outbreak News by ROBERT HERRIMAN February 17, 2017

Health officials M'lang, North Cotabato on the southern island of Mindanao have declared a chikungunya outbreak after some 50 people contracted the mosquito borne viral disease in the past week.
City health officer, Dr. Glecerio "Jun" Sotea said at least 50 individuals from Barangay Poblacion A tested positive for the virus. Testing was performed by the Manila-based the Regional Institiute of Tropical Medicine (RITM).
"We received the result just last week and the RITM confirmed that the blood samples we sent to them showed that indeed chikungunya was behind the illness of our constituents in Mlang," Sotea said.
A number of the patients were hospitalized for their illness.
Chikungunya is a viral disease transmitted by the bite of infected mosquitoes such as Aedes aegypti and Aedes albopictus. It can cause high fever, join and muscle pain, and headache. The joint pain may last for months or years and may become a cause of chronic pain and disability.
There is no specific treatment for chikungunya infection, nor any vaccine to prevent it. Pending the development of a new vaccine, the only effective means of prevention is to protect individuals against mosquito bites.

MOSQUITO ECOMOMY

Andhra Pradesh plans hi-tech war on mosquitoes

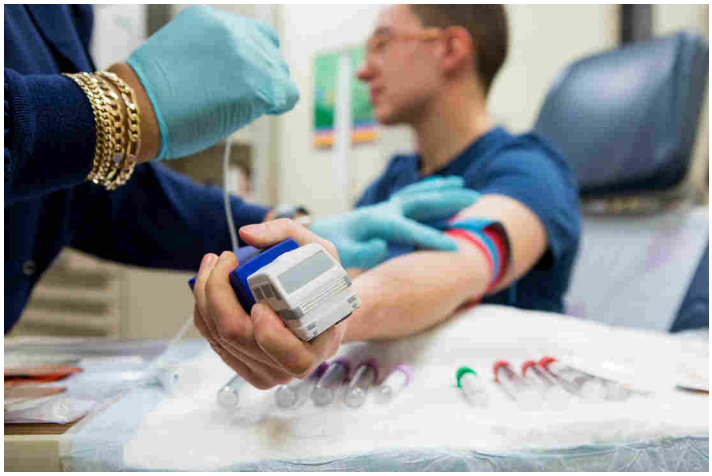
Times of India Dipak K Dash | TNN | Updated: Mar 3, 2017,

NEW DELHI: A hi-tech war against mosquitoes is being proposed using optical sensors to capture their density, species and gender before moving in to exterminate them.
Three cities in Andhra Pradesh — Vijayawada, Vishakhapatnam and Tirupati — want to use modern technology to detect mosquito breeding before malaria and other vector-borne diseases such as dengue, chikungunya and zika become an epidemic.
The Andhra government has sent a 'Smart Mosquito Density System' proposal to the Union urban development ministry for approval and to provide funds so that the three municipal bodies can implement this first-of-its-kind project in the country.
The three municipalities plan to deploy 10 sensors per sq km. The entire system will require nearly Rs 4 crore.
A total of 1,850 sensors will be deployed across 185 square kilometres of these cities Sensors fixed to electricity poles will be used to monitor density of mosquitoes along with gender and species. The devices will analyse and transfer mosquito density data along with location to a central database. There will be a control room application to provide mosquito density heat maps, which will help government agencies prioritise sprays.
The system will operate autonomously and use state-of-the-art internet of things (IoT) technology to alert health and other agencies of the need to treat geographic areas to control the mosquito population responsible for vector-borne diseases.
"The system will help us take appropriate measures to contain breeding mosquitoes and eliminate them.
The measures to check their breeding at exact location and that too with the right sprays for a particular species will help save wastage of resources. Real time data will help the local governments to be pro-active on tracking spread of vector borne diseases," said K Kanna Babu, director of municipal administration of Andhra Pradesh government.
In this system, smart phones and web application will be used to report sprays by location. Moreover, there will be analytics to monitor the effectiveness of sprays. At present, agencies spray several pesticides simultaneously since they are not aware of

the specific specie breeding at a spot.
According to National Vector Borne Disease Control Programme, about 95% population in India resides in malaria endemic areas. Around 5% of the total 214 million deaths across the globe due to malaria happen in India.

VACCINATION AND DRUG NEWS

To Test Zika Vaccines, Scientists Need A New Outbreak



Andie Vaught grasps a stress toy in the shape of a truck as she prepares to have blood drawn as part of a clinical trial for a Zika vaccine at the National Institutes of Health in Bethesda, Md., in November 2016. *Allison Shelley/The Washington Post/Getty Images*

NPR CARMEN HEREDIA RODRIGUEZ February 23, 2017

Researchers are eager to test promising vaccines against Zika, the virus that sparked a global health emergency last year.
But uncertainty over whether the Zika epidemic will continue affects researchers' ability to finish testing vaccines. They need locations with an active viral outbreak to conduct large-scale human trials and make sure the vaccine actually protects against disease.
"On one hand, you don't want to see outbreaks of infection," says Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases. "But on the other hand, [without that testing] you might have to wait a long time to make sure that the vaccine works."
All the vaccines being tested are in Phase I clinical trials, which means they are being tested for safety in a small number of people. According to a review paper published Tuesday in the journal Immunity, the vaccines represent a variety of scientific techniques to thwart the disease, ranging from inactivating the virus to manipulating its DNA.
The NIAID announced Tuesday it is launching yet another Phase I trial for a vaccine made out of proteins found in mosquito saliva. The product is intended to trigger a human immune system response to the mosquito's saliva and any viruses mixed with it. If successful, the product could protect humans against a number of mosquito-transmitted diseases, including Zika virus, dengue and chikungunya. All three have infected people in the United States.
Col. Nelson Michael, director of the U.S. Military HIV Research Program at the Walter Reed Army Institute of Research and co-author of the paper, says he expects preliminary reports on the safety of some of the older vaccines in April. As of now, he says, it is impossible to guess which vaccine will prove most effective in providing immunity.
"Sometimes it's difficult to predict which horse will win the race," Michael says.
Zika, which is spread from infected people to others by mosquito bites or sexual contact, often infects people without showing symptoms. In some cases it causes flu-like symptoms, such as fever, muscle aches and joint pain in adults — and, in rare cases, Guillain-Barré syndrome, which can cause temporary paralysis. But it is most notorious

for causing some children to be born with microcephaly, a devastating a birth defect in which a child's head and brain is smaller average size — if their mothers were exposed to Zika.

The virus garnered international attention after hundreds of cases of disabled babies surfaced in Brazil. It quickly swept through South America and the Caribbean before stopping on the southern coast of the U.S.

The World Health Organization declared the outbreak a "public health emergency of international concern" on Feb. 1, 2016, then ended the alert on Nov. 18.

Vaccines that meet the safety standard in Phase I clinical trials undergo subsequent rounds of testing to gauge effectiveness. To measure this, researchers rely on the gold standard of administering the vaccine to large number of people at risk to see if the vaccine is effective. However, Zika's recent arrival to the Western Hemisphere means researchers don't know whether the virus will become a perennial threat, or was a one-time explosion.

The uncertainty poses challenges for Zika vaccine development. A lull in the outbreak could cause significant delays in testing, pushing back the timetable for a commercially available product, Fauci says.

While researchers can use alternative methods to measure efficacy without large-scale testing, a decline in the circulation of the Zika virus could set progress back by years because the vaccine testing would be less reliable.

"If we don't get a lot of infections this season in South America and Puerto Rico, it may take years to make sure the vaccine works," Fauci says.

Fauci expects to launch the next round of human trials for a DNA vaccine developed by the NIAID next month.

Michael also worries that a lag in the number of Zika cases could lead the private sector to pull funds from vaccine development. It takes millions of dollars to develop a drug or vaccine, and pharmaceutical companies play a critical role in making and manufacturing them, he said. But those companies have many competing interests, he notes, and if it is hard to test a vaccine this year, federal agencies and private companies may turn their Zika prevention efforts elsewhere.

"This is a constant issue, where you put your resources," Michael says.

So far, signs suggest that the climate could be ripe for Zika again this year. Warmer-than-usual temperatures are affecting areas across the Western Hemisphere, including hotbeds of the Zika outbreak in Brazil. The National Oceanic and Atmospheric Administration found that South America experienced the second hottest January in recorded history.

The balmy temperatures rev up the *Aedes aegypti's* behavior in multiple ways, says Grayson Brown, professor of entomology at the University of Kentucky. They tend to move faster, lay more eggs per day and feed more frequently. However, the heat is not necessarily correlated to higher numbers of the mosquito, Brown says, as they tend to live among humans, not in the wild.

"This mosquito breeds almost exclusively in human created containers," he says. "You don't really find it out in the woods."

In the United States, areas with populations of the *Aedes aegypti* are closely monitoring their numbers. Last year, Texas and Florida dealt with locally acquired cases of Zika infection.

In Texas, public health officials have monitored mosquito populations throughout the winter to track their numbers and any presence of the virus. Despite unseasonably warm weather, Chris Van Deusen, spokesman for the Texas Department of State Health Services, says they have seen lower numbers of the *Aedes aegypti* and no cases of

Zika.
Van Deusen says the state is also monitoring the outbreak in Mexico, since heavy traffic across the border increases the possibility of transmission in Texas. Officials are expecting another outbreak of locally transmitted cases of disease, Van Deusen says.
But when and where? That's a mystery. "There's so many factors that go into it, it's really impossible to make an ironclad prediction," he says.

MOSQUITO SCIENCE

See how Zika infection changes a human cell

Science Daily February 28, 2017 Cell Press

The Zika virus taking hold of the inner organelles of human liver and neural stem cells has been captured via light and electron microscopy. In Cell Reports on February 28, researchers in Germany show how the African and Asian strains of Zika rearrange the endoplasmic reticulum and cytoskeletal architecture of host cells so that they can build factories where they make daughter viruses. The study reveals that targeting cytoskeleton dynamics could be a previously unexplored strategy to suppress Zika replication.
"Cytoskeleton elements control cellular shape, growth, and movement, provide mechanical support and stress-resilience, and coordinate organelle anchoring and vesicular transport," says senior author Ralf Bartenschlager, a virologist at Heidelberg University. "Zika virus infections cause a drastic perturbation of the cytoskeletal network, re-organizing both intermediate filaments and microtubules into a cage-like structure that surrounds the replication machinery."
His group, led by first author and Heidelberg postdoctoral fellow Mirko Cortese, also found that Zika and dengue, both flaviviruses, use similar strategies to infect host cells. Once inside of a cell, viral particles latch onto the rough endoplasmic reticulum -- the ribosome-rich membranes outside the nucleus where RNA is translated into proteins. The viruses then remodel the endoplasmic reticulum to form a protective cage with small holes where RNA and newly made viral particles can travel in or out.
The difference with Zika is that it has unique ways of rearranging structures within the cell. For example, there are an abundance of microtubules -- proteins that build the cellular cytoskeleton -- surrounding its protective cage. There were also slight variations between how Zika establishes itself in human liver cells versus neural stem cells, where it is more physiologically relevant. This suggests there are yet-unknown cell-type-specific factors that affect how the virus replicates.
"The cytoskeleton has a crucial role in neurogenesis," Cortese says. "Thus, it is tempting to speculate that the alterations induced by Zika virus on the host cytoskeleton might be connected to the underlying physio-pathological mechanisms that link congenital Zika virus infections to microcephaly and neurodegenerative disorders."
Seeing Zika's reliance on the microtubules for its replication, the researchers now want to explore whether these drugs, including taxanes routinely used during chemotherapy, can have potential anti-viral activity against Zika in animal models. These, and similar drugs, have been declared safe to use during the second and third trimester of pregnancy, as well as during breastfeeding.
"Having identified a link between cytoskeleton dynamics and Zika virus replication, together with the plethora of available cytoskeleton-targeting compounds, might contribute to gain mechanistic insight into the ZIKV replication cycle and identify new avenues for treatment," Bartenschlager says.

Does Zika Harm Male Fertility?

Web MD Feb. 22, 2017By Brenda Goodman, MA

Researchers at the CDC are working with a fertility clinic in Puerto Rico, which has been hard-hit by Zika, to determine if men infected by the virus have lower sperm counts or sperm that doesn't work as well in the weeks and months after infection.

That study got underway just last month and so far has enrolled just a handful of men. It generally takes about 90 days for a man to produce sperm, so researchers are planning to track them for at least 6 months to assess any changes.

"It's going to be important for us to follow them up for several months to rule in or rule out any effects of Zika infection," says Tyler Sharp, PhD, chief epidemiologist at the CDC's Dengue Branch in San Juan, Puerto Rico.

The reason why they're worried is that in recent months, three separate studies have documented the grave damage the Zika virus can do to the male testes, at least in mice.

"It just looks like it's been destroyed," says Kelle Moley, MD, co-director of the Institute of Clinical and Translational Sciences at Washington University in St. Louis. "As a result, you're left with a testis that's about a tenth of the size of a normal, non-infected testis." Moley has documented the same phenomenon in mice, but was not involved in the current study.

The newest study, released Wednesday by a team at Yale and the Howard Hughes Medical Institute, found that Zika attacked specialized cells called Leydig cells that produce the hormone testosterone and support sperm production. About 3 weeks after infection, the mouse testes were much smaller than those of mice that were not infected, and they had far less testosterone in their blood.

The studies raise the possibility that Zika infection may have lasting impacts on men. The virus is already known for causing birth defects in developing babies.

"No one has really correlated this to infertility in men," Moley says, "but infertility is not something that comes to the forefront when you have a cold. No one is going to get a semen analysis on someone who has a fever and a rash and chills. We may not know if people are infertile because of Zika for 20 or 30 years."

A rash, fever, and chills are among the symptoms of Zika.

In addition to being nerve-loving, or neurotropic, the Zika virus also seems to gravitate to the reproductive tract. Researchers have documented that the infection can be passed sexually, as well as through the bite of an infected mosquito.

Sharp's team reported just last week that Zika persists in the semen of some men for months.

Sharp says that so far, he has not heard any case reports from Brazil or other countries with widespread Zika outbreaks of reproductive effects or shrinkage of the testes in men. He says he is skeptical that what's happening in mice is also happening to people.

He says typically, when scientists use mice to study disease, it's because they see an effect in humans and want to study it more closely in an animal model.

"What appears to have happened now is the opposite of that. We have [observable effects] in a mouse model, and now we're seeing if we can find it in humans. That

doesn't mean that it doesn't exist, but typically it's the opposite order," he says.
Moley agrees with Sharp that her findings need to be confirmed in men.
"I think it needs to be studied at a population level, and I think that's what the CDC is trying to do," she says.
Moley and her colleagues watched what happened to the male reproductive systems in mice in the weeks after infection with the Zika virus. They found that the virus attacks cells that are responsible for building a barrier between sperm and blood. This barrier is critical because it hides the sperm from attack by the body's own immune system. When the barrier is breached, the immune system comes in, and by about 21 days after infection, Moley says, very little of the internal architecture of the testes is left.
The mice in her study, which was published last October, had lowered sperm counts, lower testosterone, and were far less likely to impregnate female mice.
The study out Wednesday found the same outcome, though the researchers think the testes shrink because Zika makes a direct attack on Leydig cells, slashing the production of testosterone.
Ryuta Uraki, PhD, a postdoctoral researcher at Yale, says other questions remain, like whether the testes can recover after a Zika infection.
"We want to examine whether damage in the testes can be reversed after the virus is cleared and fertility can be restored," he says.

SYMPTOMES AND TREATMENTS

Zika Virus and Chikungunya Co-Infection May Result in Prolonged Infection

ContagionLive Infectious Diseases Today

FEB 24, 2017 | SARAH ANWAR

When it comes to Zika and those at highest risk of developing complications, the first thing that comes to mind is pregnant women and their developing fetuses. Many studies have shown that congenital infection with the Zika virus results in microcephaly and other neurological complications.

	SYMPTOMS			
INFECTION TYPE	Fever	Arthralgia / arthritis ≤ 2 wks	Arthralgia / arthritis 2 wks to 3 mos	Arthralgia / arthritis > 3 mos
Zika mono-infected	5	8	0	0
Chikungunya mono-infected	7	4	1	3
Co-infected	17	6	8	6

Table: Number of Individuals Who Presented With Symptoms Based on Infection Type

However, in a new study presented at the First International Conference on Zika Virus, new findings were revealed on disease severity in those individuals who are dually infected with Zika virus and Chikungunya.
In the conference's first session, which discussed Zika epidemiology, Marta G. Cavalcanti, MD, PhD, Infectious Disease Clinic, Hospital Celmentino Fraga Filho, Federal University of Rio De Janeiro, Rio De Janeiro, Brazil, presented her team's findings regarding Zika virus mono-infection, Chikungunya mono-infection, and Zika and Chikungunya co-infection.
Out of the 163 individuals who presented to the facility, the research team studied a cohort of 19 females and 18 males with an average age of 43 years who presented with Zika virus infection. According to the research, 8 individuals had Zika mono-infection, 9

had Chikungunya mono-infection, and 20 were co-infected with Zika and Chikungunya. The researchers followed up with the individuals for up to one year, while testing different biological samples through RNA testing. According to Dr. Calvalcanti, Zika virus RNA testing is the most reliable way to confirm Zika infection. Normally, RNA can be detected in serum or whole blood samples for around one week, and in urine for up to 2 weeks, according to Dr. Cavalcanti.

Although Zika-related complications can be serious in at-risk populations, only 20% of infected individuals typically present with symptoms. Even in those who do present with symptoms, the severity is usually only mild and they last for about one week. Dr. Cavalcanti and her research team found that those who individuals who were co-infected with Zika and Chikungunya presented with a fever or other symptoms more often than those who were mono-infected with either of the two arboviruses (see Table). Approximately 20% of co-infected individuals remained symptomatic for up to 300 days, post onset.

Study finds link between enzyme and arthritis caused by chikungunya virus

Community Health & Wellness Science & Research 17th of February 2017

A study led by QIMR Berghofer Medical Research Institute has found further evidence that an enzyme in the immune system promotes arthritis following infection with chikungunya virus. The findings mean the enzyme could become a target for new treatments.

Chikungunya is a mosquito-borne disease related to Ross River virus. It can cause severe, chronic polyarthritis (inflammation in multiple joints) and/or polyarthralgia (pain in multiple joints). Standard anti-inflammatory drugs are usually not very effective in reducing the inflammation or pain.

The study was led by the head of the Inflammation Biology Laboratory at QIMR Berghofer, Professor Andreas Suhrbier. Professor Suhrbier said the researchers used RNA-sequencing technology to examine inflammatory responses following infection with chikungunya.

“In laboratory experiments we found that when the gene for a particular enzyme – known as granzyme A – was missing, chikungunya virus caused far less swelling and arthritis,” Professor Suhrbier said.

“We also found that when we inhibited the enzyme, there was far less swelling and arthritis.”

The researchers also tested blood samples taken from chikungunya patients and found that they had higher levels of the enzyme.

“More research is needed to confirm these findings, but our study strongly suggests that this enzyme plays a part in promoting arthritis in chikungunya patients,” Professor Suhrbier said.

“If this is correct, the enzyme granzyme A could be a target for new anti-inflammatory drugs for chikungunya, and possibly also other inflammatory diseases, such as Ross River virus.”

The study involved Australian and international collaborators from a range of institutions including Monash University, Griffith University, The University of Sydney and CEA, Paris. The findings have been published in the journal PLOS Pathogens.

MOSQUITOE’S EFFECT ON NATURE

Yellow fever devastates Brazil monkey population

Otago Daily Times Thursday, 9 February 2017

Men work on the production of Yellow Fever vaccine at a laboratory in Oswaldo Cruz

Foundation (Fiocruz) in Rio de Janeiro

An outbreak of yellow fever has claimed the lives of more than 600 monkeys and dozens of humans in Brazil's Atlantic rainforest region, threatening the survival of rare South American primates, a zoologist said on Wednesday.

The monkeys, mostly brown howlers and masked titis, are falling out of trees and dying on the ground in the forests of Espirito Santo state in Brazil's southeast.

"The number of dead monkeys increases every day," said Sergio Lucena, he said of the impact of the disease's spread in his state, "We now know that the rare buffy-headed marmoset is also threatened by the yellow fever virus and dying."

The howler's sounds closely resemble grunts or barks. It was the silence that fell on the forests that first alerted farmers that something was amiss, sparking specialists to investigate.

The masked titi is considered as "vulnerable" by the Swiss-based International Union for Conservation of Nature, which has placed it on its Red List of Threatened Species.

No evidence has so far surfaced of the affliction felling woolly spider monkeys, considered one of the world's most endangered by the IUCN.

Brazil is suffering the worst yellow fever outbreak in decades that has killed at least 69 humans, nearly all in central state of Minas Gerais, where the problems began.

Most people recover from yellow fever after the first phase of infection, which usually involves fever, headache, shivers, loss of appetite and nausea or vomiting, according to the World Health Organization.

Millions of Brazilians have been vaccinated as health authorities scramble to prevent the outbreak from turning into an epidemic. There is no such protection available for monkeys.

Yellow fever is a viral disease found in tropical regions of Africa and the Americas that mainly affects humans and monkeys and is transmitted by the same type of mosquito that spreads dengue and the Zika virus.

Hundreds of thousands of people died from it in the Americas before a vaccine was developed in 1938.

Brazil's federal health officials are investigating if the latest outbreak is linked to a tailings dam collapse last year in Minas Gerais at the Samarco iron ore mine co-owned by BHP Billiton and Vale SA.

The dam accident, which polluted the Rio Doce river, is regarded as the country's worst environmental disaster.

Some scientists have said that calamity may have made the monkeys more susceptible to contracting yellow fever by decimating their habitat and food supplies.

Birth control for mosquitoes targeted at saving Hawaiian birds

Science Blog February 22, 2017

To protect Hawai‘i’s unique, imperiled native birds, researchers from the University of Hawai‘i at Mānoa and UH Hilo are teaming up with the Department of Land and Natural Resources (DLNR) and the U.S. Fish and Wildlife Service to adapt a ‘birth control’ method used across the U.S. mainland to control mosquitoes. The scientists are taking the first steps to adapt a safe, targeted and efficient mosquito control method known as

Incompatible Insect Technique to reduce the population of the disease-carrying mosquitoes that harm native birds in Hawai‘i.

Incompatible Insect Technique acts like a birth control method for mosquitoes and it has already been adopted and proven successful around the country and the world to protect human health and quality of life. A similar method has been used in Hawai‘i for decades to control fruit fly pests which are harmful to local agricultural products.

Mosquitos are a nuisance and a hazard both to people and to Hawai‘i’s native birds, which are in danger of extinction from decades of habitat loss, predation and diseases like avian malaria and avian pox.

“We are already seeing the loss on Kaua‘i of the safe havens of higher elevation forests for our native birds. Mosquito-spread diseases are decimating bird populations and if we do nothing we could lose several more species in the next 10 years,” said Cynthia King, an entomologist with DLNR.

Just one of the 6 types of mosquitoes found in Hawai‘i harms native birds—Culex quinquefasciatus. Scientists and conservationists are working together to use a bacteria that is naturally-occuring in fruit flies in Hawai‘i. It is called Wolbachia, and the research, which will be done in controlled laboratory settings, involves giving the male mosquitoes a different strain of Wolbachia than is normally found in them, to prevent them from producing offspring. To reproduce, most mosquitoes carry a type of this Wolbachia in their system. When male mosquitoes with the different strain of Wolbachia try to mate with females, there are no offspring.

“The process for mosquitoes is very similar to techniques that have been used for many decades in Hawai‘i to control pest fruit flies for the benefit of agriculture,” said King. “It doesn’t eradicate the insect, but helps to safely reduce the population on a landscape scale without the use of pesticides and without harming any other species.”

MOSQUITO INNOVATIONS

Biotrap is the world’s first 100% biodegradable mosquito trap

inhabitat Design for Health, Health, News by Lacy Cooke

If you’re concerned about the Zika virus or simply keen to prevent pesky mosquito bites, you may not have to use DEET-filled sprays or citronella candles anymore. Canada-based Greenlid Envirosciences decided there had to be a better alternative, so they designed Biotrap, a mosquito trap that is both biodegradable and compostable.

Biotraps are designed to help protect against mosquito-borne diseases, and they’re easy to use. All a person needs is to add water and the trap takes care of the rest. Greenlid Envirosciences even recommends using dirty water for convenience in both rural and urban areas, and no upkeep is required.

Related: This billboard imitates human sweat to snare mosquitoes

Biotraps include “both attractant and environmentally safe insecticide,” drawing in female mosquitoes, according to the

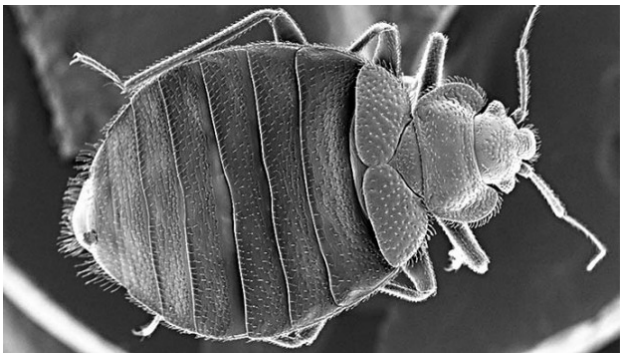
company. There's only about 0.0125 grams of the insecticide Bifenthrin in each Biotrap, and Greenlid Environsciences said the minimal concentration means the trap is non-toxic. The trap acts as a "simulated breeding ground" that kills off both the female mosquito and the larvae. It's highly effective too. According to Greenlid Environsciences, the Biotraps eliminate more than 95 percent of the larvae.
The waterproof, compostable containers are made with "end-life recycled cardboard" and will break down in four to six weeks. They've already been deployed to Brazil, Colombia, Florida, Pakistan, and Hawaii. The Australian government has also ordered Biotraps to protect against Queensland dengue outbreaks, and Greenlid Environsciences is seeking to work with other agencies and governments to help people in regions with outbreaks of mosquito-borne illness.
Soon you can order your own Biotrap via an Indiegogo campaign that launches July 18. Greenlid Environsciences will donate one Biotrap for each trap purchased through partners Direct Relief and the International Medical Corps. You can sign up for updates here.

NOT ONLY MOSQUITOES

Bed bugs on the rise in Wellington: beware when travelling, expert says
ROSS GIBLIN/FAIRFAX NZ Stuff, 4.2.2017
Bug control expert Shailendra Narayan says bed bug outbreaks are on the rise and warns people to be careful when buying second hand furniture or when travelling to warmer countries such as Thailand, Australia or India. A mysterious rise in bed bug infestations has been met with calls to be wary of secondhand furniture and warm climates.

Bed bugs often set up camp in seams of fabric, such as this one found by Shailendra Narayan in a Wellington home.

Despite Wellington's dismal summer, callouts to exterminate bed bugs have gone up in recent months, a pest control expert says.
"It's pretty consistent with fleas, but bed bugs are the new sort of pest," Shailendra Narayan of Pest Control Services Wellington said.
Those trading in the capital's average summer temperatures for warmer shores run the risk of bringing the tiny insects stowaways back, he said.
Warm countries such as Australia, Thailand and India can be hotbeds for the parasitic insects, said Narayan, who has been in the business for 20 years.
"[People] travel and they come back and bring it back in their luggage."
Narayan said bed bugs have been known to survive up to a year without a meal under cool conditions, but thrive in items with cosy cracks and crevices, which is why they love secondhand furniture.



A Vietnamese student living in Mt Cook noticed bites early in January and suspected they were from bed bugs in a second hand mattress.
At first the bites only appeared on her ankles, then the weather got hotter and she switched to summer pyjamas for a night, and the bites spread up her legs.
"They prefer to be more active at night when the host is asleep. They will come out and feed on you then go back into the crevices," Narayan said.
The student's friend had bought the mattress for her from a secondhand family store, she said.
The 30-year-old student, who asked not to be named, said the doctor prescribed a cream for the bites and told her to wash her clothes and linen in hot water and vacuum thoroughly.
The Ministry of Health said second hand mattresses should be avoided, and bags and suitcases should be kept off floors in hotels, motels and hostels.
Karori GP Jeff Lowe said he saw a "constant stream of people with itchy red lumps on their skin" in his clinic, but the offenders range from animals and insects to scabies and bed bugs.
Hot washing and insecticides in the bed are the keys to getting rid of them, he said.
The insect's knack for survival is due to its portly body, pharmacist Calvin Lim, owner of Hataitai Pharmacy said.
"These critters don't die easily. They can live in the beds quite happily where you have a turnover of people."
Beds with warm, fabric bases "are more dodgy" than slat beds, Lim said.
HOW TO SPOT BED BUGS
Bed bugs are the size of a grain of rice, oval, wingless parasitic insects. If they have recently fed on blood they will be reddish-brown. If they haven't fed for a while they will be pale and translucent. They are attracted to sleeping people by body heat and carbon dioxide in breath. They hide in cracks, creases and seams in furniture, usually close to a food source, and do not live on skin.

Naked and Afraid star is forced to quit after thousands of potentially deadly sand flies left her with a full-body rash in Belize jungle
By Mia De Graaf For Dailymail.com 3 March 2017
Anastasia Ashley, 30, made it six days on the island in Naked and Afraid. However, she had to tap out of Discovery's show early due to sand fly bites. Sand fly bites can be particularly alarming since sand flies are the biggest spreaders of leishmaniasis, an infection that can affect the internal organs.
The latest female star of Naked and Afraid has been forced to quit to seek medical help

after a swarm of flies left her with a full-body rash. Anastasia Ashley, an internationally-recognized professional surfer, joined YouTube star Cory Williams to try to make it for 14 days in the middle of nowhere in Belize. However, Daily Mail Online can reveal the 30-year-old blonde has had to tap out of Discovery's show eight days early - and this photo shows why. The normally bronzed beauty was left with redness and itchy bumps head-to-toe. According to producers, she was attacked by sand flies, being bitten for 12 hours straight from 6pm to 6am on the sixth day.

'The flies had hatched and latched on to her,' Ashley's agent Drew told Daily Mail Online. 'She had to tap out. She was told not to scratch, but she was so itchy.'

Sand fly bites can be particularly alarming since sand flies are the biggest spreaders of leishmaniasis, which can affect the internal organs.

If not treated, severe types of visceral leishmaniasis can be fatal.

Anastasia Ashley, 30, (pictured) made it six days on the island in Naked and Afraid - but she had to tap out of Discovery's show early due to sand fly bites (right), which can be deadly

If left without treatment, the bites may go away, but will likely leave ugly scars - one of Ashley's motivations to throw in the towel.

In the US, patients will normally be prescribed hydrocortisone cream.

Ashley has been using antibiotic oils and calamine lotion in a bid to stop the bites developing into a worse infection like leishmaniasis, according to her agent.

There are two forms of leishmaniasis - one manageable, one potentially deadly.

Cutaneous leishmaniasis merely causes skin sores, which appear within days, and are treatable with cream.

However, visceral leishmaniasis can affects several internal organs including the spleen, liver, and bone marrow.

Ominously, many people have a silent infection of visceral leishmaniasis without any

symptoms or signs for months.
Eventually, symptoms may start to appear such as fever, weight loss, swelling of the spleen and liver, and abnormal blood tests.
Sufferers may also have low blood counts, including a low red blood cell count, a low white blood cell count, and a low platelet count.
Sand fly bites can be particularly alarming since sand flies are the biggest spreaders of leishmaniasis, which can affect the internal organs.
If not treated, severe types of visceral leishmaniasis can be fatal.
LESS SEVERE FORM
Cutaneous leishmaniasis merely causes skin sores, which appear within days, and are treatable with cream.
MORE SEVERE FORM
Visceral leishmaniasis can affects several internal organs including the spleen, liver, and bone marrow.
Ominously, many people have a silent infection of visceral leishmaniasis without any symptoms or signs for months.
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Sufferers may also have low blood counts, including a low red blood cell count, a low white blood cell count, and a low platelet count.
HOW YOU GET LEISHMANIASIS
The most common way people get infected is through the bite of infected female phlebotomine sand flies.
They suck blood from a person, usually during the night.
They rarely bite during the day unless you brush up against them.
Scarily, they are silent, small (the third of the size of a mosquito), and at first the bites may not be noticeable.
The CDC urges anyone with a severe case of sand fly bites to seek medical attention, which Anastasia conceded to do.
The rash was a first for Anastasia, who is used to being outdoors and on the beach.
She started competitively surfing from the age of seven, and was professionally surfing by the age of 14.
Having won over 200 events including the prestigious Women's Pipeline Pro, she is currently one of the most followed surfers on social media with over 3 million followers and fans across her channels.
Anastasia's appearance marked a shift in the show's format.
Normally, participants have to engage in a 'black out' during filming, meaning they cannot tell anyone anything about their experience until it airs.
This time, the two survivalists were allowed to document their intense Naked and Afraid experience on social media.
It meant fans of the series could catch snippets of highlights and low points every day in real time.