# Vector Competence of Canadian Mosquitoes to Zika virus

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# Overview

- Background
- Question
- Vector Competence
- Methods
- Results
- Discussion
- Conclusions

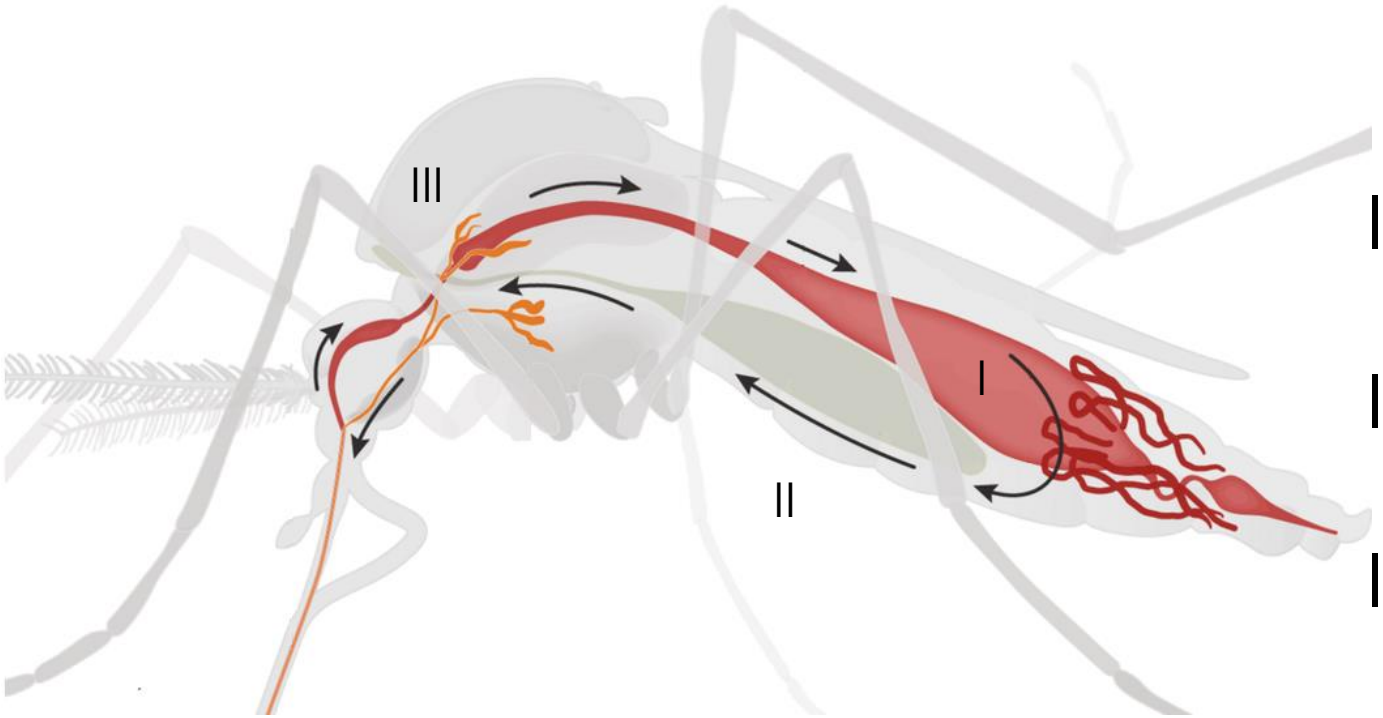
# Background

- Zika virus (ZIKV)
- Teratogenic effect and neurodegenerative disease
- Africa -> Asia -> S.A -> N.A
- *Aedes* and *Culex* mosquitoes
- Canadian cases not locally acquired
  - 478 travel related and 3 sexually transmitted cases
- Canadian mosquitoes unknown

(Dick *et al.*, 1952; Duffy *et al.*, 2009; PHAC, 2017; Zanluca *et al.*, 2015)

# What is the vector competence of Canadian mosquitoes to Zika virus?

# Vector Competence




I. Midgut Infection

II. Hemocoel Dissemination

III. Salivary Gland Transmission

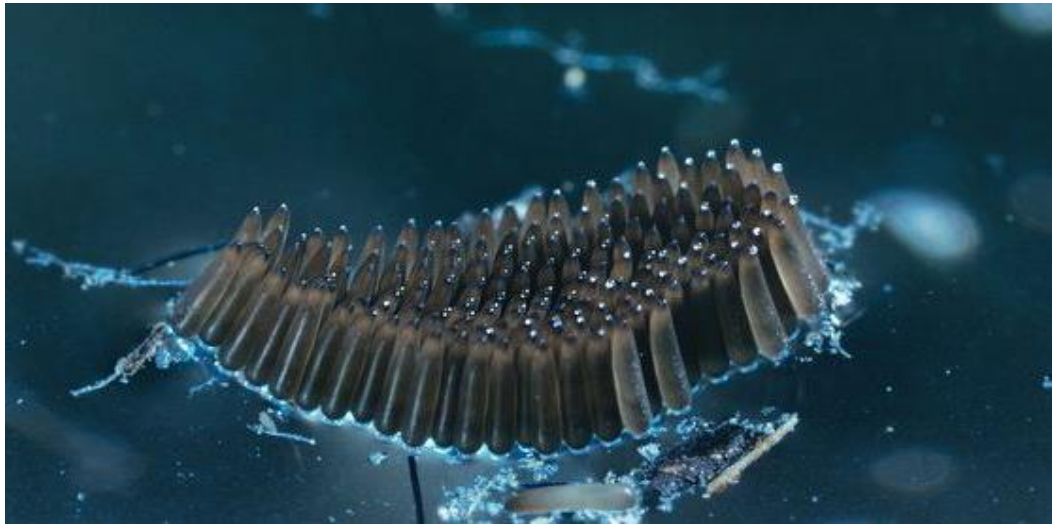
http://pbs.twimg.com/media/CbDZNgeWcAUMSiK.png:medium

# Vector competence of Canadian mosquitoes to Zika virus

- Collect wild mosquitoes
- Orally feed ZIKV
- Monitor over time
- Test for the presence of ZIKV

# Methods

- Wild-caught *Culex* egg rafts
- Reared to adulthood
- 28° C ± 1°C, 70% ± 5% humidity
- Fed fishfood/ yeast and 10% sucrose

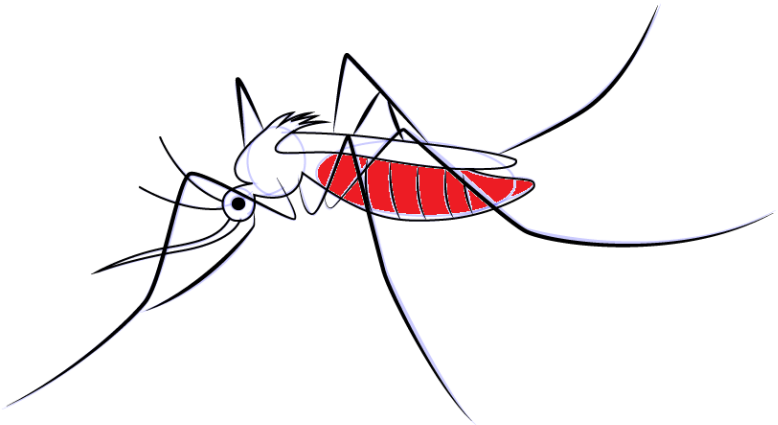


http://cdn1.arkive.org/media/56/567C6DA7-4E8A-4E58-8299-27BAF404ACA5/Presentation.Large/Northern-house-mosquito-egg-raft.jpg

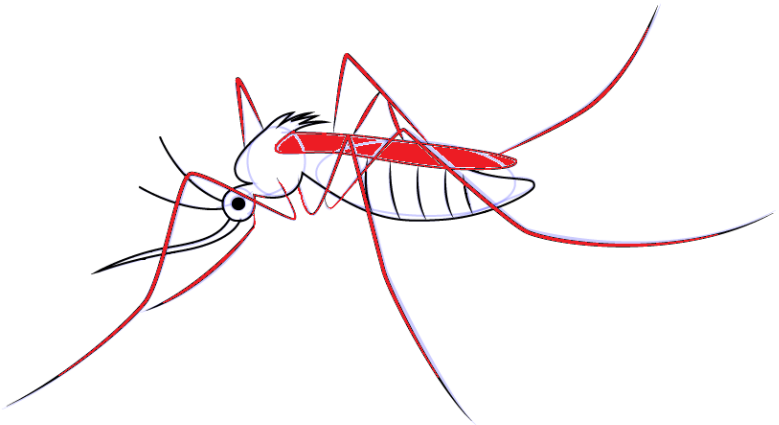
# Methods

- Starved ~3 day old female mosquitoes
- Housed in container
- [$10^5$ Plaque forming units/ml]
- Maintained 10/ 14 days post infection (d.p.i.)

# Dissection



Midgut: Infection



Legs and Wings: Dissemination

Saliva: Transmission

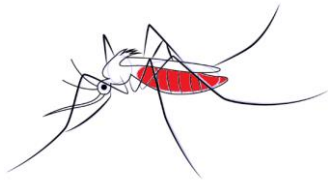
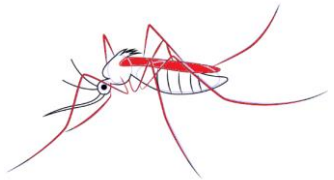
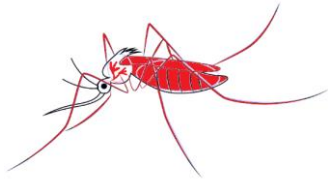
https://www.drawingtutorials101.com/drawing-tutorials/Animals/Insects/mosquito/how-to-draw-Mosquito-step-6.png

# Detection

- Legs/wings
- Mosquito induced to feed/salivate
- Whole body

- qRT-PCR
- Viral RNA amplified

Table 1. Infection, dissemination, transmission rates and efficiency for *Culex pipiens* orally fed ZIKV and reared at 28°C at 10 and 14 days post infection (d.p.i.). n= 50 after 10 d.p.i. and n= 32 after 14 d.p.i.

| | 10 d.p.i | 14 d.p.i |
|---|---|---|
| Infection rate (IR)  | 14.00% (7/50) | 3.10% (1/32) |
| Dissemination rate (DR)  | 14.29% (1/7) | 0% (0/1) |
| Transmission rate (TR)  | 100% (1/1) | 0% |
| Transmission efficiency (TE)  | 2.00% (1/50) | 0% |

https://www.drawingtutorials101.com/drawing-tutorials/Animals/Insects/mosquito/how-to-draw-Mosquito-step-6.png

# Discussion

- Vector competence of Canadian mosquitoes?
  - Niagara region Cx. *pipiens* likely poor vectors of ZIKV
  - 10 d.p.i. TE= 2.00% / 14 d.p.i. TE= 0.00%
- *Culex* mosquitoes probably poor vectors of ZIKV
  - *Cx. pipiens, Cx. tarsalis, and Cx. quinquefasciatus*
- Other species of *Culex* mosquitoes may play role

(Aliota *et* al., 2016; Amraoui *et al*., 2016; Boccolini *et al*., 2016; Evans et al., 2016; *Fernandes et al*., 2016; Huang *et al*., 2016; Weger-Lucarelli *et al*., 2016).

# Conclusion

- Niagara region Cx. *pipiens* likely poor vectors of ZIKV
- Does not negate all *Culex* mosquitoes
- *Aedes aegypti* and *Aedes albopictus* may complicate issue

# Questions?

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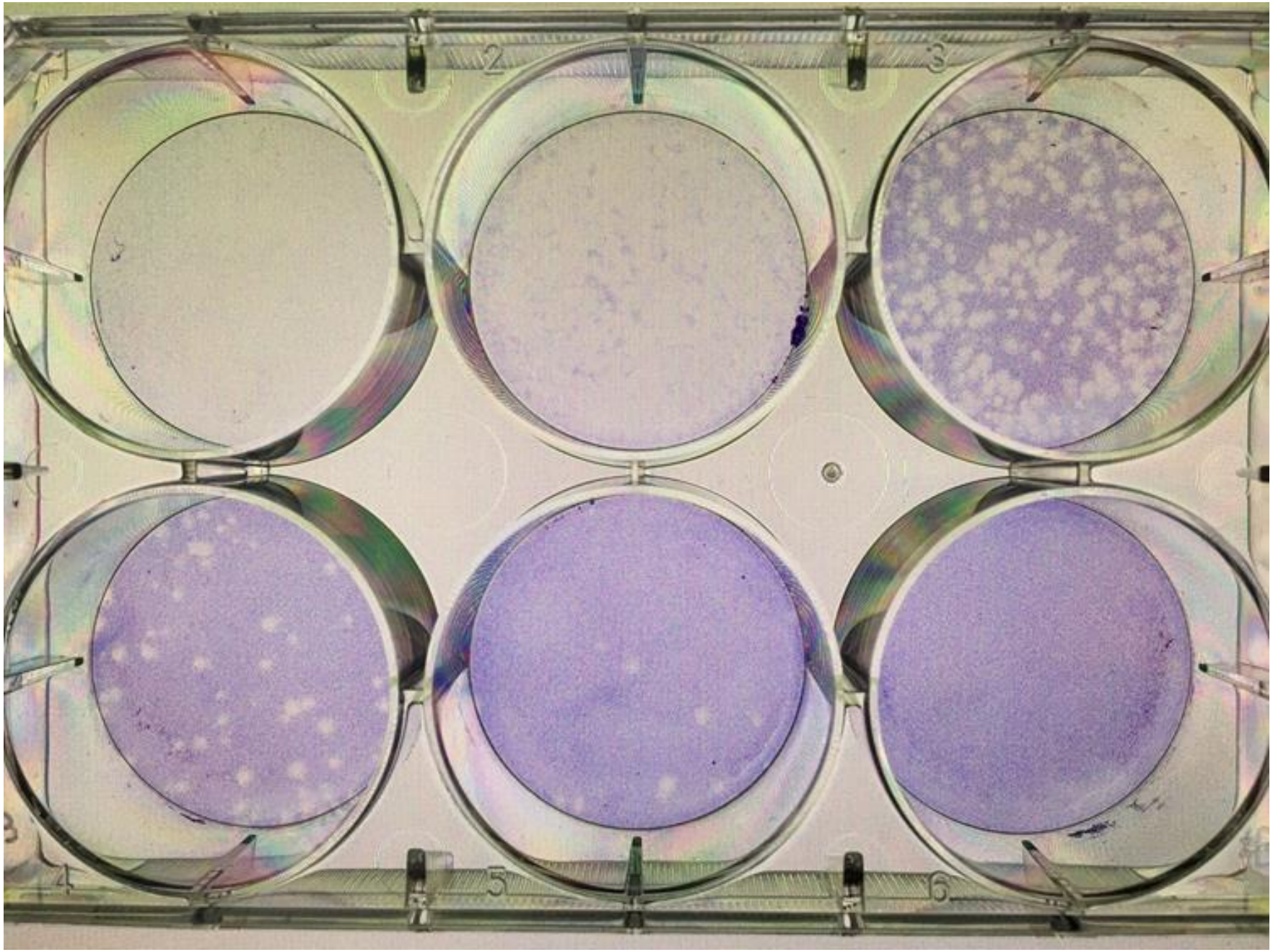
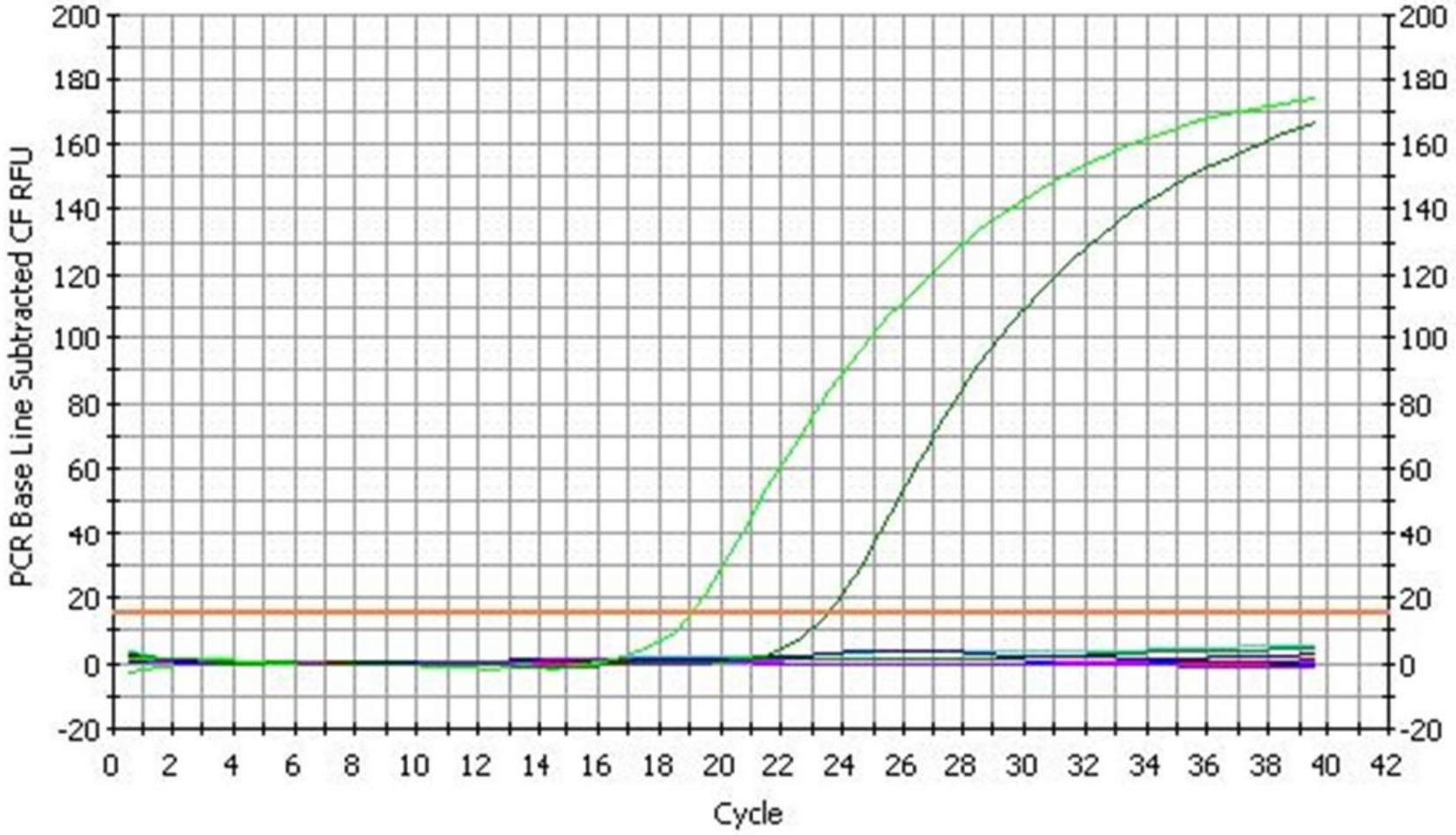


PFU=

avg. # plaques/
(DF x Volume of Inoculum)




| Well | Identifier | Ct |
|---|---|---|
| A02 | | N/A |
| A03 | | N/A |
| A04 | | N/A |
| A05 | | N/A |
| A06 | | N/A |
| A07 | | N/A |
| A08 | | N/A |
| A09 | | N/A |
| H08 | | 19.03 |
| H09 | | 23.54 |