NEW ZEALAND BIOSECURE

BORDER HEALTH NEWSLETTER - November 2016

WELCOME!

The mosquito season has doubtlessly started in New Zealand. In the last MoH circular letter you would have found information about Bti-dunks and a recommended gear list. If you have questions in this regard, especially about GPS cellphone apps and photographing mosquitoes please contact the lab. Meanwhile we should use the public's attention while the mozzies are in and around their heads and could think about outreach. Maybe something similar as the new Zika-Dengue-Chikunguya (ZDC) Toolkit which enables communities to take action to eliminate mosquito breeding sites and prevent transmission. The Sri Lanka Red Cross Society, in collaboration with the International Federation of Red Cross and Red Crescent Societies recently organised a workshop for 25 Red Cross Red Crescent health workers from the region. The workshop, which was supported by the Finnish and New Zealand Red Cross Societies, focused on improving participants' knowledge around vector-borne diseases and exploring solutions to issues faced by the health workers in their respective communities. The Toolkit contains Community and School Prevention Modules and a toolkit of resources and games to print out and use. It can be used by Red Cross volunteers and anyone working with communities to pass on knowledge and skills in prevention and response on Zika, Dengue and Chikungunya. It helps volunteers and communities to understand the cause, symptoms, treatment and the prevention of these diseases.

Participants at the workshop from Sri Lanka, India, Maldives and Bhutan get familiar with some of the games included in the ZDC Toolkit. Photo Credit: Sri Lanka Red Cross Society

SAMPLES

During November 907 samples were collected by staff from the 12 DHBs with 197 positives. Although there were multiple winter mosquitoes found, the increasing numbers of *Aedes notoscriptus* tells us that winter is finally over. It is believed that the strong rain, constantly flushing nutrients, benefits *Culex pervigilans* (El Niño activity - measured in sea surface temperature in the pacific - impacts rainfall and temperatures.) The adult numbers of our common endemic species is almost 10 times those from last year in November. Although the number of their larvae has been also high this month, it is still lower than last year.

Species	**Adults**		**Larvae**	
New Zealand Mozzies	**Nov 16**	**Nov 15**	**Nov 16**	**Nov15**
Aedes antipodeus (winter mosquito)	23	4	Nil	Nil
Ae. australis (saltwater mosquito)	Nil	Nil	3	Nil
Ae. notoscriptus (striped mosquito)	193	54	1759	2002
Coquilletidea iracunda	56	3	Nil	Nil
Culex astilae	Nil	Nil	14	Nil
Cx pervigilans (vigilant mosquito)	426	47	1689	2405
Cx. quinquefasciatus (southern house mosquito)	18	4	97	72
Opifex fuscus (rockpool mosquito)	Nil	Nil	48	17
Total	**716**	**112**	**3610**	**4496**

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BIOSECURITY SPECIALISTS

INCURSIONS/INTERCEPTIONS

During November 2 suspected interceptions were detected.
Please note that the interceptions of live unwanted mosquitoes are highlighted in red. Exotic species in general are highlighted in light blue.

2.11.2016 One male and one female mosquito, both alive, have been found at a Transitional Facility - Ezybuy in Palmerston North in a container of clothes from the UK. Both mosquitoes were native *Culex pervigilans*.

2.11.2016 One dead male *Aedes japonicus* was found at POA in a container with used machinery from Germany. Strikingly, *Ae. japonicus* is abundant in Germany.

NEW MOSQUITO SCIENCE

Antibody test gauges mosquito exposure

AAAS and EurekAlert! PLOS PUBLIC RELEASE: 1-DEC-2016

How many mosquitoes live in your neighborhood? How many mosquito bites have you and your neighbors gotten this week? Answering these questions--and gauging how mosquito populations change over time or after a control strategy is implemented--has historically been difficult. Now, researchers reporting in PLOS Neglected Tropical Diseases have described a blood test that can be used to assess human exposure to *Aedes* mosquitos. The test, which measures antibodies to an *Aedes* salivary peptide, showed decreased human exposure to mosquito bites after a vector control program.

Various species of *Aedes* mosquitoes can carry dengue fever, chikungunya virus, Zika fever, and yellow fever, among other pathogens. To slow the spread of these diseases, efforts have been made to control *Aedes* populations. But determining whether control efforts are working has typically required time and labor-intensive monitoring of larval habitats and mosquito traps. Recently, researchers developed tests that determine whether someone has been bitten by a specific *Aedes* species by measuring whether their blood has antibodies that react to that species' saliva, but working with the whole saliva required is challenging.

IMAGE: AEDES ALBOPICTUS MOSQUITO DURING THE BITE AT THE SKIN.
CREDIT: IRD - PHILIPPE BOUSSES

In the new work, author Franck Remoue, of the MIVEGEC unit of the Institut de Recherche pour le Developement (IRD) France, and colleagues tested whether antibodies against one individual peptide from Aedes aegypti saliva could be indicative of exposure to other *Aedes* species. The team collected four sequential blood samples--before, during, and after a mosquito control intervention--from 102 adults in Saint-Denis, a city on the Indian Ocean island La Reunion where Aedes albopictus, but not *Aedes aegypti,* are endemic. Mosquitos were also tallied using traditional mosquito trap and larval counting methods during the intervention, which involved spraying insecticide and physical elimination of mosquito breeding sites.

Despite being exposed only to *Aedes albopictus* mosquitos, 88% of people in the study

had a positive antibody reaction to the *Aedes aegypti* salivary peptide, before vector control. 30 days after the control strategy was implemented, that number felt o 68%, a trend that was also seen in the manual tallying of larva and adult mosquitos. Moreover, on an individual basis, the level of the antibody immune response decreased significantly between the time points after vector control. Future studies will be needed to validate the tests in children and determine the ideal timing of testing to gauge the effectiveness of mosquito control strategies.

"These results validate the usefulness of the antibody response to one salivary antigen for evaluating human exposure to Aedes bites and for monitoring vector control strategies against arboviral diseases," the researchers conclude.

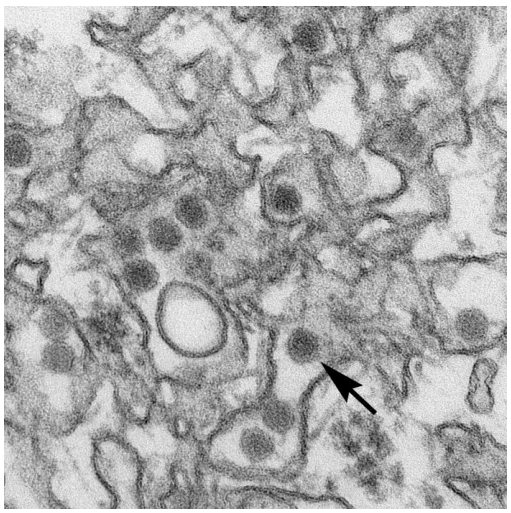
Zika virus: Neonatal mouse model provides a new platform for research

Posted by Press Release on November 17, 2016 // Leave Your Comment

A new mouse model developed by scientists at the U.S. Food and Drug Administration may help in exploring the potential activity of Zika virus vaccines and therapeutics. Published today in PLoS Pathogens, is the description of a neonatal mouse model that provides a platform for potentially improving and expediting studies to understand the causes and effects (pathology) of the Zika virus.

This is a transmission electron micrograph (TEM) of Zika virus/ Cynthia Goldsmith

The recent spread of the Zika virus and its association with increased rates of neurological disorders and complex congenital syndromes, such as microcephaly in babies and Guillain-Barré Syndrome in adults, has created an urgent need for animal models to examine the virus' pathology. Better understanding the impact and long-term effects of the Zika virus infection in mice may be useful in efforts to find ways to combat it in a human population. While past research indicated that only mice with compromised immune systems are susceptible to Zika virus infection, this study shows that neonatal mice with otherwise healthy immune systems are also susceptible.



"There are many unanswered and essential questions about how the Zika virus works, including the long-term impact," said Daniela Verthelyi, the FDA's Chief of the Laboratory of Immunology, who led the agency's development of the new animal model. "This mouse model gives researchers a new tool to study and understand how the Zika virus replicates and spreads in the body, which we hope will provide these critical answers."

The new animal model described in this publication utilizes the C57BL/6 mouse strain. The FDA's scientists found that neonatal mice of this strain are susceptible to the Zika virus and develop neurological symptoms 12 days post infection. These mice eventually recover from disease and thus the model provides an opportunity to study the virus' long-term effects as well as an additional means for early exploration of experimental Zika virus vaccines and therapeutics.

This advancement is just one of many research projects the FDA has undertaken as part of the agency's comprehensive effort to fight the Zika virus. For example, the FDA has invested in initiatives to understand the effectiveness of technologies that reduce pathogens (such as viruses or other microorganisms that can cause disease) in blood,

evaluate the impact of red blood cell storage on virus infection, expand the agency's database of virus-infected samples essential to the development of diagnostic devices, and explore how long the Zika virus persists in body tissues, among other projects.

"The FDA considers the public health response to the Zika virus epidemic to be a top priority. We stand ready to use our expertise and authorities to the fullest extent to help facilitate the development and availability of products that may help mitigate emerging infectious disease threats, such as the Zika virus. The FDA's regulatory science research program is an essential component of the national response to emerging infectious diseases," said Luciana Borio, M.D., the FDA's Acting Chief Scientist. "Helping to advance the approaches scientists can use to understand the Zika virus will ultimately assist in speeding the development and availability of the tools needed to combat it."

In addition to advancing research initiatives, the FDA is also working rapidly in a variety of areas to respond to the emerging Zika virus outbreak. The agency's activities are focused on protecting the safety of our nation's supply of blood and human cells, tissues and cellular and tissue-based products, encouraging development of diagnostic tests to help clinicians detect and diagnose Zika virus infection, and evaluating the safety and efficacy of any investigational vaccines and therapeutics that are currently in various stages of early development.

MOSQUITO TECHNOLOGY

Learning how mosquitoes hear could reap health rewards

The Argus, 6.12.2016 Siobhan Ryan / Argus_SiobhanR

KNOWING how mosquitoes hear could help control the spread diseases like malaria, yellow fever and the Zika virus.

Illnesses carried and transmitted by the insect are responsible for an estimated 725,000 deaths annually and they incapacitate a large proportion of the earth's population.

Researchers from the University of Brighton have been studying mechanisms by which male mosquitoes use their 'buzzing' sound to detect females.

Their findings could lead to the production of acoustic traps, better genetically-modified male mosquitoes and the disruption of mosquito mating, which, in turn, could significantly reduce their numbers.

Mosquitoes are well known for their annoying whine when they fly.

The sound is produced by their wings which beat several hundreds of times per second.

The male's buzz is typically higher in pitch than that produced by the relatively larger females. Mosquitoes use this frequency difference to detect and communicate with possible mating partners.

The scientists, Dr Patrício Simoes, Phd student Robert Ingham, and Professor Ian Russell, from the university's neuroscience research group, are working alongside Professor Gabriella Gibson from the University of Greenwich.

They have discovered the male mosquitoes' hearing organ is actually tuned to the frequency difference between its own flight-tone and a female's flight-tone.

Central to these findings, was the discovery and description of a stereotypical acoustic

behaviour – a specific sound signature – which male mosquitoes produce when they detect female-like sounds.
This never-before described and quantified behaviour is only observed in free-flying males. It enabled the researchers to 'ask' male mosquitoes what sounds characteristics are most attractive to males.
Researchers "unexpectedly and surprisingly" found a mismatch between the best tones that evoked the acoustic behaviour and the best tones detected by the hearing organ at the base of the antennae.
Begin Rubicon Project Tag Site: Newsquest Network - Standard
This mismatch is solved by the hearing organ by detecting and amplifying the difference between the males' own flight tone and that of a nearby female.
Dr Simoes said: "Our findings reveal that the remarkable hearing capacities of mosquitoes are based not on harmonic detection, as is generally accepted and described in recent papers and text books, but on the detection of acoustic distortion-products produced by the interaction of the two sounds.
"This discovery gives a new significance for mosquito swarming because it implies that male mosquitoes have to fly in order to acoustically detect, locate and orientate towards flying females."
Dr Simoes said the full significance of this discover is still being investigated but it holds potential interest for creating new strategies to control mosquito populations, especially for disease-carrying mosquito species.

VECTOR-BORNE DISEASES - OUTBREAK NEWS

South Pacific

RADIO NEW ZEALAND
TE REO IRIRANGI O AOTEAROA

Dengue confirmed in Vanuatu
7:32 pm on 24 November 2016
The Vanuatu Ministry of Health has confirmed two cases of dengue have been detected by the National Disease Surveillance system.
Both cases were in Port Vila and were being managed at the victims' homes.
The Ministry of Health had sent blood samples to New Zealand for further testing.
It had also reconvened its Dengue Early Warning Committee to address the issue.
The Director of the Health Ministry, George Taleo, said his staff would strengthen surveillance around the country to ensure detection of suspected dengue cases.
He said at the same time they would be alert to the threat posed by similar mosquito borne diseases that were now prevalent in the Pacific like Zika and Chikungunya.

World Health Organization Western Pacific Region

Pacific syndromic surveillance report – Week 47, ending 27 November 2016

Dengue: Vanuatu- As of 30 November there have been 10 suspected cases of which 7 tested NS1 or IgM positive with the Standard Diagnostic's Dengue Duo rapid diagnostic test (RDT). Samples have been sent to the Institute of Environmental Science and Research laboratory , New Zealand for confirmatory testing. Source: Vanuatu Ministry of Health. Solomon Islands – From epidemiological week 33 to 46 (15 August to 20 November) 3920 suspected dengue cases have been reported in Honiara, Guadalcanal,

Malaita, Isabel, Choiseul, Makira, Temotu, Western and Centra Surveillance data for week 46 suggests that overall presentations for dengue-like illness have decreased slightly compared with week 45.
Two deaths have previously been reported to be associated with dengue – a 4 year old and a 53 year old. Investigations are ongoing on a small number of other deaths to determine if are associated with dengue. Source: Solomon Islands Dengue Sit Rep No. 8
Kosrae state (FSM) – As of 30 November there have been 98 suspected cases identified since 21 Oct 2016 (seven more cases in the past two weeks). There have been 6 RT-PCR confirmed cases in with onset of illness beginning 11 August 2016. Source: Kosrae EpiNet team.
Zika: Kosrae state (FSM) – As of 30 November there have been 238 Source: Kosrae EpiNet team. For further details please refer to PacNet post by Afeke Kumbai on 30 November 2016.

Public Health Surveillance
Information for New Zealand Public Health Action

MONTHLY NOTIFIABLE DISEASE SURVEILLANCE REPORT - Oct 2016

Chikungunya fever: Three confirmed cases of chikungunya fever were notified in October. Twenty-six cases have been notified in the year to date compared to 48 at the same time in the previous year. Cases were in the 50–59 years (2 cases) and 20–29 years (1 case) age groups. Two cases reported overseas travel to India during the incubation period for the disease. The other case reported a prior history of overseas travel to Bali, Singapore and Viet Nam that might account for the infection.
Dengue fever: 10 cases of dengue fever (9 confirmed and 1 under investigation) were notified in October compared to seven cases notified in the same month of the previous year. All cases had travelled overseas during the incubation period for the disease. Countries visited included: Indonesia (5 cases), India (2 cases), Australia, Philippines, Thailand and Viet Nam (1 case each). One case reported travel to more than one country.
Zika virus infection: Two cases of zika virus infection (1 probable and 1 under investigation) were notified in October 2016. After further investigation, one case has since been found not to meet the case criteria. The case was a female in the 20–29 years age group, of European or Other ethnicity and from Capital & Coast DHB. Overseas travel to Tonga during the incubation period for the disease was recorded.

ZIKA
South America

Life After Zika (exerpt)
A young family struggles to care for their daughter. Their story in pictures.
PHOTOGRAPHS BY PETER BAUZA TEXT BY ALEX RONAN December 6, 2016
The government appointed psychologist for mothers at the local hospital's microcephaly unit had encouraged their reconciliation. There is currently no standard

treatment for microcephaly, but physical therapy is common. (And, while the heads of babies like Sophia have become a potent symbol of the Zika epidemic, researchers fear that many infants who initially appear unaffected by in-utero exposure to Zika may eventually show other problems of their own.) **An X-ray Barbosa and Wanderley have in their home shows irreversible calcification in Sophia's brain.**

With nearly 65 percent of Brazil's population identifying as Catholic and abortion almost entirely illegal, the Zika epidemic has raised questions about birth control, abortion, and faith. Though Wanderley and Barbosa belong to an Evangelical church rather than a Catholic one, they've dealt with stigma surrounding sex before marriage. "We got shamed and yelled at, but mostly, for parents, it is about sex before marriage and not about using birth control," Wanderley says. "My mother was always very understanding. She says that having sex before marriage was wrong, but if we were going to do it, to use condoms or birth control." Like many other teenagers they know, Barbosa was able to get free birth-control pills from a local clinic. She was taking them when she became pregnant with Sophia.

Malvinas, the neighborhood where Barbosa and Wanderley found an affordable apartment, was intended as middle-class housing when it was built in the early '80s. Though today there's running water and electricity. Still, like many of their neighbors,

As recently as July, 90 percent of Brazil's microcephaly cases were reported in the small region of the country's northeastern tip where the family lives. Barbosa knows approximately 45 other mothers like her in their area. And it was in Campina Grande that fetal-health specialist Adriana Melo confirmed Zika in two patients' amniotic fluid, an essential breakthrough in establishing the connection between Zika and microcephaly.

Standing water, like that seen here in Malvinas, provides a perfect breeding place for mosquitoes.

Sophia has frequent visits to the neurologist.

Campina Grande's health specialists have set up a microcephaly unit in a local public hospital, where they offer free physical therapy twice a week as well as donated formula and diapers. In physical therapy, Sophia works on motor development and receives sensory stimulation through toys and games; Barbosa learns exercises to do at home with Sophia. The clinic tracks her development.

For Barbosa, the government-sponsored van rides to and from physical therapy have been more than just a means of transport. Spending time together with other mothers in the same situation has made them a close-knit group. "The rides are playful; the women have become family," Barbosa says. Outside of physical therapy, they communicate via a WhatsApp group. "We message all the time," she says. "It's nice to let off steam or share concerns. Some of the mothers have babies who are a little older, so I can ask them for advice. Generally, though, the other moms remind me to be strong and have patience."

The women and their babies recently went on a hospital-sponsored trip to the beach, which is two hours away. “The doctors thought it would be good for the babies to get different types of stimulation, like the sand and the water,” Barbosa says. “I’ve actually never been [to the beach] before, so it was my first trip too — I loved it. Sophia did not like the water, though. She cried.”

“It’s humiliating for me to say, but Sophia is the one who sustains us,” Wanderley says. The government provides 880 reals (about $250) a month because of her microcephaly; her condition will be reviewed every three years. Wanderley is trained as a carpenter but has been unable to find work: “I have tried in many ways, but companies today are laying off workers, not hiring.” So mostly he stays home with Barbosa and the children during the day: He tries to keep Emanuel entertained and to support Barbosa, while also continuing to look for a job. The family has a hard time getting by on the government stipend. “I give my children love and affection,” Wanderley says. “But a good father would also provide for them, put food on the table, and I can’t do that right now.”

Inspired by Sophia’s condition, he hopes to go to medical school. He’s beginning a nursing class in January. **Barbosa organized** an online fundraiser called Amor Maior (Bigger Love) for mothers like her using a crowdfunding platform. “I talk to the other mothers, and when I saw that we all needed financial help, I decided to try and help us all, not just my own family,” she says. The first fundraiser brought in 40,000 reals (about $11,000). After deducting the cost of the platform and the bank fees, Barbosa was able to distribute 1,200 reals (about $345) to 25 mothers.

Zika’s rise in Brazil this year sparked a global panic, with medical experts calling for the cancellation of the Rio Olympics and the World Health Organization labeling Zika an international public-health emergency. Incidence of microcephaly in Brazil shot up to 2,000 cases. But as Zika spread throughout the Americas, the anticipated explosion of microcephaly didn’t follow: In Colombia, which has the second-highest rate of Zika in the world, doctors predicted 700 cases, but so far, only 47 have materialized. Photo: Peter Bauza

And while increased use of birth control, precautionary abortions, and slightly different counting metrics may explain some inconsistency between the two countries, such a vast disparity complicates the relationship between microcephaly and Zika.

Scientists and doctors believe other factors may help determine whether a baby develops microcephaly. Environmental and socioeconomic differences could play a role: Most women who have given birth to babies with microcephaly in Brazil are young, single, and poor. There’s the possibility that co-infection — contracting Zika along with another virus — could make microcephaly more likely. And low rates of vaccination against yellow fever have been linked to microcephaly clusters, suggesting that the vaccine may offer some protection from Zika (which is in the same viral family). The Brazilian Ministry of Health recently announced it would investigate whether Zika alone is responsible for microcephaly.

On November 18, the World Health Organization declared that Zika was no longer a "global health emergency"; instead, the organization says, it should be regarded as an ongoing, seasonal threat, like other mosquito-borne diseases. Some experts worried that the move would stall efforts to fight Zika internationally. For the women in Campina Grande — women who have participated in studies and scans, women who offered their amniotic fluid and babies' blood up for research — Zika's effects aren't going anywhere. Their babies are growing or not growing; they think about small steps, baby steps, if walking is really a possibility at all.

USA

Local Transmission of Zika Virus Is Reported in Texas

The New York Times 28, 2016

By DONALD G. McNEIL Jr. and MANNY ERNANDEZNOV

A probable case of local transmission of the Zika virus has been reported in Texas, state health officials announced on Monday, making it the second state, after Florida, in which the infection is thought to have been carried from person to person by mosquitoes.The patient is a woman who is not pregnant and lives in Brownsville, on the Gulf Coast near the Mexican border. The state's first case of chikungunya, a virus spread by the type of mosquito that carries Zika, was confirmed this year in Brownsville.

Medical investigators must now determine whether the infection is spreading and, if so, how many people may have become infected. Officials have begun asking the woman's neighbors for urine samples and trapping mosquitoes to test for the virus.

State and county health officials are working with the Centers for Disease Control and Prevention on the case. The state medical operations center has been activated to help with contact tracing, mosquito surveillance and public education.

The C.D.C. sent a training team to Texas this year but has not yet been asked to send an emergency response team, said Dr. Thomas R. Frieden, the agency's director.

No travel alert suggesting that pregnant women avoid the area will be issued now, Dr. Frieden said, because a single case does not constitute evidence of continuing local transmission. "Most local cases are isolated dead ends," he said.

Confirmation of several cases within a roughly one-square-mile area for more than about two weeks, despite aggressive mosquito control, would prompt an alert from federal authorities.

In Florida this year, the C.D.C. first advised pregnant women to avoid Wynwood, the neighborhood where the first cases in Miami were discovered, and later suggested they avoid all of Miami-Dade County.

There have now been 4,444 confirmed cases of Zika infection in the continental United States, including 1,114 in pregnant women. Most of those infected had traveled to countries where the virus had been spreading, but 182 of the infections were contracted in Florida by people who had not visited such places.

The Texas patient, who was not identified, told investigators that she had not traveled recently to anywhere the virus had been spreading. She had no other risk factors, such as having sex with someone who had visited an area with Zika transmission.

"We knew it was only a matter of time before we saw a Zika case spread by a mosquito in Texas," said Dr. John Hellerstedt, the state health commissioner.

Residents of Brownsville, a city of 183,000, are concerned but not fearful, Mayor Tony Martinez said on Monday.

"I don't think it's something that people need to be alarmed about, but by the same token, they need to be cautious about it and report anything that needs to be reported to our health department," Mr. Martinez said.

"On the coast, we kind of hoped that it wouldn't happen," he added, "but the likelihood was pretty high."
Dr. Carmen Rocco, a Brownsville pediatrician, said she had been checking her patients for Zika, but none so far had been infected. Most of her patients are poor enough to be on Medicaid, and she praised state health officials for reinstating a Medicaid benefit for mosquito repellent.
"Families were taking advantage of that," she said.
While cold weather is arriving in other parts of the country, southern Texas has had an unusually hot autumn, making it more hospitable to the Aedes aegypti mosquitoes that transmit Zika.

Even in normal years, Aedes aegypti can persist in the Brownsville area well into December, so new cases may be confirmed in January or later.
"I predicted last April that we would see cases along the Texas Gulf Coast this summer," said Dr. Peter J. Hotez, the dean of the National School of Tropical Medicine at Baylor College of Medicine. "This is now the one case we know about, but we don't know if there are dozens or hundreds."
"Because of the lack of funds from Congress, there has been no active surveillance along the Gulf Coast," he added. "Those cases in Florida were found by serendipity."
Chris Van Deusen, a spokesman for the Department of State Health Services in Texas, said the new case was discovered because the woman fell ill and was tested for Zika infection by a local doctor, who alerted public health authorities. All such cases are investigated to see if a patient has a travel history or other risk factors that might explain the infection.

"Pregnant women should continue to protect themselves from mosquito bites there and elsewhere in Texas," Mr. Van Deusen said.
Mosquito control measures will be stepped up, he said, but he did not know if they would involve aerial spraying of pesticides like Naled and larvicides like Bti.
In the Wynwood section of Miami, mosquito swarms did not decrease enough to stop disease transmission until both types of aerial spraying were used.
Thousands of Mexicans and Americans cross bridges over the Rio Grande each day in the Brownsville area; it is possible that the virus has been spreading in Matamoros, Mexico, just across the border.
In 2002, when there was a small outbreak of dengue in Brownsville, Dr. Hotez said, there turned out to be a much larger one in Matamoros. Both cities have poor neighborhoods where residents lack air-conditioning and window screens, he said, but many more Matamoros residents live in poverty.
"We won't know how widespread the virus really was until babies with microcephaly begin being born, probably in the spring," Dr. Hotez said, referring to the Zika virus and its link to the birth defect. "And I expect it to return next year."

The C.D.C. regularly collaborates with Mexican health authorities, and Mexico "has quite a strong mosquito control program," Dr. Frieden said.
Exactly how much Zika infection there may be in nearby parts of Mexico is unknown. "We know there is transmission in the border areas," Dr. Frieden said. "But exactly where, we don't know."

DENGUE

Nepal

'1,473 people infected with dengue in five months'

The Kathmandu Post Dec 7, 2016

A total of 1,473 people from 30 districts have been infected with dengue virus in the past five months, up by multiple folds the figure during the same period last year, said a report by the Epidemiology and Disease Control Division under the Department of Health Services.

Last year a total of 134 people from 31 districts were found to have suffered from the disease while the figure reached 785 in the fiscal year 2070/71 and 302 in the FY 2071/72.

Chitwan district has the highest figure of infected with 675, the report said.

Likewise, Jhapa has 394 infected people while Rupandehi 148. The disease has also been detected in districts like Kathmandu, Lalitpur, Makawanpur, Banke, Bardiya, Surkhet, Kailali, Morang, Dang, Sarlahi, Parsa, Nawalparasi, Dhading, Kapilvastu, Bara, Kanchanpur, Mahottari, Kavrepalanchok, Saptari, Kaski, Syangja, Baglung, Kalikot, Rukum, Sunsari, Pyuthan and Baitadi, the report said.

Vector Control Inspector of the division Uttamraj Pyakurel attributed to the prolonged monsoon this year that increase the number of Aedes aegypti mosquitoes for the increased number of people infected with the disease.

He said one person died from the disease in Chitwan this year while two persons died from the disease each in Dang and Chitwan last year. RSS

Africa

Dengue Fever – Burkina Faso

Disease Outbreak News 18 November 2016

Since August 2016, suspected dengue fever cases and deaths have been reported in Ouagadougou, the capital city of Burkina Faso.

From 5 August to 12 November 2016, a total of 1061 probable (Dengue Rapid Diagnostic Test (RDT) positive) cases out of 1266 suspected cases were reported with a cumulative total of 15 deaths (CFR 1.2%). All cases have been reported from all 12 districts of Ouagadougou. In addition, two other regions have reported cases, Sahel Region in the north (12 RDT positive cases) and the Hauts-Bassins region in the west (6 RDT positive cases).

Among the RDT positive cases, 273 cases in Ouagadougou were well documented. The main signs reported by patients include headaches (77 %), joint pains (51%), gastrointestinal symptoms (47 %) and haemorrhagic symptoms (6%). 70% of affected people are over the age of 25 with a mean age of 30 years. In addition, women are more affected than men. 61 samples have been sent to Institut Pasteur de Dakar (IPD), a WHO Collaborating Centre for Arbovirus, on 9 November for confirmatory testing. The preliminary results, received on 14 November 2016, show that 29 samples (47.5%) were dengue positive (qRT-PCR). The serotype 2 has been identified and further tests are required. Results for genetic sequencing are pending.

Public health response

The Ministry of Health (MoH) has established an integrated disease surveillance and response (IDSR) mechanism but dengue surveillance was not included. There is a plan to include dengue to increase the surveillance capacity.

An initial investigation was performed between 24 to 28 October into six health facilities and further investigations are ongoing.

Coordination is ensured by holding weekly meetings of the national epidemic

management committee along with the health authorities and the other ministerial departments involved in the response.
A response plan has been developed which includes vector control and risk communication.
An update of dengue surveillance tools and guidelines for cases detection and management was carried out and tools were disseminated to individuals in the response.
The Ministry of Health plans to strengthen the capacity of the national reference laboratory for viral haemorrhagic fevers, with additional support being deployed by IPD and WHO.
Delivery and dissemination of dengue awareness, case management and preventive measures messages translated into different country's own official languages.
The main hospitals in Ouagadougou are providing mosquito nets for the patients affected by severe dengue (for more information on severe dengue, see "Fact sheet on dengue").
Free medical care and treatment for severe cases of dengue.

CHIKUNGUNYA

Chikungunya cases top 5,000 in Delhi

Africa

Outbreak News Today by Press Release November 18, 2016

During the past week, Delhi saw nearly 1600 additional chikungunya cases, a 43 percent increase over the prior week. The total cases in India's capital is now at 5,293 cases.
At least 15 fatalities lined to chikungunya have also been reported.
That said, health officials say the worst of the mosquito borne outbreak is over. "New infection is down but recorded cases are up because the confirmatory test for chikungunya is done a week to 10 days after people get symptoms," said Dr DK Seth, director, hospital administration, north corporation.
Chikungunya in Delhi has also led to the courtroom as Delhi Health Minister Satyendra Jain has been fined Rs. 25,000 for not submitting names of supposed errant government officials who have not been cooperating in dealing with outbreak of dengue and chikungunya cases in the capital.
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.

Elephantiasis

Africa

Elephantiasis elimination campaign to start tomorrow in Kenya

Outbreak News Today by Press Release November 18, 2016

The Kenya Ministry of Health commence a three-day treatment exercise as part of an ongoing campaign to eradicate elephantiasis by 2020 beginning Saturday. The campaign will target counties on the country's Indian Ocean coast–Mombasa, Kilifi, Lamu, Tana River and Taita Taveta Counties.

According to Kenya media, the campaign will involve mass administration of drugs followed by provision of surgical opportunities for those suffering from complications of the disease. Elephantiasis of leg due to filariasis/CDC

Commonly known as elephantiasis, Lymphatic filariasis occurs when filarial parasites are transmitted to humans through mosquito bites. Infection is usually acquired in childhood and the painful and profoundly disfiguring visible manifestations appear much later in life, often in the form of elephantiasis which causes permanent disability. These patients suffer the disease and also suffer mental, social and financial losses contributing to stigma and poverty.

Worldwide, more than 120 million people are infected with elephantiasis, and 1.3 billion people in 73 countries are at risk of the disease.

RIFT VALLEY FEVER

Africa

In a follow-up on the Rift Valley Fever (RVF) outbreak in the West Africa country of Niger, the World Health Organization (WHO) released the following update this week:

On 30 August, the Ministry of Health in Niger notified WHO of unexplained deaths among humans, along with deaths in livestock in the Tahoua region of Niger. On 23 September, human and animal specimens were tested at the Institut Pasteur de Dakar (IPD) and were reported positive for Rift Valley Fever (RVF) virus by PCR and for specific IgM antibodies confirming the first outbreak of RVF in Niger. Initially the outbreak was centered in the north west of the country in areas bordering Mali, in particular around Tassara and Tchintabaraden in the Tahoua Region, however suspected cases of RVF have recently been identified in new areas to the north and south of Tchintabaraden.

The outbreak also coincided with the annual Cure Salée gathering in Ingall (close to Agadez), Tahoua region, where nomadic stockbreeders from Niger and surrounding countries gather with their animals. It is estimated that around 2 million cattle and smaller ruminants were in the affected area during the beginning of the outbreak. Furthermore, there were reports of waves of abortions and deaths among livestock in Boni-Bangou in Niger while human RVF suspected cases and animals were confirmed with specific IgM in the neighbouring region of Menaka in Mali.

From 8 August to 21 November, 266 suspected human cases including 32 deaths have been reported from Abalak, Keita, Madaoua, Tilia, Tassara, Tahoua department and Tchintabaraden in the Tahoua Region. From 8 August to 18 November, 196 specimens were tested and 17 patients were confirmed positive by RVF PCR and/or serological identification of IgM antibodies. Further testing of RVF negative specimens is being performed at IPD.

Given that more than 90% of the samples were tested negative for a recent RVF infection (IgG, PCR negative) and the increasing proportion of house wives and children affected there is a need to broaden the investigation to identify possible other underlying cause(s). In this regard an adapted investigation protocol is currently being developed which includes infectious and non-infectious diseases as well as chemicals and toxins.

Since October 2016, the epidemiological situation has evolved. Since August 2016, out of 196 specimen tested, only 17 patients have been confirmed with RVF, including 2 confirmed in November 2016 and 2 in October 2016. The epidemiological data are showing that the RVF outbreak amplitude is modest.

The spread of the RVF outbreak to previously unaffected areas should still be monitored as the health infrastructure is limited and the areas and populations dispersed along the stock routes.

The stockbreeder population is highly mobile and moves along stock routes to find pasture for their herds in the Sahel region that incorporates a number of neighboring countries. The RVF outbreak caused concern and posed a serious public health threat in Niger as the health infrastructure is limited and populations are dispersed along the stock routes. Surrounding countries previously considered at risk including Mali, Burkina Faso, Nigeria, Chad, Benin, Togo and Cameroon have not reported any RVF cases.

VACCINATION NEWS

Philippines

Is the dengue vaccination worth it?

Sci Dev Net *South-East Asia & Pacific*

[MANILA] The ground breaking dengue vaccine, Dengvaxia, is significantly less effective among children below 9 years old admits a Sanofi Pasteur expert.

Dengvaxia, developed by Sanofi Pasteur, is the world's first dengue vaccine that offers protection on all four dengue virus types. But while it is effective against four strains, its efficacy differs among age groups.

In an interview, Alain Bouckenooghe, associate vice president and regional head of clinical R&D Sanofi Pasteur, tells SciDev.Net that based on their findings, efficacy in children younger than 9 years old is way lower than those vaccinated in ages 9 and above.

According to Sanofi test results, vaccination in children ages 9-16 is able to reduced risk of hospitalisation by almost 81 per cent while efficacy against the four strains is at 66 per cent. But this drops to 56 per cent on reduced risk of hospitalisation and 45 per cent efficacy for kids below 9 years of age.

This result is crucial since below nine years of age are the most vulnerable age group to dengue and many kids already had been infected with at least one or two strains by the time they reach 9 years old. This means those who had been exposed to dengue would be vaccinated for just one to three strains at the same vaccination cost.

Earlier this year the World Health Organization supported the vaccination against dengue in countries with high incidence. Several countries have expressed interest in using Dengvaxia mostly in Latin America, with the Philippines becoming the first country to use the vaccine when it immunised 489,000 public school children in April. Last October it administered the second of the three-dose vaccine.

When pressed by SciDev.Net if he will recommend to health officials to exclude kids that already had two or three strains of dengue in the vaccination course to cut government expenses, Bouckenooghe says the company is leaving the decision to individual governments on what to recommend.

The dengue vaccination program in the Philippines is currently under congressional scrutiny over its reported dangers and irregularities.

Philippine Senator Richard Gordon, who is also the long-time chair of the Philippine Red Cross, recently brought up in a Senate privilege speech about the dangers of Dengvaxia.

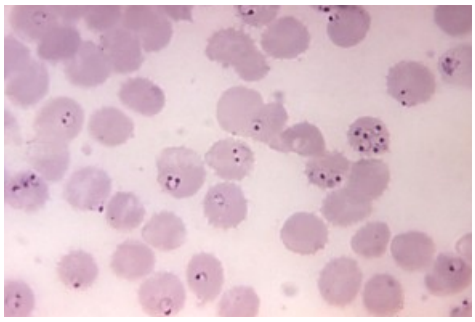
In an interview with SciDev.Net, Senator Gordon says he is questioning the hasty way the vaccination was decided and is calling for a senate inquiry through its anti-graft body, the blue ribbon committee which he chairs, to determine if there are irregularities.

"The timing is very suspicious. It was done near the end of the previous administration. There are reports that people have gotten sick and died," he says.

Malaria vaccine to be rolled out in Africa in 2018

Outbreak News Today by Press Release November 18, 2016

The world's first malaria vaccine will be rolled out in pilot projects in sub-Saharan Africa, WHO confirmed today. Funding is now secured for the initial phase of the programme and vaccinations are due to begin in 2018.



Plasmodium falciparum/CDC

The vaccine, known as RTS,S, acts against *P. falciparum*, the most deadly malaria parasite globally, and the most prevalent in Africa. Advanced clinical trials have shown RTS,S to provide partial protection against malaria in young children.

"The pilot deployment of this first-generation vaccine marks a milestone in the fight against malaria," said Dr Pedro Alonso, Director of the WHO Global Malaria Programme. "These pilot projects will provide the evidence we need from real-life settings to make informed decisions on whether to deploy the vaccine on a wide scale."

Vaccine financing and development

The Global Fund to Fight AIDS, Tuberculosis and Malaria today approved US$ 15 million for the malaria vaccine pilots, assuring full funding for the first phase of the programme. Earlier this year, Gavi, the Vaccine Alliance and UNITAID announced commitments of up to US$ 27.5 million and US$ 9.6 million, respectively, for the first 4 years of the vaccine programme.

RTS,S was developed through a partnership between GlaxoSmithKline and the PATH Malaria Vaccine Initiative (MVI), with support from the Bill & Melinda Gates Foundation and from a network of African research centres.

"WHO recognizes and commends the leadership and support of all funding agencies and partners who have made this achievement possible," said Dr Jean-Marie Okwo-Bele, Director of the WHO Department of Immunization, Vaccines and Biologicals.

Vaccine programme recommended by two WHO advisory bodies

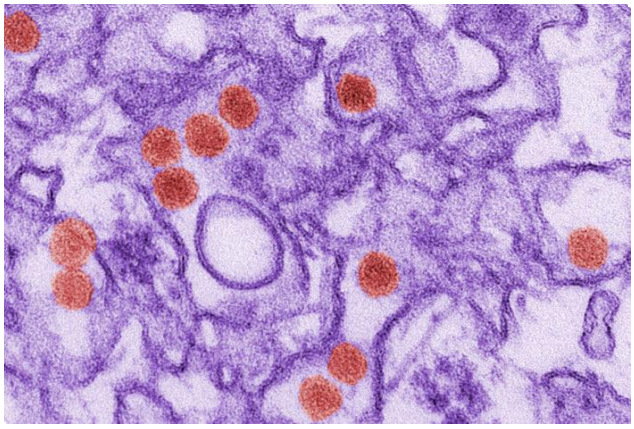
In October 2015, two independent WHO advisory groups comprised of the world's foremost experts on vaccines and malaria – the Strategic Advisory Group of Experts (SAGE) on Immunization and the Malaria Policy Advisory Committee (MPAC) – recommended pilot implementation of the RTS,S vaccine in 3 to 5 settings in sub-Saharan Africa. These recommendations followed a July 2015 announcement that the European Medicines Agency (EMA) had issued a positive scientific opinion of the RTS,S vaccine.

WHO officially adopted the SAGE-MPAC recommendations in January 2016 and has since worked to mobilize financial support for the pilots and to finalize the programme design. The pilot programme will evaluate the feasibility of delivering the required 4 doses of RTS,S; the impact of RTS,S on lives saved; and the safety of the vaccine in the context of routine use.* It will also assess the extent to which the vaccine's protective effect demonstrated in children aged 5–17 months old in the Phase 3 trial can be replicated in real-life settings.

DNA-based Zika vaccine showed protection from infection, brain damage and death

Outbreak News Today Press Release on November 12, 2016

As the global spread of the Zika virus continues, efforts are underway to halt the disease's transmission. While no licensed therapies or vaccines to protect against the Zika virus are currently available, new research published **in the journal *npj Vaccines*** demonstrates how a synthetic DNA vaccine approach successfully protected against infection, brain damage and death caused by the mosquito-borne Zika virus in vivo.



Image/CDC

In this preclinical study, 100 percent of the animal models were protected from Zika after vaccination followed by a challenge with the Zika virus. In addition, they were protected from degeneration in the cerebral cortex and hippocampal areas of the brain, while the other cohort showed degeneration of the brain after Zika infection.

"Our results support the critical importance of immune responses for both preventing infection as well as ameliorating disease caused by the Zika virus," said lead researcher David B. Weiner, Ph.D., Executive Vice President and Director of the Vaccine Center at **The Wistar Institute** and the W.W. Smith Charitable Trust Professor in Cancer Research at Wistar. "As the threat of Zika continues, these results provide insight into a new aspect of the possibly protective ability of such a vaccine as a preventative approach for Zika infection."

This study is the first of its kind to analyze a vaccine in an animal model that is susceptible to the disease, providing information regarding the protective impact of the immune response in susceptible individuals. Prior studies of the Zika virus have tested vaccines in animal models that are naturally resistant to Zika. This study extends these prior research studies in an important manner.

J. Joseph Kim, Ph.D., MBA, President and CEO of Inovio Pharmaceuticals, Inc., added, "Working with Wistar, we have clearly demonstrated the power and the speed of our product development platform when we and our collaborators moved our Zika vaccine from the bench to human studies in less than six months, taking advantage of our platform to help in this outbreak situation.

In this latest study, Weiner and colleagues demonstrated how a synthetic DNA vaccine expressed specific antigens for Zika in vivo. They observed that this novel vaccine generated robust antigen-specific antibody and T cell responses that neutralized the virus in preclinical animal models. Moreover, they found that the vaccine provided protection against the disease and death in animal models while also being neuroprotective, meaning that the disease was unable to spread to the brain. This is especially important given the risk that infants born with the disease have of developing microcephaly, a birth defect resulting in an abnormally small head and that may prevent the brain from developing properly.

One important aspect of Zika and many other mosquito-borne diseases is that not everyone infected with the virus will actually become ill as a result. With Zika, only about 20 to 25 percent of individuals with the virus are actually impacted by the disease, according to previous studies from the U.S. Centers for Disease Control (CDC). However, there is no way to know for certain who will be at risk for illness due to the virus, which is why it was crucial for this study to examine how a vaccine would operate in an infected, symptomatic host.

This Zika vaccine is being developed in collaboration between Inovio, The Wistar Institute, and GeneOne Life Science Inc. and is currently being tested in two human clinical studies. Before the end of 2016, Inovio expects to report phase I data from the first 40-subject study being conducted in Miami, Philadelphia and Quebec City. In August, the companies also initiated a second study in 160 subjects in Puerto Rico. The CDC estimates that Zika will infect more than 25 percent of the Puerto Rican population by the end of the year, creating the potential for this study's placebo-controlled design to provide exploratory

signals of vaccine efficacy in 2017.
A total of nearly 4,000 cases of Zika infection have been reported in the United States alone, according to the CDC. While most of these are travel-associated cases, more than 100 cases of Zika infection originating within the United States have been reported. Globally, more than 60 countries have reported mosquito-borne transmission of the disease.

VECTOR NEWS

USA

Mosquitoes Thrive in U.S. But Don't Blame Climate Change

NBC News DEC 6 2016 by MAGGIE FOX

A surprising new study finds that mosquito populations have exploded in parts of the U.S. but not because of a warming climate. Instead, the study finds, growing cities and the ban on the insecticide DDT may be responsible.
The trend doesn't bode well for the spread of new diseases — not just Zika virus, but West Nile virus, dengue virus, chikungunya and others, the team at the University of California, Santa Cruz found.
They tracked mosquito populations in New York, New Jersey and California.
"Mosquito populations have increased as much as tenfold, and mosquito communities have become two- to fourfold richer over the last five decades," A. Marm Kilpatrick and colleagues wrote in their report, published in Nature Communications.

"These increases are correlated with the decay in residual environmental DDT concentrations and growing human populations, but not with temperature."
DDT was first used in the U.S. in 1945 to fight mosquitoes that carried diseases such as malaria. It was most heavily used in the 1950s and '60s, but use was phased out when it became clear the chemical was not just killing insects, but affecting birds and other wildlife.
DDT for agricultural use was banned in the U.S. in 1972.
It's clear why cleaning up pesticides might allow mosquitoes to thrive, but less clear why urbanization would.
The connection is that some of the most dangerous species of mosquitoes, such as the Aedes aegyptis species that carries Zika, dengue, yellow fever and chikungunya, prefer living in and around buildings.
"Urbanization results in increased impermeable surfaces (for example, pavement) associated with buildings and roads, and decreases in forest cover, wetlands and other natural habitats," Kilpatrick's team wrote.
This changes where mosquitoes lay their eggs and what animals and plants they feed on. They may displace species that depend on natural habitats in preference to the urban pest mosquitoes like Aedes species, the team said.
"The increase in species richness with urbanization likely reflects expansion of habitat for mosquito species associated with suburban environments and man-made wetlands," the team wrote.
In the past 10 years, epidemics of dengue and chikungunya have swept through Latin America and the Caribbean. Dengue's also been seen in Hawaii. Now Zika's doing the same thing, and has also hit the U.S. states of Florida and Texas and the territories of Puerto Rico and the U.S. Virgin Islands.
Zika virus is causing small epidemics of terrible birth defects wherever it turns up. It's also causing severe cases of the paralyzing Guillain-Barré syndrome, and it has turned out to

be transmitted by sex. Zika stays in semen for months and may cause invisible brain damage in babies and perhaps even adults.
West Nile virus is carried by different species of mosquitoes and has spread across all 48 contiguous states since it showed up in the U.S. for the first time 16 years ago. It has infected hundreds of thousands of people, causing severe illness in about 40,000 and killing more than 1,600.

DID YOU KNOW?

El Niño conditions in Pacific precede dengue fever epidemics in South Asia

November 21, 2016

el Niño activity -- measured in sea surface temperature in the pacific -- impacts rainfall and temperatures in Sri Lanka and thus contributes to exacerbated dengue epidemics six months later.
These new findings allow disease early warning systems to provide warnings for upcoming epidemics
This would give health officials longer time to increase preparedness and mount control effort responses prior to the epidemics.

NOT ONLY MOSQUITOES

Plague: Dozens of cases in Madagascar

Posted by Robert Herriman on December 7, 2016
Plague, a disease many think of as something from the history books, is alive and well in many areas of the globe and is clearly no stranger to Madagascar. During the last decade, the island country reported more than 7,000 human plague cases, second most on the planet.
Reports coming out of the country say that an outbreak in the Befotaka Atsimo and the Midongy Atsimo district say that dozens of deaths have been reported in two months. “We have heard about people who died for little known causes in Ambalarano two months ago. The inhabitants of this commune who come to shop in Midongy Atsimo speak of it, but they believe that it is due to the sorcery “, it is reported in the new source, L’Express (computer translated).
The victims would have the same symptoms, namely lymph nodes, such as those of bubonic plague.

The website, Africa Review, offers more definitive numbers: Bubonic plague has killed at least 31 people in Madagascar’s southern district of Befotaka Atsimo.
Bush fires, blamed on persistent drought, have reportedly driven disease carrying rodents into villages, where they have transmitted the disease to humans.
Teams from the Ministry of Public Health and the Pasteur Institute of Madagascar (IPM) were dispatched to investigate the scene Monday; however, they have not yet arrived. It is an almost inaccessible zone, there are still about thirty kilometers to walk, the L’Express report states. Image/CDC
According to the general secretary of the Madagascar Ministry of Health, between 300 and 600 suspected cases are reported each year, with about 30 cases of pulmonary

plague and 10 to 70 deaths.
According to the World Health Organization (WHO), plague is endemic in the country, with epidemic seasonal peaks ranging from September to March.
Plague is an infectious disease caused by the bacterium, *Yersinia pestis*. It is found in animals throughout the world, most commonly rats but other rodents like ground squirrels, prairie dogs, chipmunks, rabbits and voles. Fleas typically serve as the vector of plague. Human cases have been linked to the domestic cats and dogs that brought infected fleas into the house.
People can also get infected through direct contact with an infected animal, through inhalation and in the case of pneumonic plague, person to person.
Yersinia pestis is treatable with antibiotics if started early enough.
There are three forms of human plague; bubonic, septicemic and pneumonic.

Lyme advocate website disputes Australian researchers conclusion on local transmission
Robert Herriman on November 20, 2016
At the beginning of the month, we published information about **a study led by researchers at The Australian National University (ANU)** concerning whether Lyme disease actually exists on the continent.

With its abdomen engorged with a host blood meal, this image depicts a lateral, or side view of a female blacklegged, or deer tick, Ixodes scapularis/CDC
In the study, lead researcher Professor Peter Collignon AM states, "Australia doesn't appear to have ticks capable of hosting the bacterial species that causes Lyme disease. Lyme disease diagnosed in Australia is acquired overseas."
Professor Collignon said some patients and advocacy groups claimed Lyme-like illnesses to label chronic, debilitating symptoms, often following a tick bite.
"This has led to patients believing that prolonged antibiotic therapy, including intravenous antibiotics, may cure their diseases – but such treatments can be dangerous," he said.
"Antibiotic resistance resulting from the unnecessary and prolonged use of broad spectrum antibiotics is a major problem. Treating patients with so-called Lyme-like disease with prolonged intravenous or oral antibiotic therapy is unjustifiable and unethical, and is likely to do much more harm than good."
This drew a comment from the natural health website, **ProHealth**, which featured the research article Sunday.