



BORDER HEALTH NEWSLETTER -March 2016

WELCOME!

Hi Everybody! Winter is not here yet, even if some days are already cold as...but the numbers of mosquito tell a different story: they are very high for this time of the year. 2015/16 is quite obviously a very good season if you are a mosquito (and lucky enough to escape the busy HPOs). And busy it was with three extraordinary events: first we had an unusual cluster of Dengue cases in January at Tolaga Bay, then there was the unusual case of Zika in Torbay during February, and lastly *Aedes aegypti* larvae were found in one of the routine tyre traps at AIAL. The delimit surveys and response following all three events unveiled no (further) exotics. Well done to everybody involved!!!



Also the news about mosquitoes and their transmitted diseases are quite colorful presented in the media. In this issue we concentrate more on Malaria rather than Zika, since it is still one of the most dangerous diseases in the world despite being ousted by the interest in Zika of late.

SAMPLES

The numbers for March 2016 look very impressive. More than 700 adult *Aedes antipodeus* and almost 3000 *Ae. notoscriptus* came mainly from Northland, where they have had a particularly good mozzie season and a trial comparing different trap types, which meant some extra sampling. The same applies to the *Ae. notoscriptus* larvae.

Species	Adults		Larvae	
	March 16	March 15	March 16	March 15
New Zealand Mozzies				
<i>Aedes antipodeus</i> (winter mosquito)	753	2	Nil	Nil
<i>Ae. australis</i> (saltwater mosquito)	5	1	1	56
<i>Ae. notoscriptus</i> (striped mosquito)	2914	840	6080	1379
<i>Coquilletidea iracunda</i>	57	3	Nil	Nil
<i>Coq. tenuipalpis</i>	1	Nil	Nil	Nil
<i>Culex astilae</i>	Nil	Nil	5	Nil
<i>Cx pervigilans</i> (vigilant mosquito)	138	88	2448	1468
<i>Cx. quinquefasciatus</i> (southern house mosquito)	2211	950	7217	1595
<i>Maorigoeldia argyopus</i>	Nil	Nil	2	Nil
<i>Opifex fuscus</i> (rockpool mosquito)	2	Nil	118	59
Total	6081	1884	15871	4557



Culex quinquefasciatus are spreading further around New Zealand and are now occurring more frequently in Wellington and even as far south as Timaru. However, the hot spot for *Cx. quinquefasciatus* was and is AIAL, where the adults flying around in the ITB and cause many interception responses and delimiting surveys, which increased sampled *Cx. quinquefasciatus*. In total the sampling frequency with 1237 samples of which 472 were positive was as high as usual.

INCURSIONS/INTERCEPTIONS

During March 13 suspected interceptions were detected and responded to.

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

- 3.2016 Two *Ae. aegypti* larvae (instar 2 and 3) were found in the routine SMS samples at AIAL in a tyre trap located in the breezeway.
- 5.3.2016 One dead male *Culex quinquefasciatus* was found at Thermosash Commercial in Auckland in a container with machinery from Japan.
- 12.3.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB MPI search area, flying around associated with Korean luggage.
- 14.3.2016 MPI found *Cx. quinquefasciatus* larvae in a concrete mixer at Tauranga port. One larvae of the first, second and third larval instar respectively, as well as two pupae and one freshly emerged male.
- 15.3.2016 One live female *Cx. quinquefasciatus* was found at AIAL ITB MPI risk assessment area – likely to be a local one.
- 16.3.2016 Four dead female *Cx. quinquefasciatus* were found in a container with grapes from Australia at Airport Oaks AIAL.
- 22.3.2016 One live male and two female *Cx. quinquefasciatus* were found in the MPI inspection room at Freshmax AKL in a container with oranges from USA.
- 22.3.2016 One live male *Cx. quinquefasciatus* was found at Menzies AIAL.
- 23.3.2016 One live female *Cx. quinquefasciatus* was found in the MPI inspection room at Freshmax AKL.
- 25.3.2016 One live female *Cx. quinquefasciatus* was found at AIAL – likely to be a local one.
- 26.3.2016 One live female *Cx. quinquefasciatus* was found at AIAL – likely to be a local one.
- 27.3.2016 One *Cx. annulirostris*, seven *Aedes vigilax* and two *Ae. vexans* were found in a tent from New Caledonia by MPI staff in the search area.
- 31.3.2016 One live female *Cx. quinquefasciatus* was found at AIAL MPI search area – likely to be a local one.



NEW ZEALAND BIOSECURE

VECTOR-BORNE DISEASES

South Pacific News



Pacific syndromic surveillance report – Week 12, ending 28 March 2016

Dengue: French Polynesia: there were 44 confirmed cases for week ending 20 March 2016. Dengue serotype 1 is in circulation.

Zika virus: Kosrae state, Federated States of Micronesia has reported one confirmed and 16 suspected cases. For further information please refer to PacNet post on 30 March 2016. On 28 March, American Samoa reported 403 suspected cases of Zika virus infection and 14 confirmed cases, including 6 pregnant women. Ninety one samples have been sent off island for testing.



Public Health Surveillance
Information for New Zealand Public Health Action



MONTHLY NOTIFIABLE DISEASE SURVEILLANCE REPORT - Feb 2016

Chikungunya fever: Three cases of chikungunya fever (2 confirmed and 1 probable) were notified in February 2016 compared to nine confirmed and one probable case notified during the same month of the previous year. Three cases have been notified in the year to date compared to 31 at the same time in the previous year. The cases reported overseas travel to Fiji (3 cases) and the Solomon Islands (1 case) during the incubation period. One case reported overseas travel to more than one country.

Zika virus infection: 65 cases of zika virus infection (60 confirmed, 2 probable and 3 under investigation) were notified in February 2016. After further investigation, two cases have since been found not to meet the case criteria. The highest numbers of cases were reported in the 30–39 years (18 cases), 20–29 years (14 cases) and 50–59 years (11 cases) age groups. Laboratory testing information was recorded for all cases, of which 95.2% (60/63) of cases were confirmed by PCR. Overseas travel information was recorded for all cases, of which 98.4% (62/63) of cases travelled during the incubation period for the disease. Countries visited included Tonga (48 cases), Samoa (14 cases) and American Samoa (1 case). One case reported travel to more than one country.

PICTURES OF THE MONTH



Brave school kids during Dengue vaccination

DENGUE - STORY OF THE MONTH

Phillippines

DOH starts dengue vaccination program

CNN Philippines April 4, 2016 by Pia Bonalos,

Metro Manila - The Department of Health (DOH) launched its school-based dengue immunization program on Monday.

Around 250 Grade 4 students of Parang Elementary School in Marikina City received free immunization from the life-threatening disease.

The DOH will be vaccinating Grade 4 students from regions with the highest number of dengue cases, namely the National Capital Region, Calabarzon, and Central Luzon.

Students will be given three doses of the vaccine — another in September and the last one in March next year.

It took scientists 20 years to develop Dengvaxia, the world's first anti-dengue vaccine, and the Philippines is the first country where it is commercially available.

However, some doctors are questioning the supposed haste of the DOH in spending P3.5 billion on an immunization program that has yet to be approved by the World Health Organization (WHO).

"Why rush this when even the World Health Organization's report from the Strategic Advisory Group of Experts (SAGE) on the vaccine is yet to be released?" said Dr. Tony Leachon, president of the Philippine College of Physicians Foundation.

Also read: World's first dengue vaccine now available in PH

"As health advocates, we appeal to the DOH to wait until the study is completed and put in place safeguards to protect children from possible adverse effects on their health."

Health authorities previously said the vaccine will have side effects, including fever, headache, muscle pain, weakness, redness and swelling.



Recommended use of the vaccine will likely be issued by the WHO in April 2016, after experts review it based on vaccine safety, vaccine efficacy, disease burden, programmatic suitability, as well as dose scheduling and cost-effectiveness.

Dengue a priority

Meanwhile, DOH secretary Janette Garin shot down critics by reasoning that dengue fever is a public health priority.

"Masakit mang aminin, may nagkakasakit, may namamatay, at hindi pwedeng pumikit ang gobyerno. Hindi pwedeng talikuran ang panahon na kayo ay nangangailangan sa amin," said Garin.

[Translation: "It painful to admit there are people who get sick and die. The government can't close its eyes. We can't turn our backs on you when you need us."]

She said the vaccine was found to prevent nine out of 10 severe dengue cases.

Even Sanofi Pasteur, the pharmaceutical company that developed the anti-dengue vaccine, said it does not guarantee 100 percent protection against the disease.

"Vaccine is not enough to tackle dengue in the world," said Guillaume Leroy, vice president of Sanofi Pasteur. "We will have to continue also efforts also in place in vector control to try to reduce circulation of the virus."

Related: New dengue vaccine protects against virus in small first-pass study

But some parents are relieved to know that their children are protected against the disease.

"Masaya po ako kasi libre at protektado sa dengue [ang anak ko]," said Carolina Baguio, a mother of a student who received free dengue immunization.

[Translation: "I'm happy because the vaccine is free and I know that my child is protected from dengue."]

According to a study by the University of the Philippines National Institutes of Health, the vaccine is expected to reduce dengue cases in the country by over 24 percent in a span of five years.

The number of dengue cases in the country spiked from around 120,000 in 2014 to over 200,000 in 2015.

MALARIA – MOSQUITO DISCUSSION

Malaysia

Malaysia deforestation linked to human cases of 'Monkey Malaria' - Deadly and More Transmissible

Motherboard 4 April 2016 by MICHAEL BYRNE

A species of malaria-causing parasite that is increasingly being transmitted from macaques to humans in South Asia has the potential to evolve into a more virulent form that is also capable of being efficiently transmitted from human to human. This is according to a paper published Monday morning in the journal Nature Communications by researchers at the Harvard TH Chan School of Public Health.

Plasmodium knowlesi, aka "monkey malaria," has been stalking the Earth already for some 257,000 years, but in that time the parasite has largely left humans out of its business. In some large part this has to do with a relative lack of overlap between human populations and macaque populations. As such, mosquitoes get to feast





on the blood of one species or the other but rarely both. Lately, however, monkey malaria has become a significant human threat in the countries of South Asia, particularly Borneo. In February, researchers were able to link massive deforestation in that country to

<http://www.imaginature.nl/pages/Angkor%202.html>

the parasite's increasing spread—it turns out that one species of macaque known to carry *P. knowlesi* thrives on deforested land. Put this together with a general increase in human encroachment on macaque territory in the region and we have an ideal case for introducing the parasite to human populations in far greater numbers.

Fortunately, *P. knowlesi* isn't all that deadly to humans. Or at least that's been the case up until now.

"Most human blood-stage infections are mild and associated with low parasitaemias, but increasing numbers of severe infections accompanied by high parasitaemias are being reported," the study notes. "There is growing concern that this simian parasite is adapting to infect humans more efficiently."

There are five variations of malaria known to infect humans, but the parasites all share basically the same life cycle: infect host via mosquito, head for said host's liver, and then reproduce. The resulting parasite multitudes then spread throughout the body invading red blood cells, where they reproduce again, bursting the blood cells in the process. Malaria parasites make for some really shitty guests in the human body, even by parasite standards.

When it comes to human infection, *P. knowlesi* hasn't been much of a player because it's very poorly equipped for invading human red blood cells. Around 3.2 million years ago, early humans lost the ability to convert a certain kind of acidic sugar into another kind of acidic sugar often found on the outsides of red blood cells. Apes, however, did not. As it turns out this converted form of sugar is largely what *P. knowlesi* needs to breach blood cells.

And yet that natural defense seems to be losing its effectiveness, according to this week's study, in part because the parasite has figured out (genetically) that it can work its way into older red blood cells without the aforementioned pathway.

What the Harvard researchers wanted to know is what would happen if humans again started producing the parasite's preferred sugar. So, they basically just undid the ancient mutation that changed our red blood cells from those of our ape kin, with the result being, "enhancement of *P. knowlesi* invasion," according to the paper.

Of even more concern was that the parasites were eventually able to adapt to human red blood cells in such a way that they no longer needed the sugar pathway being studied. Currently, they need that sugar to make the molecule required to bind to the blood cells, but the researchers found the parasites were eventually able to duplicate it independently. That doesn't mean this is currently happening in human cells not in a dish in a lab, but the potential is there. And as *P. knowlesi* spends more time around people, as is the trend, then that potential only increases. Add that to a potential if not likely increase in human-to-human transmission, and we have a bad scene.

"There is already evidence suggesting the clustering of *P. knowlesi* infections in households, where individuals had not been in proximity to macaques," the paper notes. "In the 1950s, the use of *P. knowlesi* as a treatment for tertiary neurosyphilis had to be stopped because of increased pathogenicity of the parasite, with continuous passaging in humans. This suggests that increased parasite adaptation to humans may be associated with severe disease."

MALARIA - WORLD OF MOSQUITO SCIENCE



With mosquito Y chromosome sequencing, researchers lay groundwork for advanced disease control

Sarah Craig April 04, 2016 Notre Dame News

Human malaria, uniquely transmitted by a handful of anopheline mosquitoes, continues to attack nearly 200 million people and claims the lives of 600,000 each year. Africa bears the biggest burden due to its dominant vector, *Anopheles gambiae*. Ever since the groundbreaking *Anopheles gambiae* genome sequencing project was published in 2002, efforts have been underway to harness genomics for novel vector-based malaria control strategies.

Nora J. Besansky, O'Hara Professor in the Department of Biological Sciences and member of the Eck Institute for Global Health at the University of Notre Dame, assembled a diverse and multinational team of scientists to crack the genetic code of the Y chromosome in malaria mosquitoes for the first time.



Anopheles gambiae mosquito (credit: CDC)

The Y chromosome is a crucial element in anopheline reproductive biology, as it carries an unknown primary sex determination signal. Although this chromosome comprises an estimated 10 percent of the total genetic material, it was never successfully assembled and has almost completely eluded genomic analysis until now. Indeed, the Y chromosomes of many, if not most, organisms with heteromorphic sex chromosomes are resistant to assembly and genomic analysis because they are dense with repetitive DNA. As a result, scientific understanding of Y chromosome organization, content and evolution across the tree of life is based on a very small set of model organisms, mainly the fruit fly and mammals. The research team leveraged emerging genome sequencing technology and applied it to extensive genomic DNA and mRNA data sets, including the *Anopheles gambiae* 1000 Genomes project. The researchers extended their analysis of *Anopheles gambiae* to closely related species, providing a unique glimpse into Y chromosome evolution in this group of malaria mosquitoes. Their study finds that the Y chromosome mainly consists of only a few types of repetitive sequences that are massively amplified. It contains very few genes, and the genic content does not overlap between closely related species, with the sole exception of one gene, YG2, that this study implicates in male determination. Surprisingly, their data suggest that the Y chromosome may have crossed species boundaries in this group of mosquitoes, complementing the findings of extensive introgression of other chromosomes published in January 2015 in *Science*.

The study provides a long-awaited foundation for studying mosquito Y chromosome biology and evolution and also lays the groundwork for exploiting the Y chromosome to control disease transmission.

The multidisciplinary team included leading computational biologists, molecular biologists, cytogeneticists, genome scientists and vector biologists from nine institutions, including Notre Dame, Virginia Tech, Imperial College London, University of Perugia, National Biodefence Analysis and Countermeasures Center, National Human Genome Research



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Institute, Indiana University Bloomington, Tomsk University and the University of California, Riverside.

The results of their research were published in the Proceedings of the National Academy of Sciences on March 29.

The research was funded in part by the Eck Institute for Global Health, a University-wide enterprise that recognizes health as a fundamental human right and endeavors to promote research, training and service to advance health standards for all people, especially people in low and middle-income countries, who are disproportionately impacted by preventable diseases.



MALARIA - DID YOU KNOW?

An ancient killer: Ancestral malarial organisms traced to age of dinosaurs

March 28, 2016 *Phys.Org*

A new analysis of the prehistoric origin of malaria suggests that it evolved in insects at least 100 million years ago, and the first vertebrate hosts of this disease were probably reptiles, which at that time would have included the dinosaurs.

Malaria, a scourge on human society that still kills more than 400,000 people a year, is often thought to be of more modern origin - ranging from 15,000 to 8 million years old, caused primarily by one genus of protozoa, Plasmodium, and spread by anopheline mosquitoes.

But the ancestral forms of this disease used different insect vectors and different malarial strains, and may literally have helped shape animal survival and evolution on Earth, according to George Poinar, Jr., a researcher in the College of Science at Oregon State University.

Poinar suggested in the journal *American Entomologist* that the origins of this deadly disease, which today can infect animals ranging from humans and other mammals to birds and reptiles, may have begun in an insect such as the biting midge more than 100 million years ago. And in previous work, Poinar and his wife, Roberta, implicated malaria and the evolution of blood-sucking insects as disease vectors that could have played a



significant role in the extinction of the dinosaurs.

"Scientists have argued and disagreed for a long time about how malaria evolved and how old it is," Poinar said. "I think the fossil evidence shows that modern malaria vectored by mosquitoes is at least 20 million years old, and earlier forms of the disease, carried by biting midges, are at least 100 million years old and probably much older."

This 15- to 20-million-year-old mosquito *Culex malariager*, was discovered in the Dominican Republic preserved in amber, and is infected with the malarial parasite *Plasmodium dominicana*. It's the oldest known fossil showing *Plasmodium* malaria, related to the type that today infects humans. Credit: George Poinar, Jr., courtesy of Oregon State University

Since the sexual reproduction stage of malaria only occurs in insects, Poinar said in the new study that they must be considered the primary hosts of the disease, not the vertebrate animals that they infect with disease-causing protozoa. And he believes the evidence points toward the Gregarinida as a protozoan parasite group that could have been the progenitors of malaria, since they readily infect the insects that vector malaria today.

Understanding the ancient history of malaria evolution, Poinar said, might offer clues to how its modern-day life cycle works, how it evolved, and what might make possible targets to interrupt its transmission through its most common vector, the *Anopheles* mosquito.



ZIKA – OUTBREAK NEWS

USA

Zika mosquito's habits force new strategy by US cities, states

Reuters Fox News Health April 04, 2016

CHICAGO – U.S. states and cities need to adopt a different mosquito-fighting strategy to battle the species carrying the Zika virus as an outbreak that started in Brazil heads north with warmer weather in the coming weeks, health officials said on Friday.

The World Health Organization declared a global health emergency in February as the virus spread rapidly in the Americas, citing Zika's link to the birth defect microcephaly and Guillain-Barre syndrome, an autoimmune disorder in adults that can cause paralysis.

The mosquito species responsible for spreading the virus by biting people lives in and around homes, making traditional evening insecticide fogging campaigns from sprayers mounted on trucks an ineffective option, U.S. Centers for Disease Control and Prevention officials said.

CDC Director Dr. Thomas Frieden said health departments need to take a "four corners approach," targeting the *Aedes aegypti* mosquitoes indoors and outdoors as well as focusing on killing both larvae and adult insects.

"We think we can at least have significant knockdown and potentially significant disease control," Frieden told state and local health officials and others taking part in a "Zika Action Plan Summit" at the agency's Atlanta headquarters.

Most mosquito abatement efforts in U.S. states target nuisance mosquitoes, those that bite at dusk and ruin picnics and barbecues but pose little public health threat. But *Aedes aegypti* is a daytime biter that dines exclusively on humans, biting several people in a single blood meal.

Aedes aegypti has been dubbed "the cockroach of mosquitoes" because it is so hard to kill, Frieden said.

"Unfortunately, in some parts of the U.S., it has widespread resistance to some insecticides. But that doesn't mean it's impossible," Frieden said.

Zika has been linked to thousands of suspected microcephaly cases in Brazil. The virus is spreading rapidly in Puerto Rico, a tropical island territory of the United States that is expected to be hardest hit by the current outbreak.

Zika is expected to reach southern U.S. states soon as temperatures rise in spring and summer months. As in Puerto Rico, the main focus of the U.S. plan is to protect pregnant women from exposure to Zika-carrying mosquitoes.

Dr. Lyle Petersen, director of the CDC's Division of Vector-Borne Disease, said U.S. mosquito abatement is handled by a "patchwork" of mosquito-control districts that are coordinated and funded locally. Some may not be linked to local health departments.

Most of these programs, Petersen said, are "primarily funded to control nuisance mosquitoes rather than to control disease-spreading mosquitoes."

Surveillance systems in most states and municipalities are geared toward night-biting mosquitoes that breed in larger bodies of water, and are not likely to detect *Aedes aegypti*, which breeds in flower pots, tires, trash and small pools of water.

Unlike many other types of mosquitoes, *Aedes aegypti*'s eggs can dry out and cling to container surfaces, waiting for the next rain to revive them.

At the meeting, Petersen showed a map of mosquito abatement districts in U.S. states. One attendee said "abatement" in his area consisted of a man with a pickup truck who plowed snow in the winter and did some mosquito spraying during warmer months.

Many officials expressed concerns about the cost of efforts to deal with Zika. Daniel Kass,



New York City's deputy commissioner for environmental health, estimated the city, which has high volumes of travelers and prior outbreaks of Yellow fever and a recent case of dengue, will spend \$5 million to \$6 million on Zika preparedness. *Aedes aegypti* is not common in New York City, but it is home to *Aedes albopictus*, another mosquito thought capable of carrying Zika.

Umair Shah, executive director of the health department in Harris County, Texas, where *Aedes aegypti* mosquitoes are common, said he plans to spend about half that much. The county includes the city of Houston.

The Obama administration has asked Congress for about \$1.9 billion in emergency funds to combat Zika but has encountered opposition from Republicans who contend health agencies should have enough money from prior funding for Ebola virus preparations.

Amy Pope, the White House deputy homeland security advisor, said the federal government has already diverted some of the funds from global Ebola efforts for Zika efforts in Puerto Rico. Pope said inaction by Congress is forcing health officials to make difficult choices.

Dr. Edward McCabe, the March of Dimes Foundation's medical director, said most birth defects cannot be prevented because their cause is not known. With Zika, the government could save "dozens or even hundreds" of newborns from devastating birth defects, McCabe said.

Vietnam

Zika confirmed in Vietnam: Female patients from Khanh Hoa province and Ho Chi Minh city

Outbreak Today April 5, 2016 by Robert Herriman

Vietnamese health officials have confirmed the first Zika virus infections in the country in two women from Khanh Hoa province and Ho Chi Minh city, Assoc Tran Dac Phu, director of the Department of Preventive Medicine at Ministry of Health said in a press conference Monday.

The Institute of Hygiene and Epidemiology / Pasteur tested 1,215 samples in 32 provinces and cities across the country and detected 2 cases positive for Zika virus in Khanh Hoa province and Ho Chi Minh city.

Details of the cases are as follows:

The first patient is a 64-year-old woman from Nha Trang, Khanh Hoa province. She presented with a slight fever, headache, rash on the legs and pinkeye on Mar. 26. She attempted to treat herself at home but did not get better and two days later was admitted to Khanh Hoa Hospital for Tropical Diseases. Test results dated 03.31.2016 in Nha Trang Pasteur Institute positive for Zika virus; Confirmation testing at the Institute of Hygiene and Epidemiology and the Institute Pasteur in HCM was positive for Zika virus Monday.

The second patient, a 33-year-old woman from Ho Chi Minh city had an onset of symptoms on Mar. 29—rash, conjunctivitis, fatigue and examined at the Hospital District 2 on the same day due to fear of rubella. She was hospitalized and tested positive for Zika at the Institute of Hygiene and Epidemiology on Apr. 2. Testing at Nagasaki University was positive on Monday.

These cases follow a report of an Australian tourist in Vietnam who was diagnosed with Zika infection last month.

Speaking at a press conference, Deputy Minister of Health Nguyen Thanh Long said the two cases were currently in stable condition and monitoring of the women's household contacts and surrounding households have not uncovered any additional Zika cases. He also added that the first two Zika cases in Vietnam were transmitted by mosquitoes, not through sexual transmission or other route.



YELLOW FEVER – OUTBREAK NEWS

Angola

Angolan yellow fever outbreak highlights dangerous vaccine shortage

Science 4. Apr 2016 by Kai Kupferschmidt

The three people dressed in baby blue plastic suits and goggles form a human conveyor belt for chicken embryos. The first takes a tray of eggs that were injected with a yellow fever vaccine virus, then left to incubate for 4 days, and cuts the top off each egg. The second tweezes the embryos out of the eggs and deposits them in a large bottle. The last person adds some liquid, then blends the embryos into a rich, red broth that contains millions of weakened virus particles.

The end result of this procedure, repeated dozens of times every week at the Pasteur Institute of Dakar, is a highly effective vaccine that offers lifelong protection against yellow fever. But the 80-year-old process is decidedly low-tech and hard to scale up—and that's become a problem, because a big yellow fever outbreak that started in December 2015 in Luanda, Angola's capital, has emptied the world's strategic reserves of the vaccine.

The Pasteur Institute, which makes about 10 million doses a year, is one of only four facilities around the world producing yellow fever shots, joining two government-run plants in Russia and Brazil and French vaccine company Sanofi Pasteur. Their combined output has long fallen short of the world's needs, and the Angola outbreak has worsened the shortfall. Another major outbreak—for instance in Asia, where yellow fever has never gained a foothold—could be impossible to control, says retired virologist Jack Woodall in London. "I hate being alarmist," says Woodall, who's also a moderator at the Program for Monitoring Emerging Diseases, an online alert system for disease outbreaks. "But this is something I'm really panicking about."

break

The vaccine is the only bulwark against yellow fever, a formidable killer without a cure that's transmitted primarily through the bite of *Aedes aegypti*, also known as the yellow fever mosquito. Most infected people have no symptoms at all; some experience fever, joint pains, and headaches. But roughly 15% progress to a more severe stage in which their eyes and skin turn yellow; they may also bleed from the eyes, nose, and mouth. Up to half of these serious cases are fatal. Although yellow fever is endemic in much of Latin America, Africa bears by far the highest burden. Exact numbers are hard to come by, but a study published in 2014 in *PLOS Medicine* estimated that the disease kills 78,000 Africans every year—although many experts felt that number was too high.

Most infections occur in or close to the jungle, where mosquitoes spread the virus primarily between monkeys and occasionally infect a human bystander as well. Urban outbreaks, like the one in Angola, can be far more severe, because mosquitoes can transmit the virus from person to person. "That's when the disease can really take off," says William Perea, of the World Health Organization's (WHO's) Control of Epidemic Diseases department in Geneva, Switzerland. Angola has seen 490 confirmed cases and 198 deaths so far, but experts say the real toll may be 10 times as high. "We haven't seen an outbreak like this in many years," Perea says.

A huge vaccination campaign launched in February has already reached almost 6 million of Luanda's roughly 7.5 million inhabitants. But the disease has since spread to six of the country's 18 provinces, and the global emergency stockpile of 6 million vaccines is empty. "This is definitely a stressful situation," says Melissa Malhame of Gavi, the Vaccine Alliance, a Geneva-based public-private partnership that aims to increase immunization in poor countries.

A ramped-up battle against yellow fever had already strained the global supply of vaccine.



Many countries have made the shot part of their routine vaccination schedules for children, while massive catch-up campaigns were launched to protect entire populations that never received the vaccine before. A United Nations Children's Emergency Fund report last year estimated that the organization needed 42% more vaccine in the next 3 years than is available to it. A 2013 report put global production in 2009 at 75 million doses, up from 30 million in 2000 but well short of the 105 million doses needed that year. The exact annual production today is unknown, but it's probably about 80 million doses, says Tom Monath, a virologist who has studied yellow fever for decades and currently works at NewLink Genetics, a biotech company in Ames, Iowa. To make matters worse, the factory in Dakar is about to shut down for a 5-month renovation.

Things may get better in the long run. Demand for the vaccine should decline in a few years, after countries wrap up their catch-up campaigns. The Pasteur Institute is building a new facility in Diamniadio, about 30 kilometers from Dakar, that could triple production by 2019; Sanofi Pasteur has built a new facility in France.

In the meantime WHO has urged Angola to only vaccinate in areas where yellow fever is spreading. But infected travelers have already brought the disease from Angola to three other countries in Africa, including the Democratic Republic of the Congo; if the disease started circulating in its sprawling capital, Kinshasa, that could be catastrophic, Monath says.

"I think all the specialists in my field agree that there is a real and present danger of having a major outbreak of yellow fever that is uncontrollable," adds medical entomologist Paul Reiter of the Pasteur Institute in Paris. "It's a ticking time bomb." One stopgap measure might be to lower the vaccine dose, Monath says; some studies have shown that just one-fifth or one-tenth of the current dose could protect people.

Spread to Asia is the nightmare scenario for yellow fever experts. Angola is home to many Chinese workers, and in at least six cases they have already brought the virus to China. Five of these cases occurred in Beijing, where *Aedes aegypti* does not occur, so the disease could not spread. But the mosquito is abundant in southern China and elsewhere in Asia—and so are vulnerable people. Oddly, however, yellow fever has never taken off on that continent.

Understanding the evolution of malaria also takes one on a worldwide journey, according to evidence found in insects preserved in amber. Poinar is an international expert in using plant and animal life forms preserved in this semi-precious stone to help learn more about the biology and ecology of the distant past.

Poinar was the first to discover a type of malaria in a 15-20 million-year-old fossil from the New World, in what is now the Dominican Republic. It was the first fossil record of *Plasmodium malaria*, one type of which is now the strain that infects and kills humans.

Even further back, malaria may have been one of the diseases that arose, along with the evolution of insects, and had a huge impact on animal evolution. In a 2007 book, "What Bugged the Dinosaurs? Insects, Disease and Death in the Cretaceous," George and Roberta Poinar argued that insects carried diseases that contributed to the widespread extinction of the dinosaurs around the "K-T boundary" about 65 million years ago.

"There were catastrophic events known to have happened around that time, such as asteroid impacts and lava flows," Poinar said. "But it's still clear that dinosaurs declined and slowly became extinct over thousands of years, which suggests other issues must also have been at work. Insects, microbial pathogens and vertebrate diseases were just emerging around that same time, including malaria."

Avian malaria has been implicated in the extinction of many bird species in Hawaii just in recent decades, especially in species with no natural resistance to the disease. Different forms of malaria, which is now known to be an ancient disease, may have been at work



many millions of years ago and probably had other implications affecting the outcome of vertebrate survival, Poinar said.

The first human recording of malaria was in China in 2,700 B.C., and some researchers say it may have helped lead to the fall of the Roman Empire. In 2015 there were 214 million cases worldwide, according to the World Health Organization. Immunity does not occur naturally and the search for a vaccine has not yet been achieved.

NOT ONLY MOSQUITOES

British Airways ground plane after bed bugs found on board

Stuff

A British Airways plane has been taken out of service after bed bugs were found on board. The airline said two of the bloodsucking insects were found.



"Whenever any report of bed bugs is received, we launch a thorough investigation and, if appropriate, remove the aircraft from service and use specialist teams to treat it - this happened in this instance," a spokeswoman for the airline told Mashable. The airline said two of the bloodsucking insects, were found.

Bed bugs are reported to have been found on a British Airways flight. BRITISH AIRWAYS/SUPPLIED

British tabloid The Sun reports that the bugs were found in the economy section of a Boeing 747 that was en-route to London from the US. But despite the find, the plane is reported to have been kept in action during another service to South Africa without being disinfected.



British Airways deny the claim, with a spokesman saying "Reports of bed bugs on board are extremely rare. Nevertheless, we continually monitor our aircraft."

This is not the first time a British Airways flight is reported to have been infected with the parasitic

insect. In 2011 a premium economy passenger blogged about finding bed bugs on her her inflight blanked. "There were at least four live ones on my shirt, another two crushed on my shoulder, and a blood stain on the back of my shirt where I must have leant back on a full-size (and full-stomached) one," Zane Selkirk wrote.



Thousands of cockroaches invade Auckland street

Staff by Elesha Edmonds

A war has broken out in Auckland and there have been thousands of casualties. Cockroaches have been invading David and Philippa Gravatt's Epsom property for the past three summers.

Every night David sets about six traps around his Albury Rd house and wakes to find them covered in hundreds of cockroaches.

David says the average nightly haul is 120 roaches. This summer's total has nearly reached 2000.

"We've had thousands this summer, literally thousands," he says.

"I put bait out where the cockroaches are and then go back 10 minutes later and see 20 or 30 of them, just like that."

Philippa says their neighbours are having similar problems, with one couple finding a cockroach in their baby's bed.

"The problem now is they are all coming into the house," she says.

"You'd just be sitting there watching telly and something would move so then you'd spend the next 10 minutes trying to catch them."

The Gravatts have traps in their attic, bathroom, by their dishwasher and around their house.

"We had two families out one night with rolled up newspapers and tape, belting the hell out of them and we didn't even make a dent in them," Philippa says.

Philippa noticed the problem three years ago when she was out walking her dogs at night.

"There were all these insects running round like baby mice all over the footpath and down the hill," she says.

"There were literally thousands and they were coming out of the sewer lid in the middle of the road."

David shone a torch down the sewer and was horrified to see it full with cockroaches.

A Watercare spokesperson says they have been contacted twice by Albury Rd residents about the issue.

"Each time we flushed the wastewater pipes and Auckland Council's environmental health team arranged for the cockroach extermination," the spokesperson says.

"If the access point is a manhole or public pipe, we will

employ a bug extermination company to treat or seal the access." atercare has arranged another "courtesy flush" of the Albury Rd pipes.

ELESHA EDMONDS / FAIRFAX NZ

Cockroaches have been invading David and Philippa Gravatt's Epsom property for the past three summers.





'Baghdad boil' surge reported in Baquba District, Iraq

Posted by Robert Herriman on February 6, 2016 /

City officials in Baquba District, Iraq are reporting some 100 cases of cutaneous leishmaniasis, or "Baghdad boil", in recent weeks in the agricultural belt of Baquba, according to a ProMed news posting Friday.



Mayor of Baquba District in Diyala governorate, Abdullah Al-Hayali said, "the past few weeks have witnessed more than 100 cases of Baghdad boil in the agricultural belt of Baquba, which consists of tens of villages inhabited by thousands of families." Leishmaniasis is not a single disease, but a group of syndromes due to a variety of species of this parasite. The affect different populations and are related to a characteristic vector, the sandfly.

Sandfly/James Gathany

Leishmaniasis is found in 88 countries worldwide and is broken down between Old World and New World. Old World leishmaniasis is primarily found in parts of Asia, East and North Africa, Southern Europe and the Middle East.

New World leishmaniasis occurs from northern Mexico to northern Argentina, with rare cases reported in parts of Texas and Oklahoma. In South America it is not found in Chile or Uruguay.

The vector for this parasite is a phlebotomine sandfly. There are a few different species implicated depending on the part of the world.

Even one bite of a sandfly can transmit disease, so travelers on short trips can still get infected.

When the female sandfly takes a blood meal it injects the parasite into the wound. Macrophages pick up the parasite and here they multiply until the cell bursts from overcrowding. The parasite goes on to infect more macrophages.

Some of these cells get carried to organs of the body including the liver, spleen and the bone marrow.

There are several species of Leishmania that cause disease in humans. The most common are Leishmania donovani (kala-azar), L. tropica (Baghdad boil), and L. braziliensis (espundia).

After getting bitten by a sandfly, disease may manifest itself from a week to many months later. It starts out as a papule that enlarges to an ulcer. The ulcer can give the appearance of a volcano crater. Lesions may appear singly or multiple; many heal spontaneously within weeks to months to years.

Certain species (L. braziliensis) can disseminate to the mucosal areas of the face and mouth and cause very destructive and disfiguring disease (espundia) that appears similar to leprosy.

Kala-azar, an Indian name given to systemic type of the disease due to the grayish appearance of the body, can result in enlarged spleen and liver, diarrhea, emaciation, weakness and death.

There is not a vaccine available to prevent leishmaniasis. The best way is to avoid sandfly bites.