

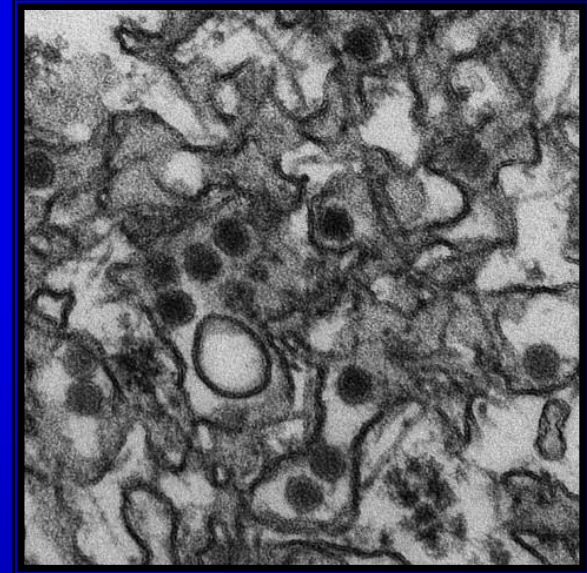
Biologist's meeting

11-Feb-2016

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Objectives

- Zika update
 - Vector bionomics
 - Species distribution
 - ID & monitoring
 - Local MCP response
- Trapping
- Reference collections

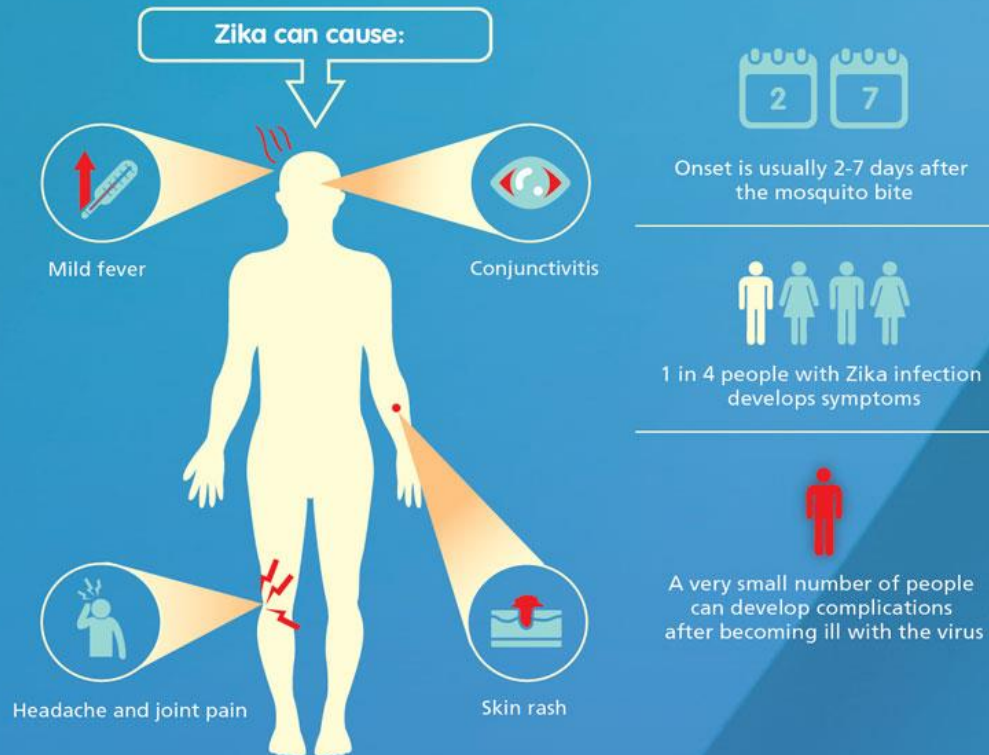




ZIKA VIRUS

What is Zika?

Zika is a virus transmitted by the *Aedes* mosquito, which also transmits dengue and chikungunya.



Pan American
Health
Organization

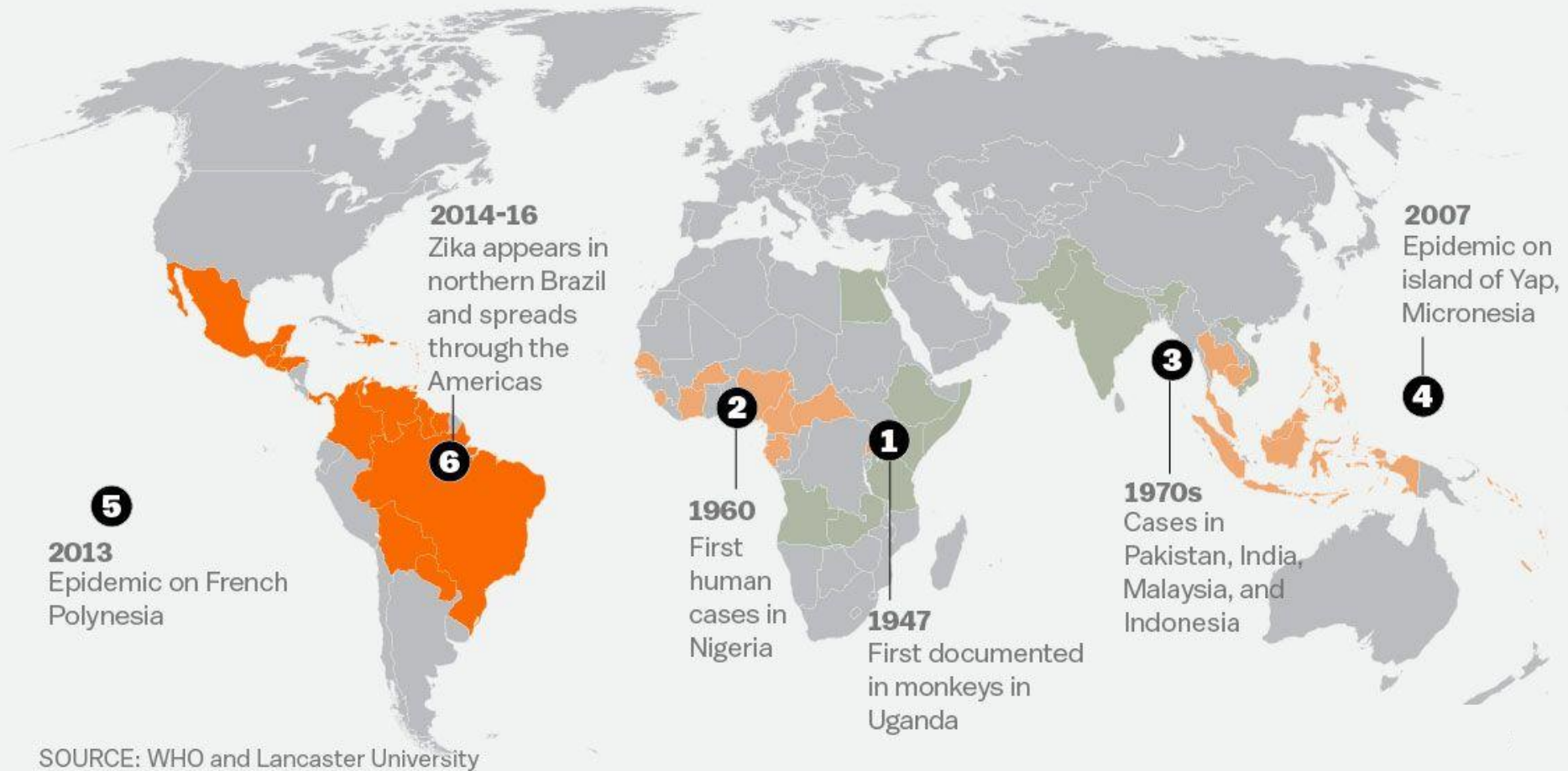


World Health
Organization
REGIONAL OFFICE FOR THE
Americas

#zika
#FightAedes
#ZikaVirus
www.paho.org/zikavirus

How the Zika virus spread

 Active transmission  Known previous transmission  Antibodies also detected



Approximate distribution of *Aedes aegypti* in the United States*



Approximate distribution of *Aedes albopictus* in the United States*

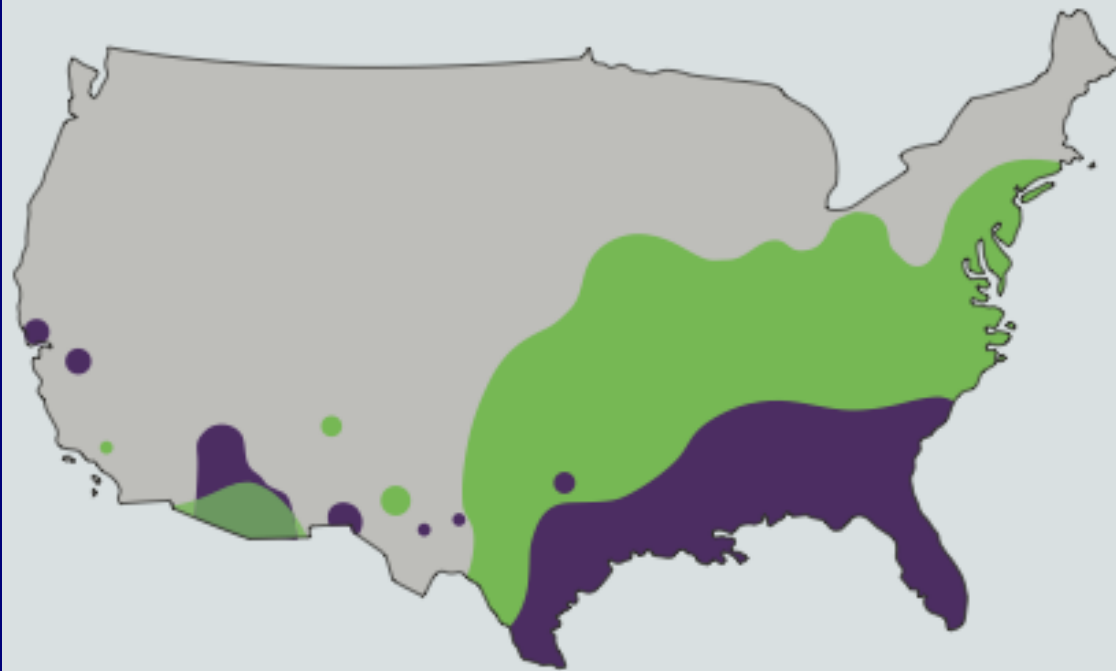


CDC Survey

<https://docs.google.com/forms/d/1eqWDzmFw7AEGDyooZwpUXsebh8qrUkzQJ82PDiYLPI/viewform?c=0&w=1>



Fill out the survey for your county

Maps were developed by CDC using currently available information. Mosquito populations may be detected in areas not shaded on this map, and may not be consistently found in all shaded areas.



U.S. MOSQUITOES

Aedes aegypti, which spreads the Zika virus, is found in parts of the U.S. Its relative, *Aedes albopictus*, can range as far north as New York and Chicago.


-  AEDES ALBOPICTUS
-  AEDES AEGYPTI



ZIKA
FEAR

Dengue, countries or areas at risk, 2013



 Countries or areas where dengue has been reported

The contour lines of the January and July isotherms indicate areas at risk, defined by the geographical limits of the northern and southern hemispheres for year-round survival of *Aedes aegypti*, the principal mosquito vector of dengue viruses.

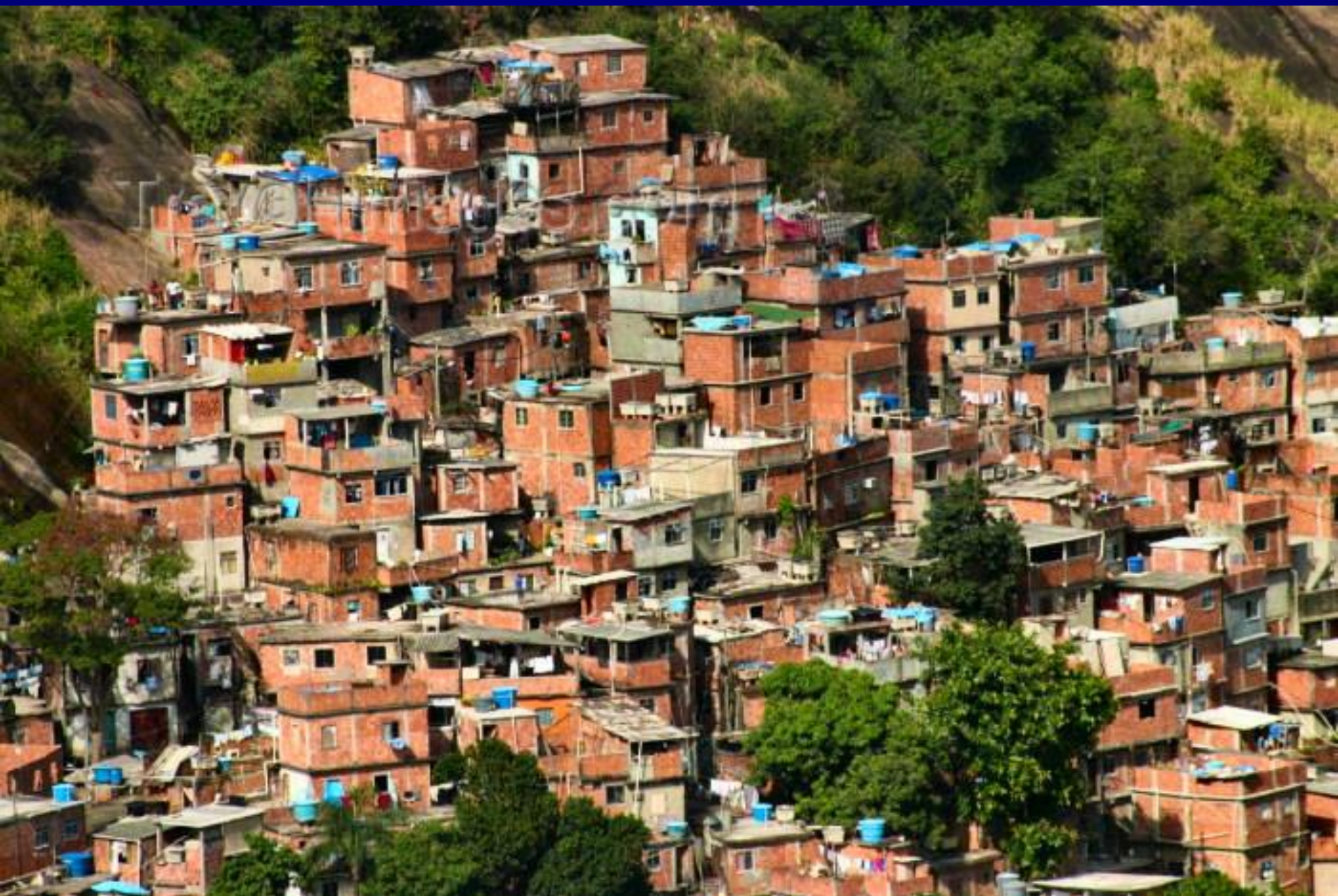
The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization



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Brazil Zika Epicenter In this Jan. 27, 2016 photo, homes are lit by the setting sun in Ibura, one of the neighborhoods with the highest numbers of suspected cases of children born with microcephaly in Recife, Pernambuco state, Brazil. The Zika virus is the suspected culprit of 3,400 cases of microcephaly in the country. (AP Photo/Felipe Dana)



Brazil Zika Epicenter In this Jan. 26, 2016 photo, Daniele Ferreira dos Santos, center right, stands outside her house as her ex-husband holds their son Juan Pedro, who was born with microcephaly, outside her house in Recife, Pernambuco state, Brazil. Almost from birth, Pedro cried ceaselessly, as do many babies with microcephaly. Her husband was annoyed by the baby's constant fussing, which distracted him from his television show, she said, and then within weeks of the baby's arrival, left the house with the family's flat screen TV. (AP Photo/Felipe Dana)



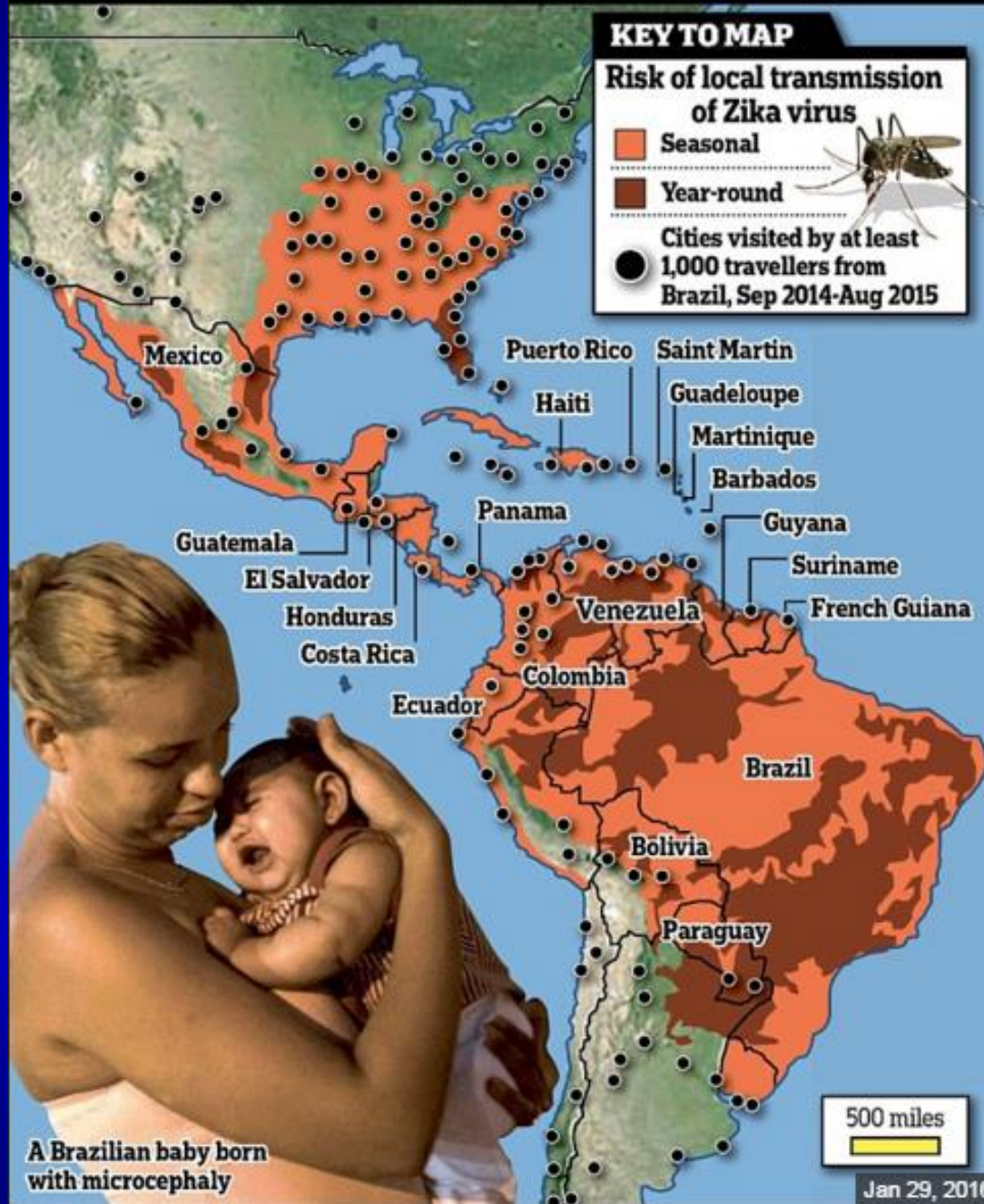








HOW ZIKA IS SPREADING



Container ecosystem

- Container mosquitoes
- Develop in $<1\text{L}$ of water

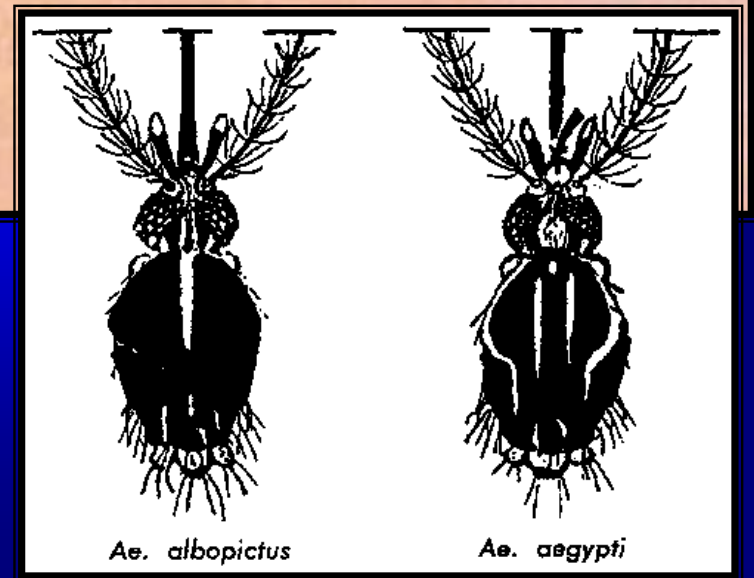
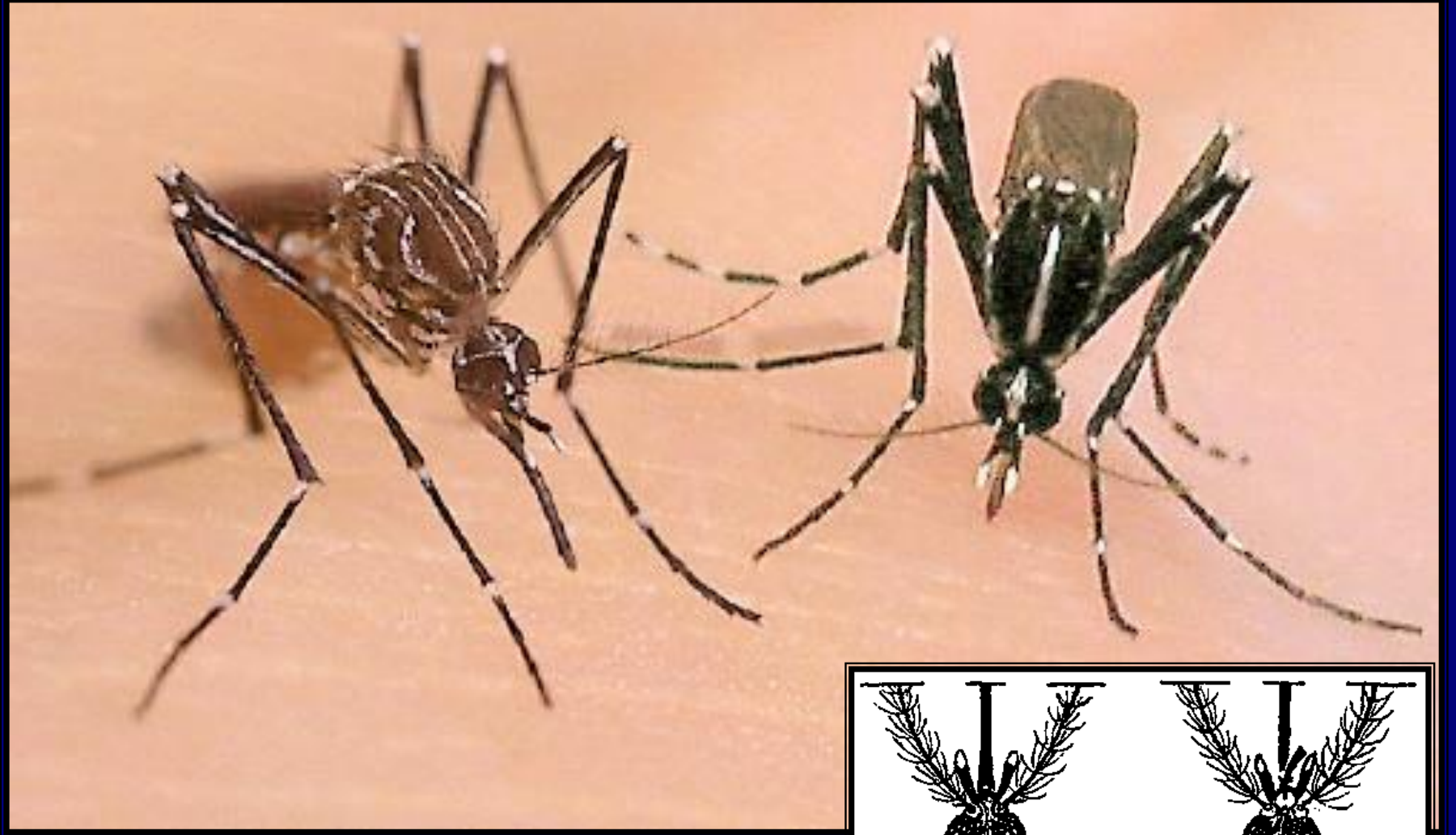


Endless examples





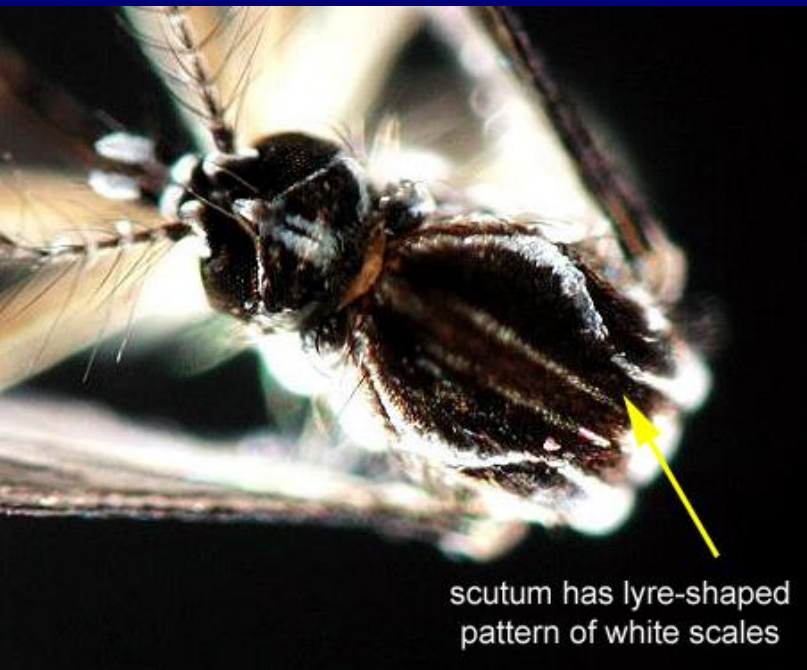
Primary vector of Yellow fever, Dengue, Chikungunya, Zika



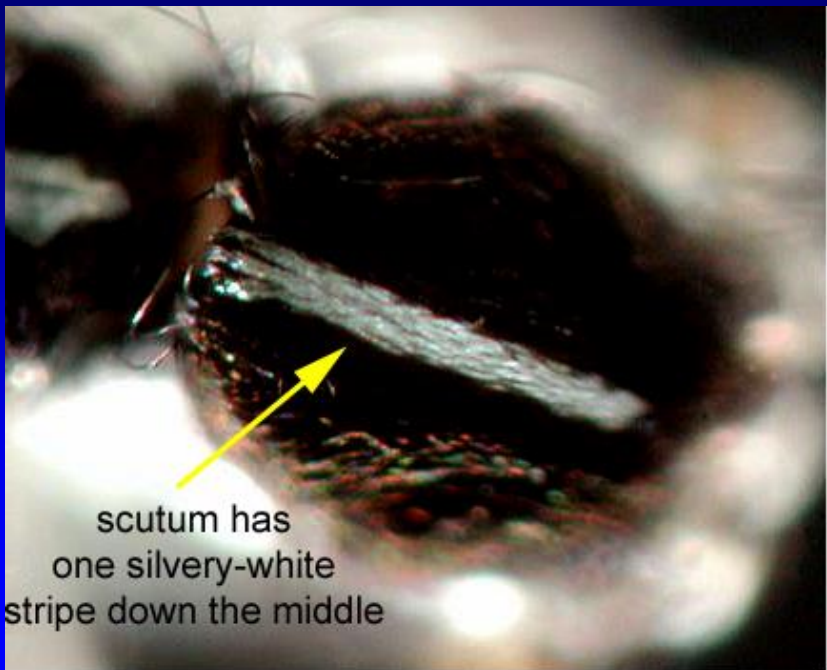
Ae. albopictus

Ae. aegypti

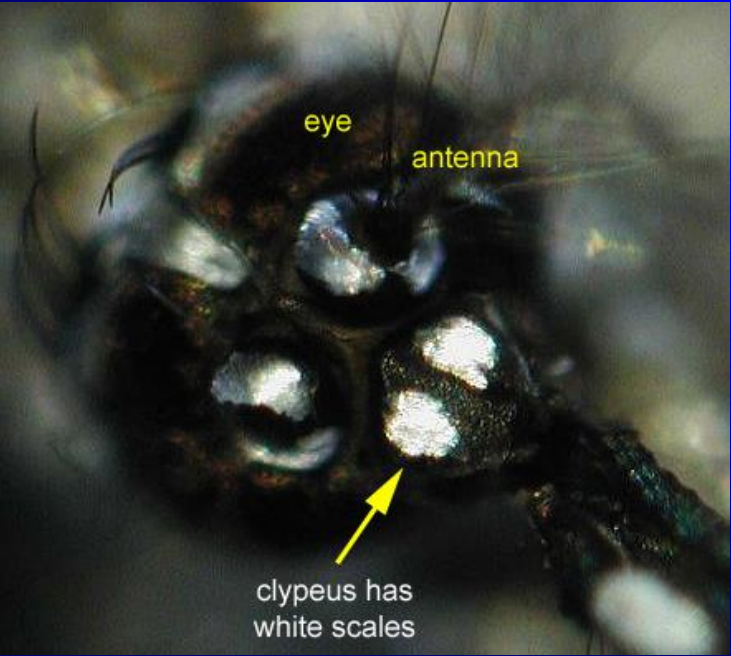
http://fmel.ifas.ufl.edu/key/genus/aedes_aeg.shtml



scutum has lyre-shaped pattern of white scales

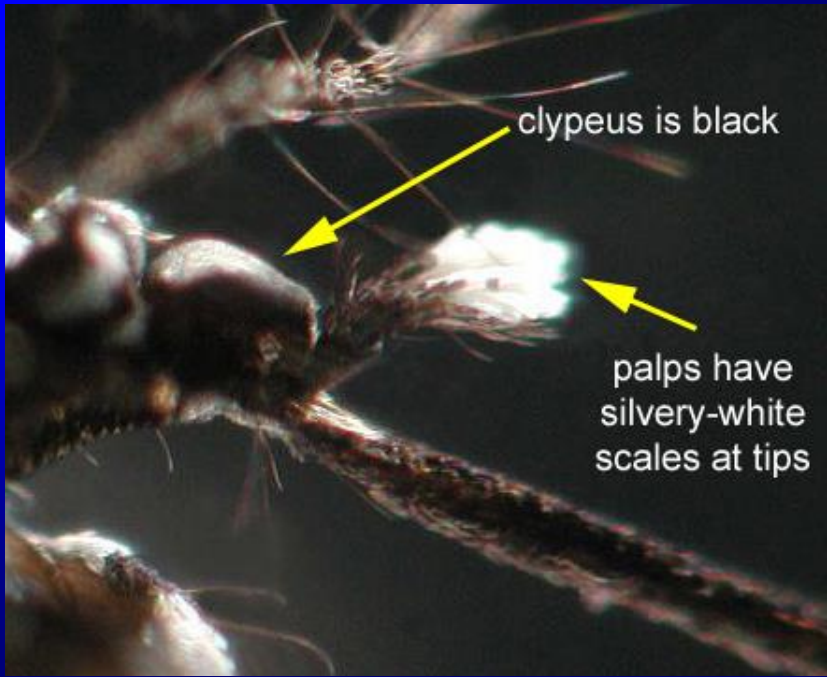


scutum has one silvery-white stripe down the middle



eye
antenna

clypeus has white scales

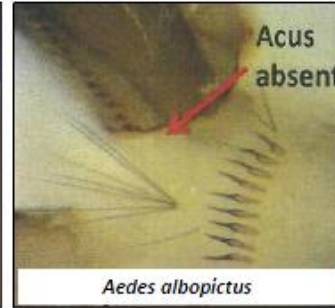
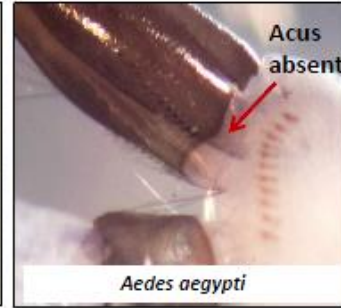
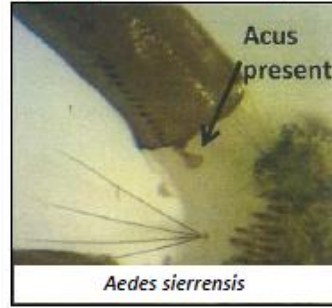


clypeus is black

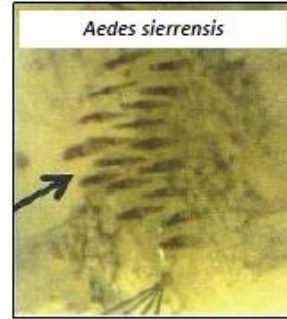
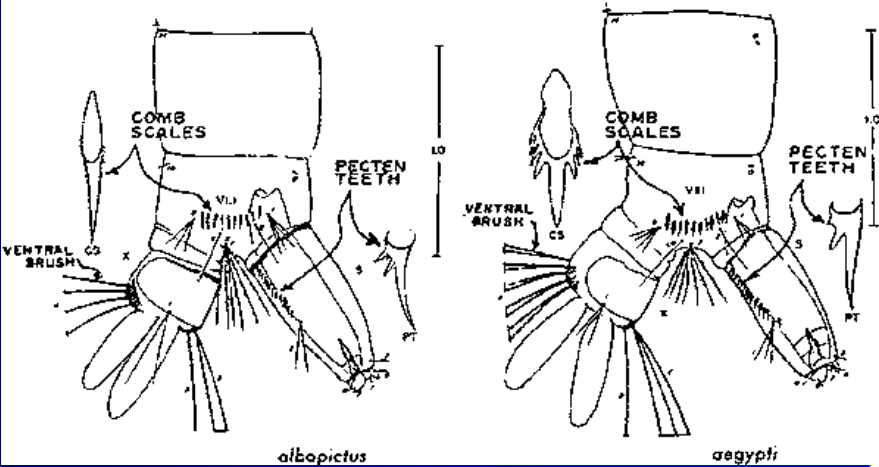
palps have silvery-white scales at tips

Key characters for larval *Aedes spp.* identification in CA

(1) Siphon acus - present or absent



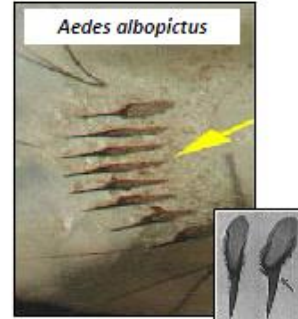
(2) Comb scales – multiple rows or single row



Multiple rows w/blunt or fringed points



Single row w/pitch-fork shape

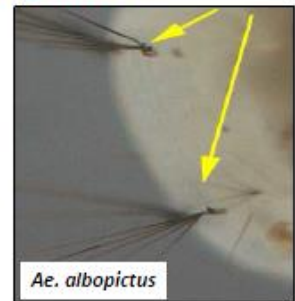


Single row w/straight thorn-like shape

(3) Thorax hooks – strong or weak



Strong black hooks on side of thorax



Small or no hooks on side of thorax

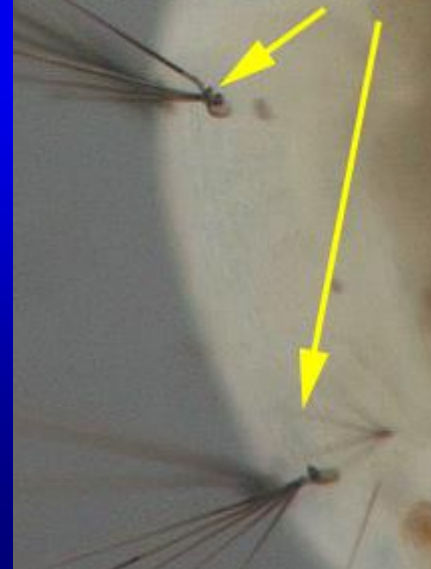
'pitchfork'-shaped comb scales in 1 row



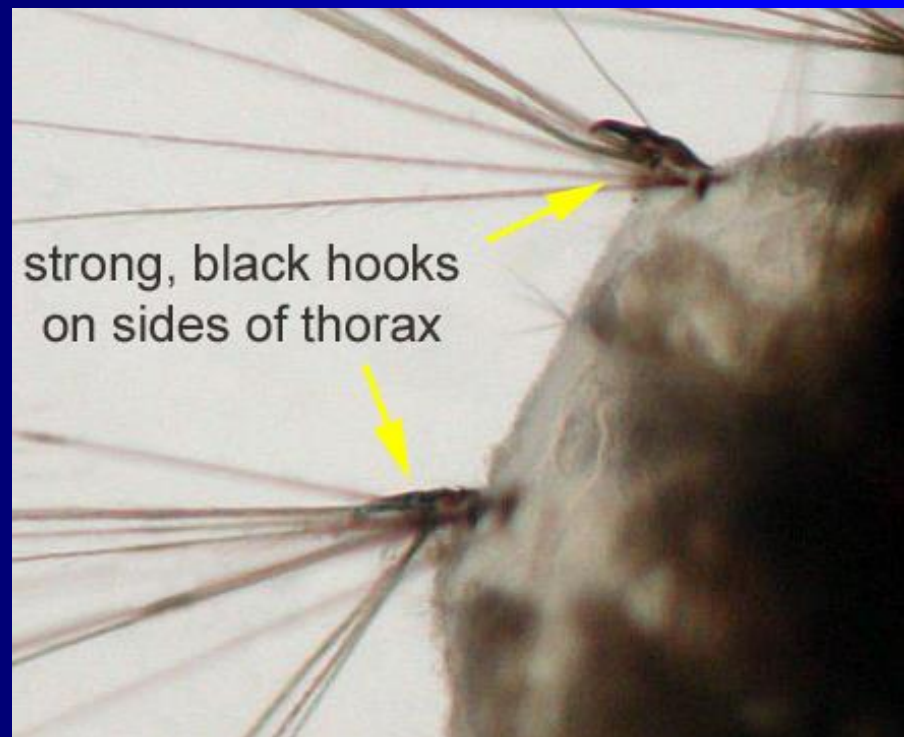
straight thorn-like comb scales in 1 row

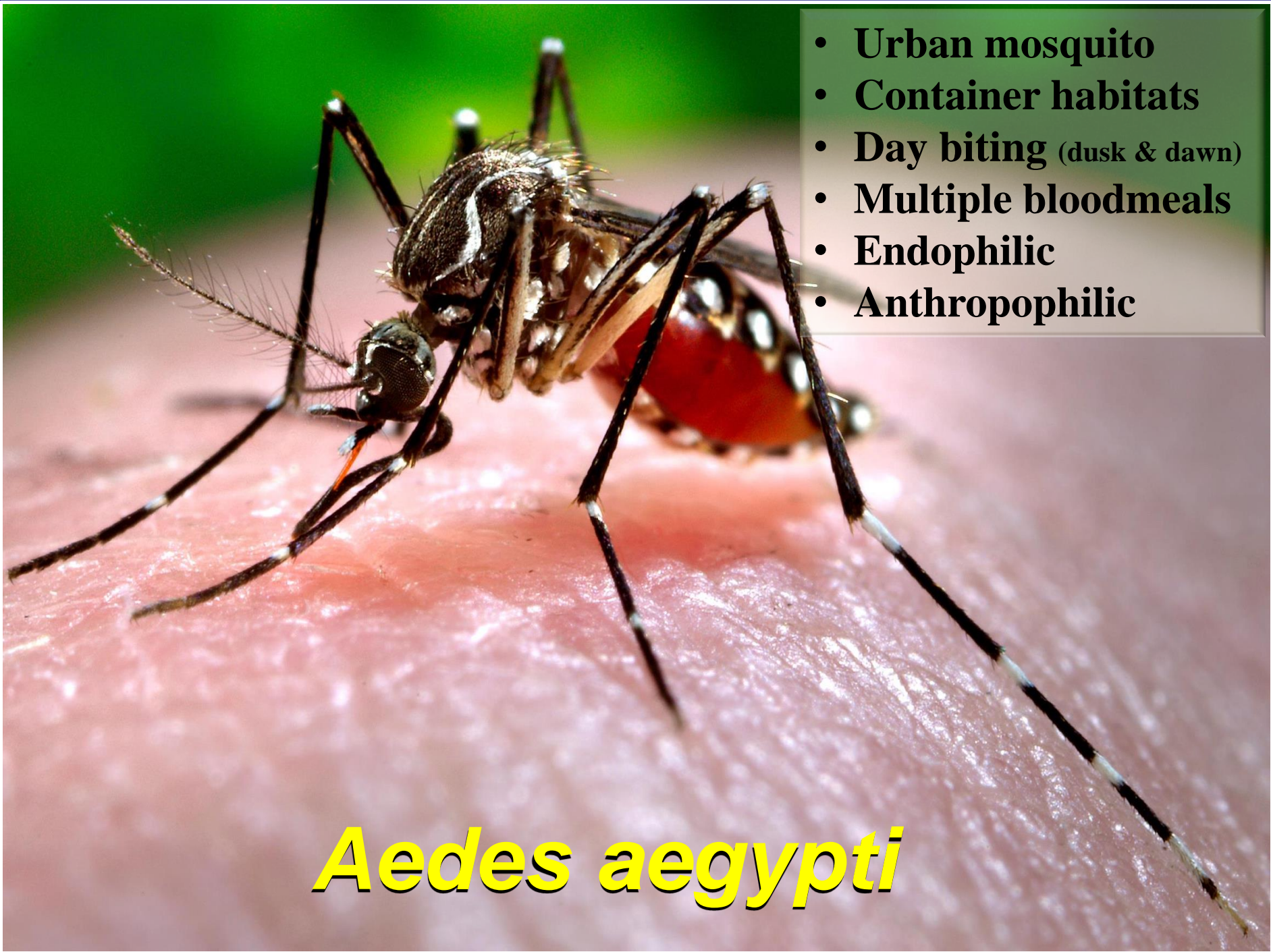


small hooks, or no hooks on sides of thorax



strong, black hooks on sides of thorax



- 
- **Urban mosquito**
 - **Container habitats**
 - **Day biting** (dusk & dawn)
 - **Multiple bloodmeals**
 - **Endophilic**
 - **Anthropophilic**

Aedes aegypti

- **Highly adaptive mosquito**
- **Natural & artificial containers**
- **Rural & suburban**
- **Opportunistic day biting** (dusk & dawn)
- **Outside & inside**
- ***Wider host range**



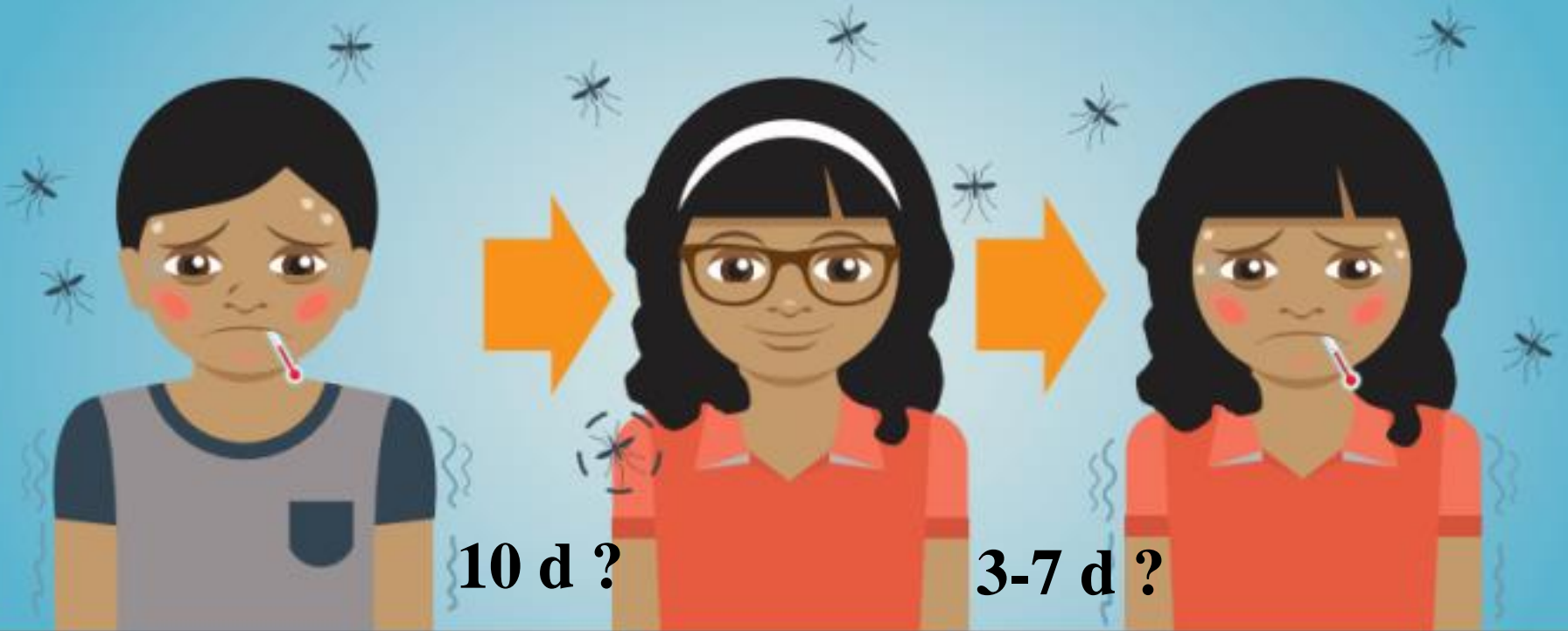
Aedes albopictus



CHIKUNGUNYA, DENGUE, or ZIKA: What is local transmission?



A person who has not traveled recently gets bitten by an infected mosquito where they live, work, or play.



A mosquito bites a person who is sick. The mosquito gets infected.

10 d ?

Infected mosquitoes can then bite healthy people and spread the infection.

3-7 d ?

Within 3-7 days, the person may become sick. Other mosquitoes can bite the sick person, become infected, and bite more people.

extrinsic incubation

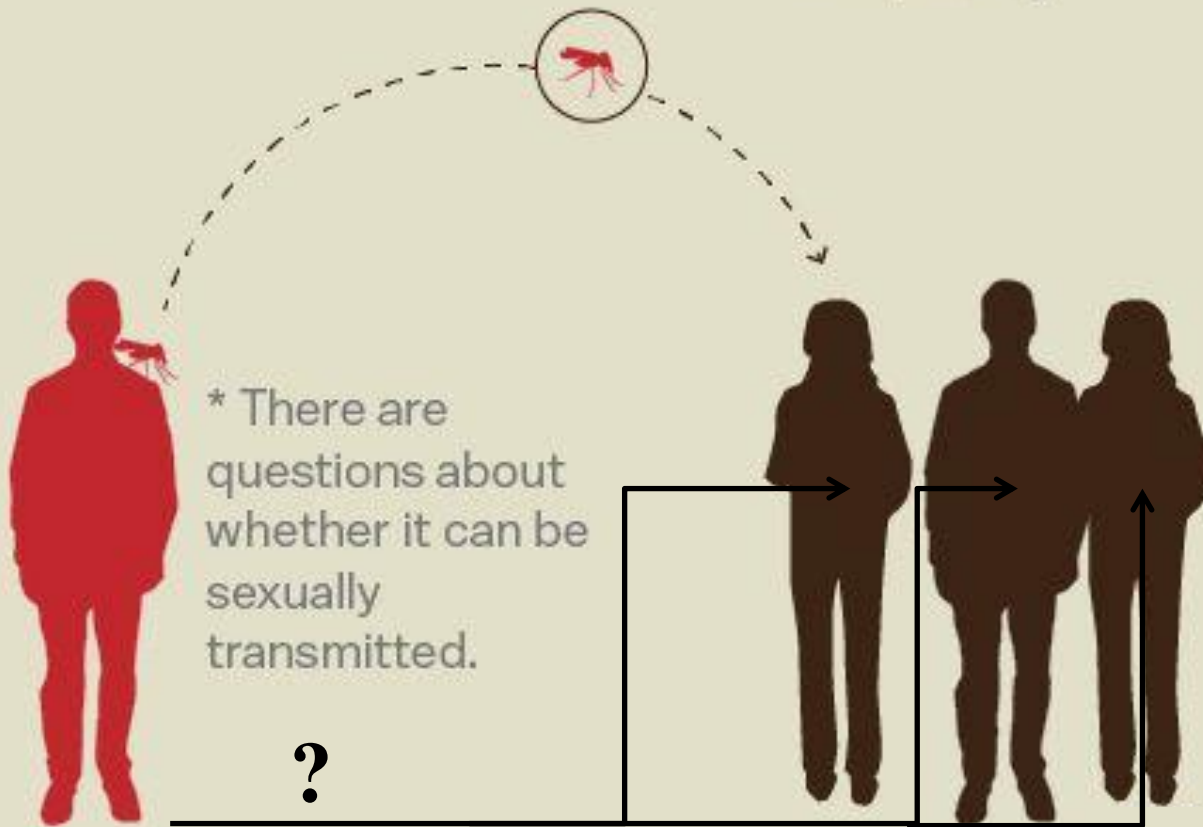
intrinsic incubation

gonotrophic cycle

Zika is spread by mosquitoes, not from person to person*



Aedes mosquito



* There are questions about whether it can be sexually transmitted.

?

State & county mosquito control responsibilities



IVM components

(Integrated Vector Management)

- **Continuing professional education**
- **Public education**
- **Mosquito & virus surveillance**
- **Source reduction**
- **Bio-Control**
- **Larviciding**
- **Pupiciding**
- **Aduticiding**
- **Annual reporting**

NJ philosophy

- Measures populations
- Justifies intervention
- Effectiveness of abatement
- Targets pest and/or habitat specifically in financially efficient & environmentally sensitive manner



Do you know where your vector populations are?

- **Have plenty of surveillance data (20 yrs)**
 - **Locates problem**
 - **Breeding site books / cards**
 - **Address for service requests**
- **Communities w/ frequent travel to Zika infected countries?**
 - **Same as CHIK right?**
 - **Increase surveillance efforts**

Survey

- **Inspectors**
 - **Established routes**
 - **Investigate complaints**
 - **Door to door**
 - **Collect samples**
 - **Abate as needed**



Let them know you were there

Leave information

Survey goals

- Determine presence absence
- Develop maps
- Identify areas of high abundance
- Address as needed



Adult surveillance

- Complaints
- Landing counts
- BGS/Fay Prince...
- Portable CO2
EVS/ABC/CDC/MMX/
Propane driven
- Oviposition traps
- New Jersey light



New Jersey Light Trap

Landing counts

- **Simple & quick**
 - count mosquitoes
- **Very selective**
 - host seeking
- **Intervention need**
- **Variability**



Great but, risk involved

Trapping bias

- Incorporate several methods
- Built in bias
- Species differences
 - Some better than others
- Trap placement

Been through all of this with ATM



Collect data on mosquito infection rates?

- Important during outbreaks
 - ID primary & secondary vectors
 - Establish thresholds
 - When do humans become infected
- Mosquito testing?



However for DENV,
CHIKV, YFV, ZIKV

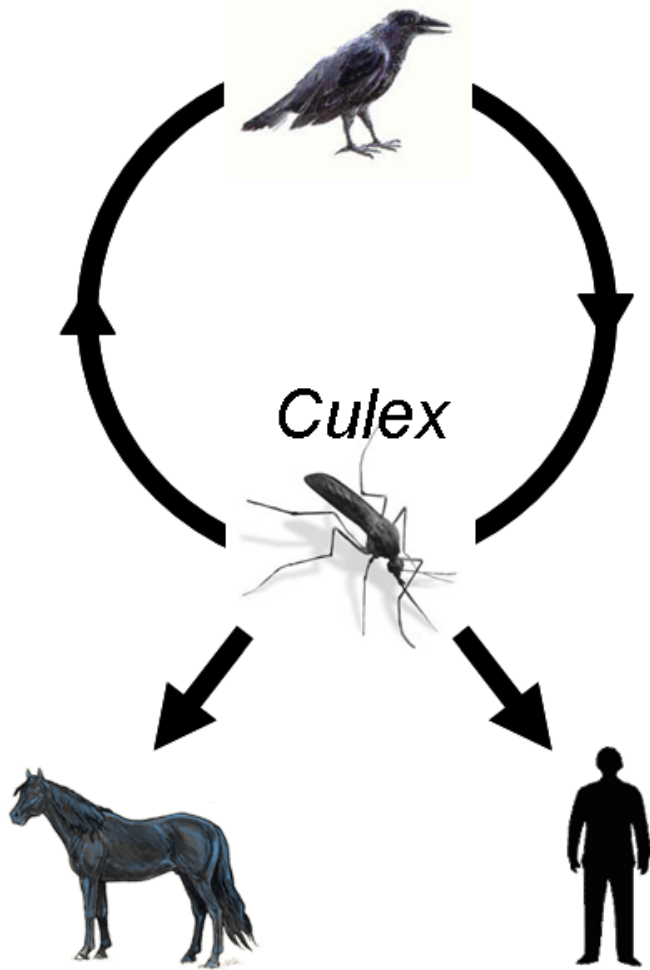
More efficient to detect cases in people

- Human testing?
- **DENV & CHIKV** nationally notifiable
- **Timely communication**
 - System in place
- **Initiate control measures early**

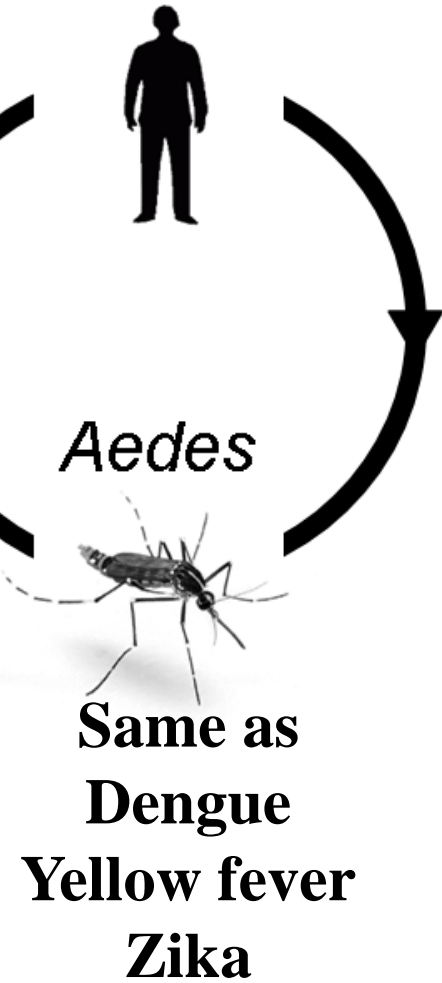


**For us, nothing new –
IVM right - do your job**

West Nile

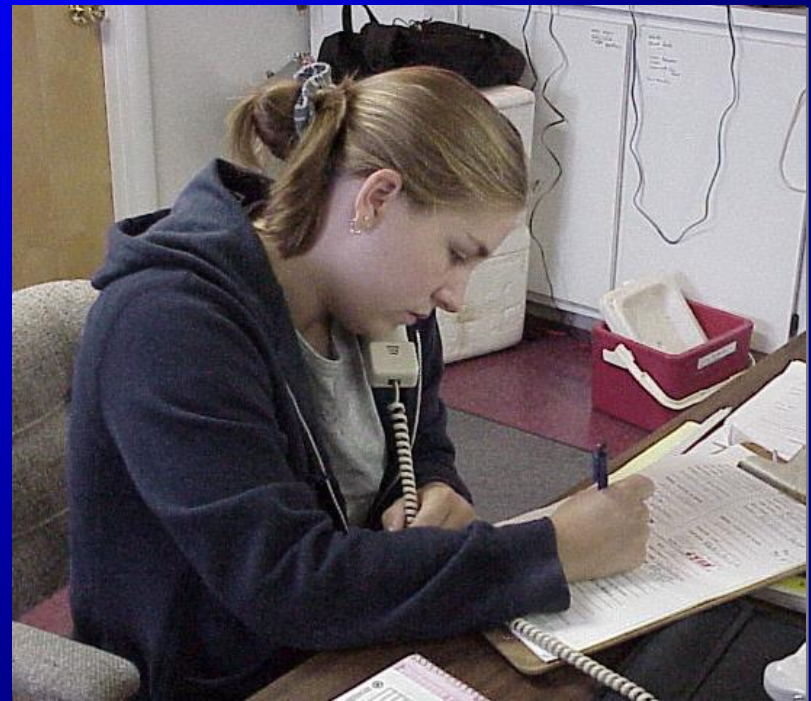


Chikungunya



Nuisance situation

- Mosquito problem warrants complaint(s)
- Program investigate & evaluate situation
- Take measured local action or not based on surveillance
- **If not called into area, likely won't see MCP**



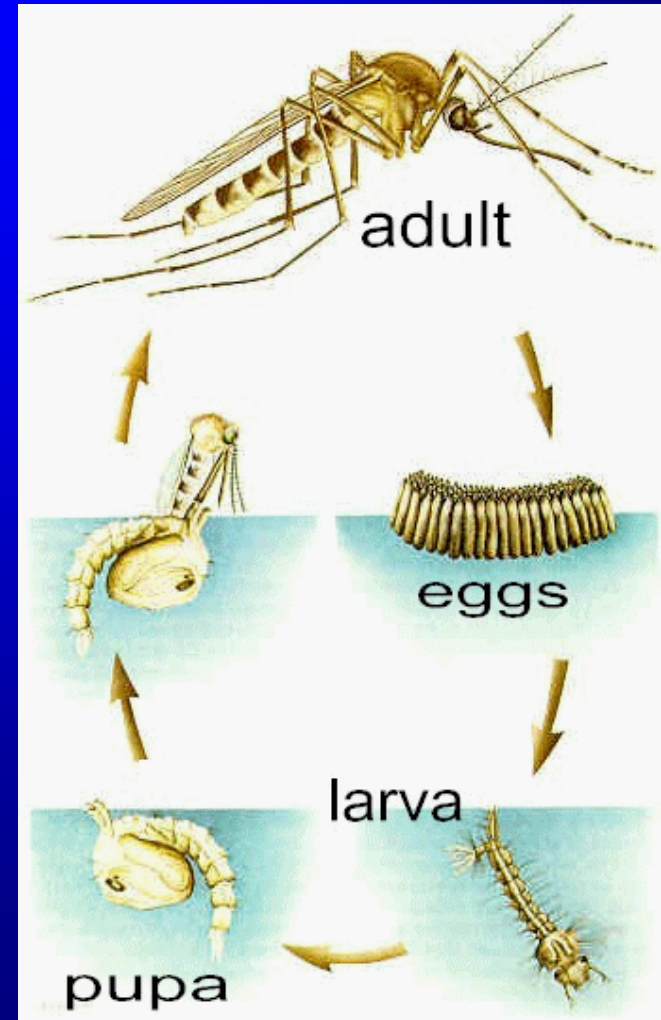
Programs are working where people have requested service

Get your message out early!

Disease prevention



- Sound IVM nuisance program = disease prevention
- Eliminating larval habitat
- Keeping adult mosquito populations down



Interrupting this cycle

Young is “Good” old is “Bad”

- **Strike early**
- **Prevent multiple blood meals**
- **Each blood meal increases chance of infection**



Young mosquitoes are a nuisance, Old mosquitoes can be a Public Health Threat!

Important public health message to share

- Take personal responsibility
- Don't provide larval habitat
- Minimize exposure to mosquitoes
- Repair screens
- Dress appropriately
- Use repellents
- **Use condoms**

Public health and vector control can help

But

there is a lot the public can do for themselves

Travel precautions

(Avoid mosquito bites)

- Cover exposed skin, wear hats, long sleeve shirts and long pants, socks and shoes
- Use permethrin treated clothing
- Use mosquito repellents on exposed skin
- Always follow label directions, reapply as directed
- Stay and sleep in screened or air conditioned rooms
- Use bed net if the sleeping area is exposed to the outdoors

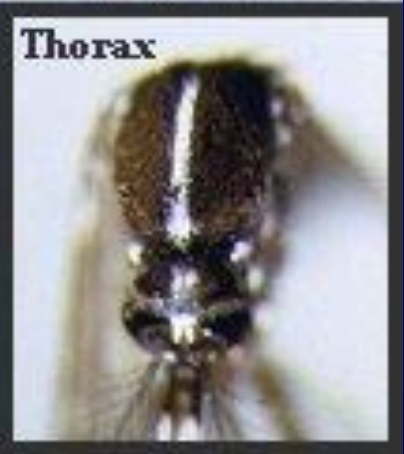
Repellents

(follow CDC recommendations)

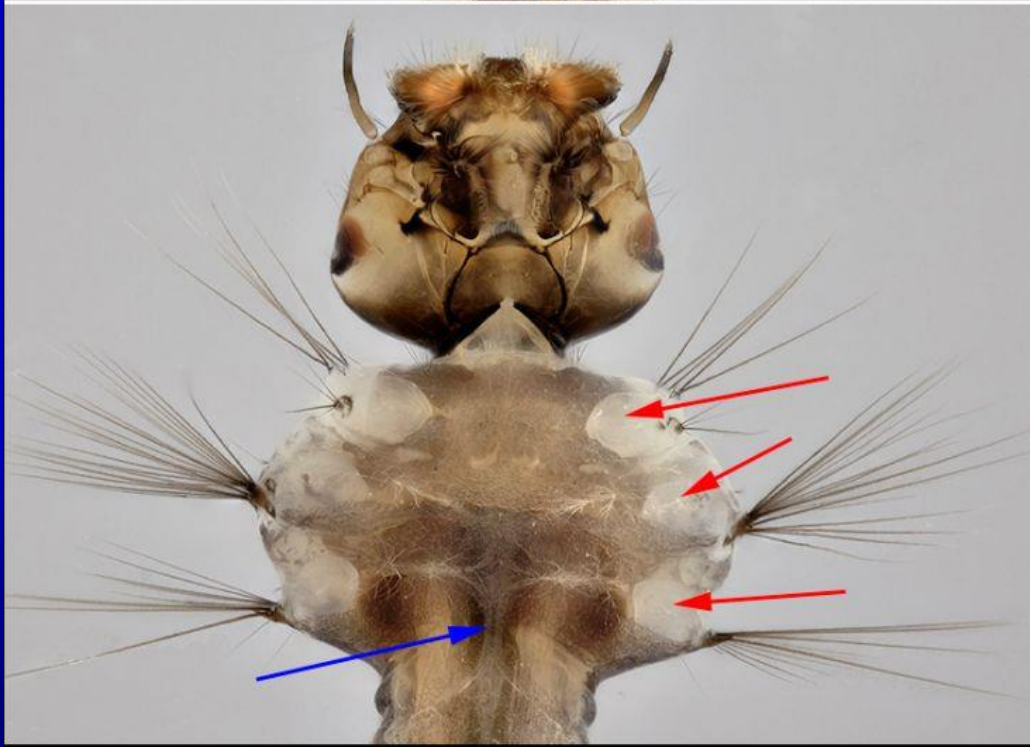
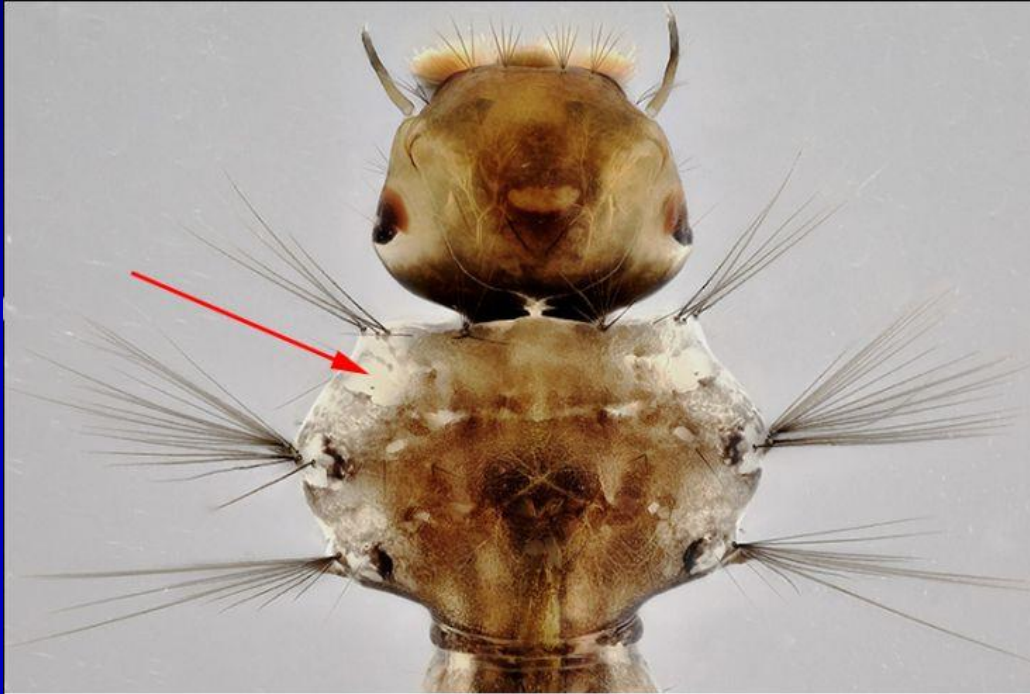
- Higher % of AI generally provide longer protection
- DEET
 - Off!, Cutter, Sawyer, and Ultrathon
- Picaridin
 - KBR 3023, Bayrepel, and icaridin products
- Oil of lemon eucalyptus (OLE) or PMD
 - Repel and Off! Botanicals
- IR3535
 - Skin So Soft Bug Guard Plus Expedition and SkinSmart



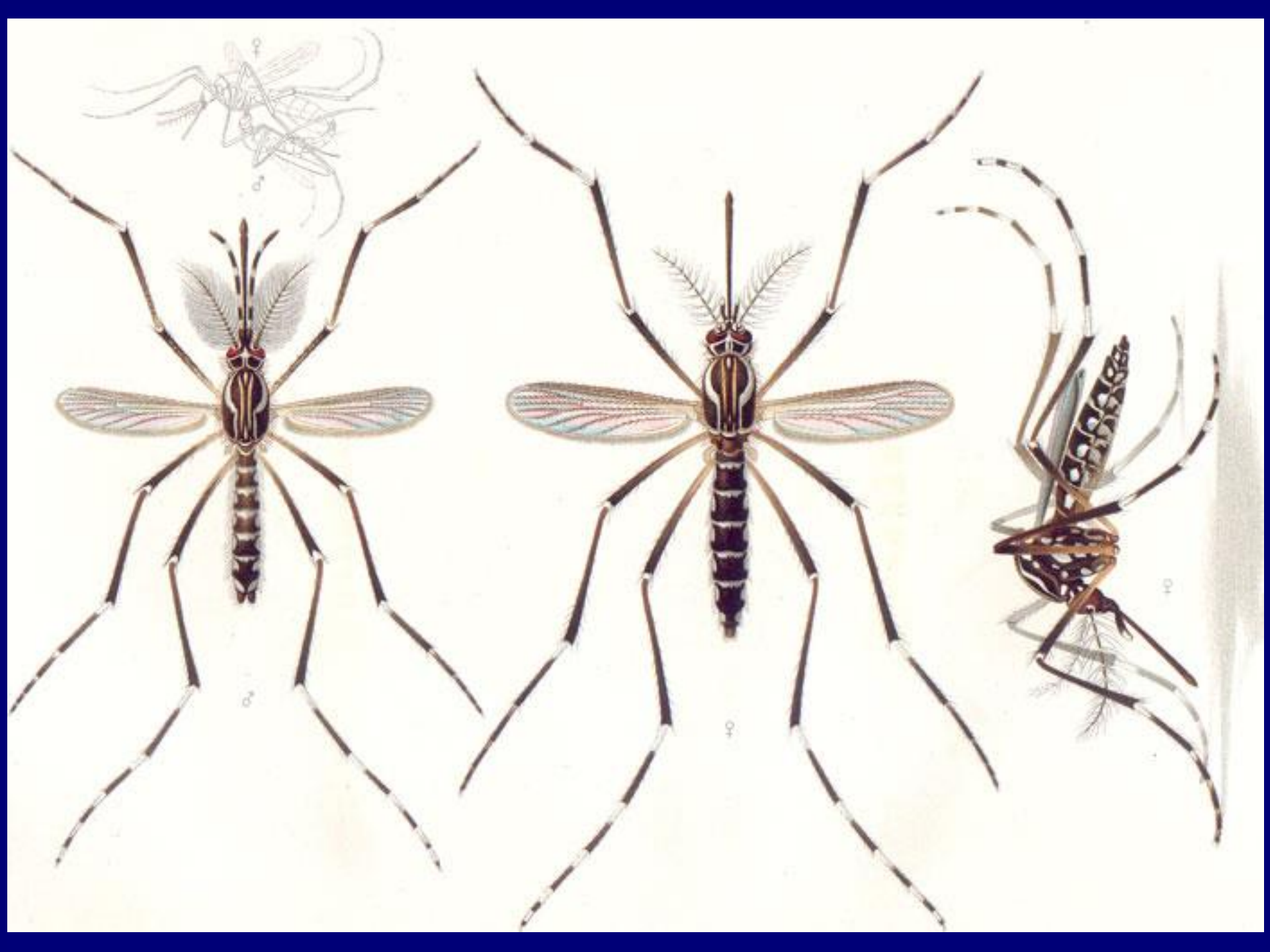
WALTER REED BIOSYSTEMATICS UNIT











Information

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