

Immunity, outside the immune system

Seth Baribeau

LIFE322

sethb@liv.ac.uk

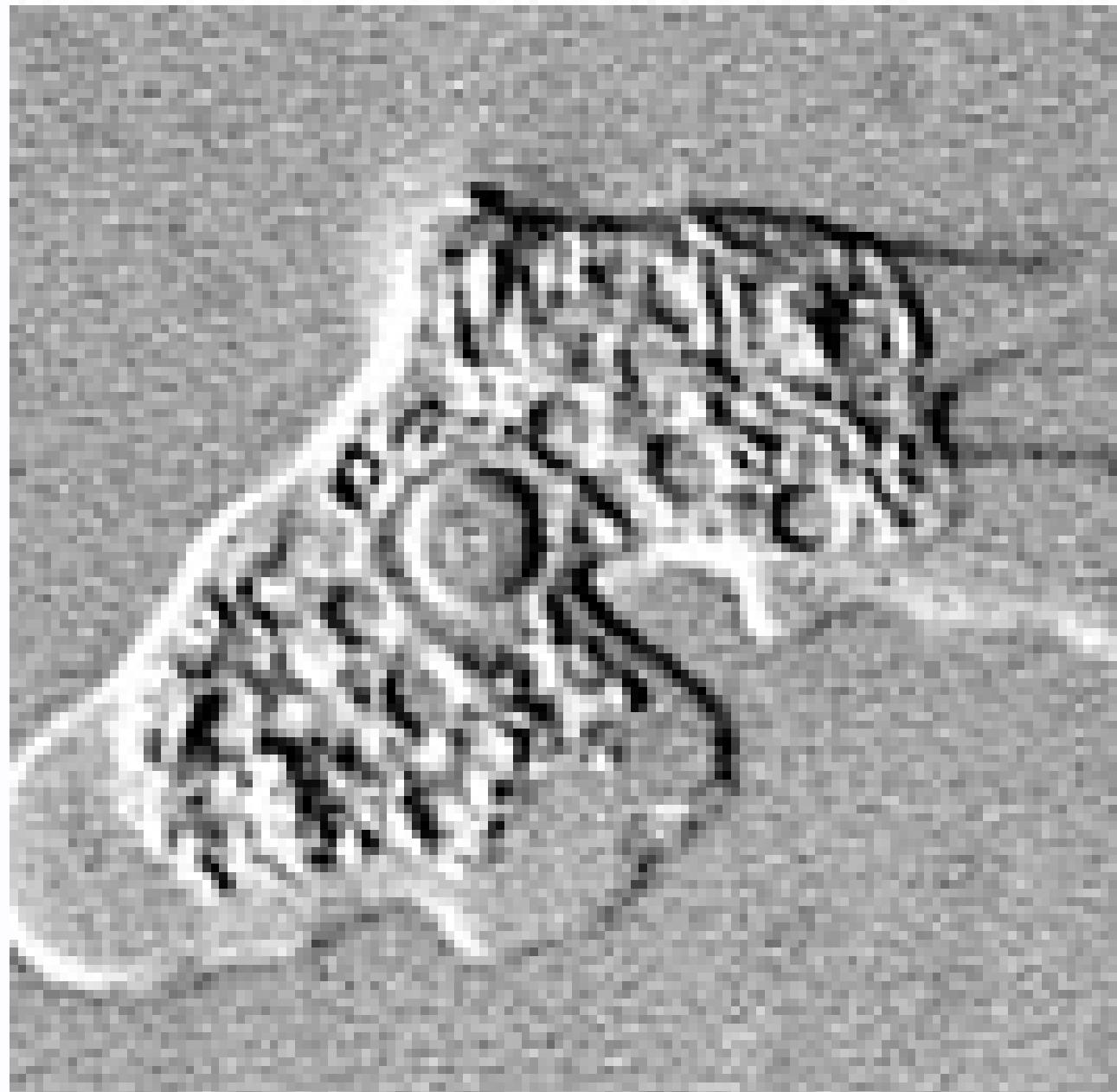
Pathogens and parasites are everywhere



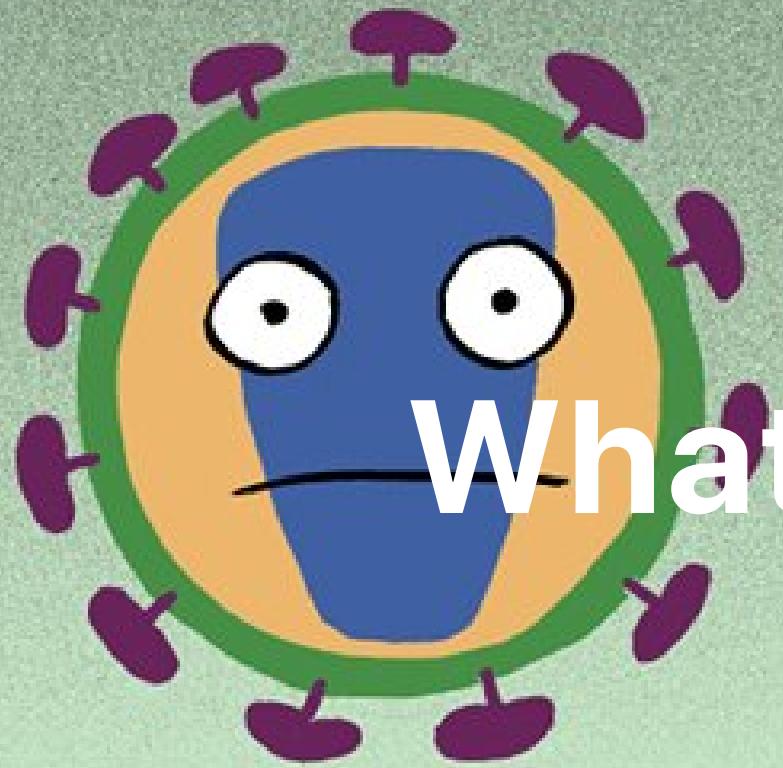
Pathogens and parasites are everywhere



Pathogens and parasites are everywhere



What is a parasite?



VIRUS

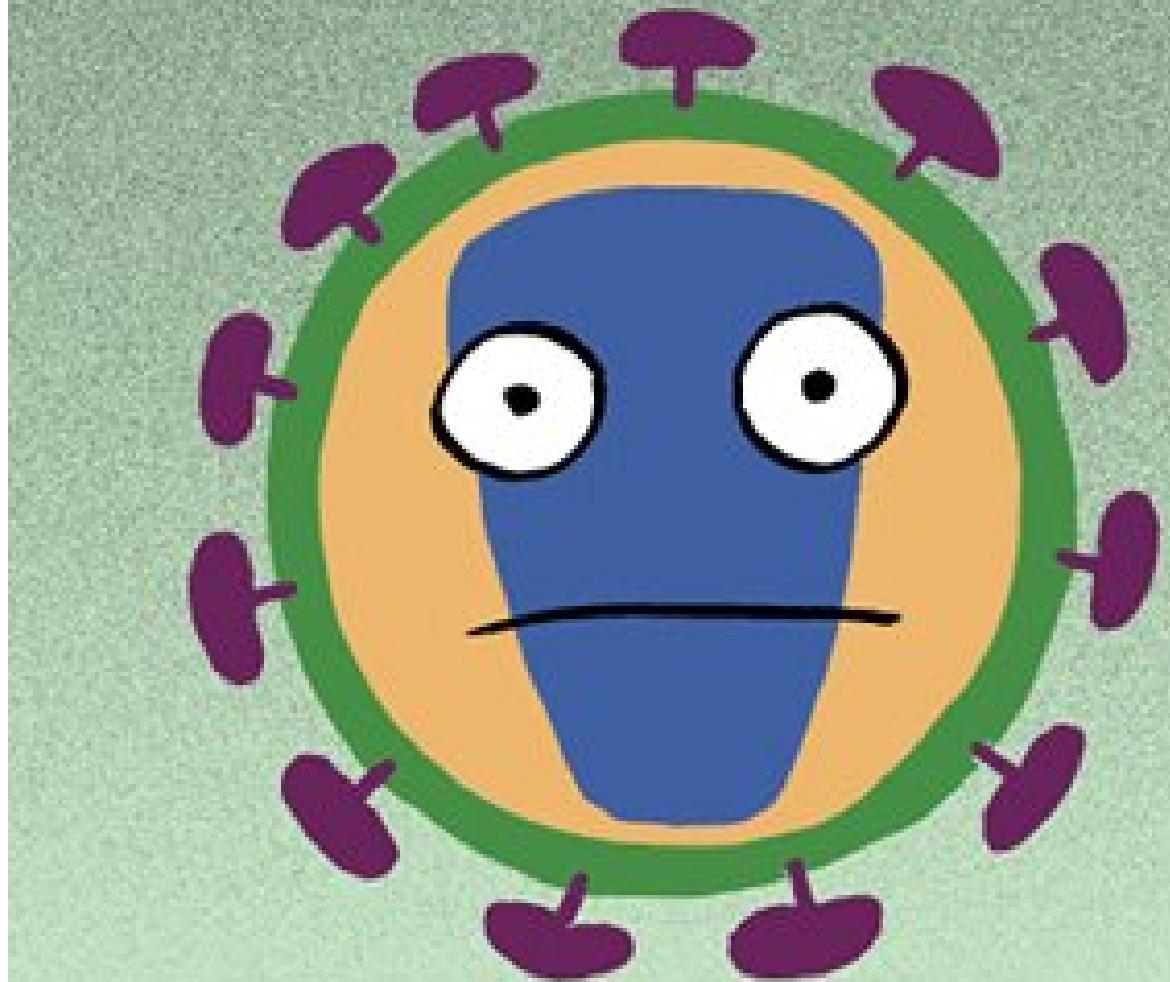


RETOVIRUS

What is a parasite?

What is a parasite?

- Takes resources at its host expense
- Causes damage



VIRUS

- Immune manipulation & evasion
- Nausea, vomiting
- Constipation
- Indigestion & Heartburn
- Depression & Anxiety
- Fatigue
- Bloating & Weight gain
- Insomnia
- Frequent urination
- Diabetes

- Immune manipulation & evasion
- Nausea, vomiting
- Constipation
- Indigestion & Heartburn
- Depression & Anxiety
- Fatigue
- Bloating & Weight gain
- Insomnia
- Frequent urination
- Diabetes



What is a parasite?

“Life is a sexually transmitted disease and the mortality rate is one hundred percent.

R. D. Laing

What is a parasite?

SCIENTIFIC AMERICAN™

[Sign In](#) | [Register](#)  0



[Subscribe](#)

[News & Features](#)

[Topics](#)

[Blogs](#)

[Videos & Podcasts](#)

[Education](#)

[Citizen Sci](#)

Mind & Brain » Mind Matters

83 :: [Email](#) :: [Print](#)

Scientists Discover Children's Cells Living in Mothers' Brains

The connection between mother and child is ever deeper than thought

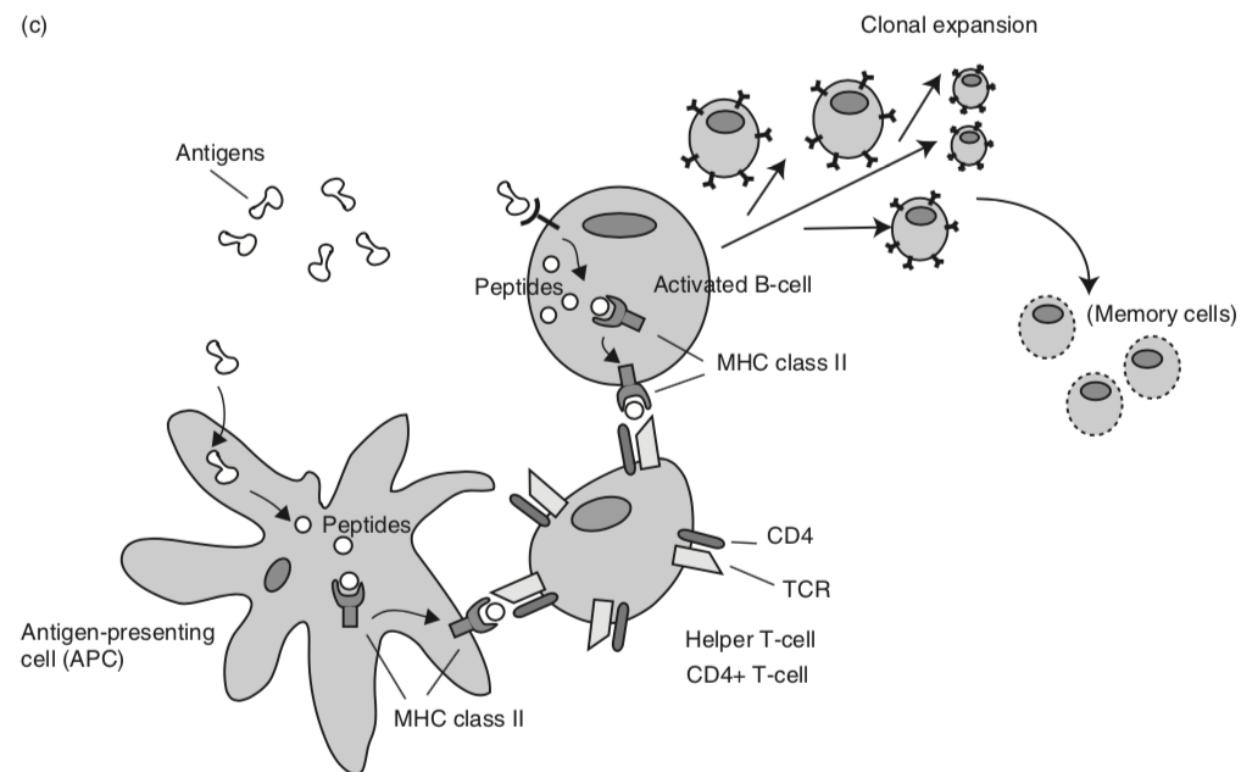
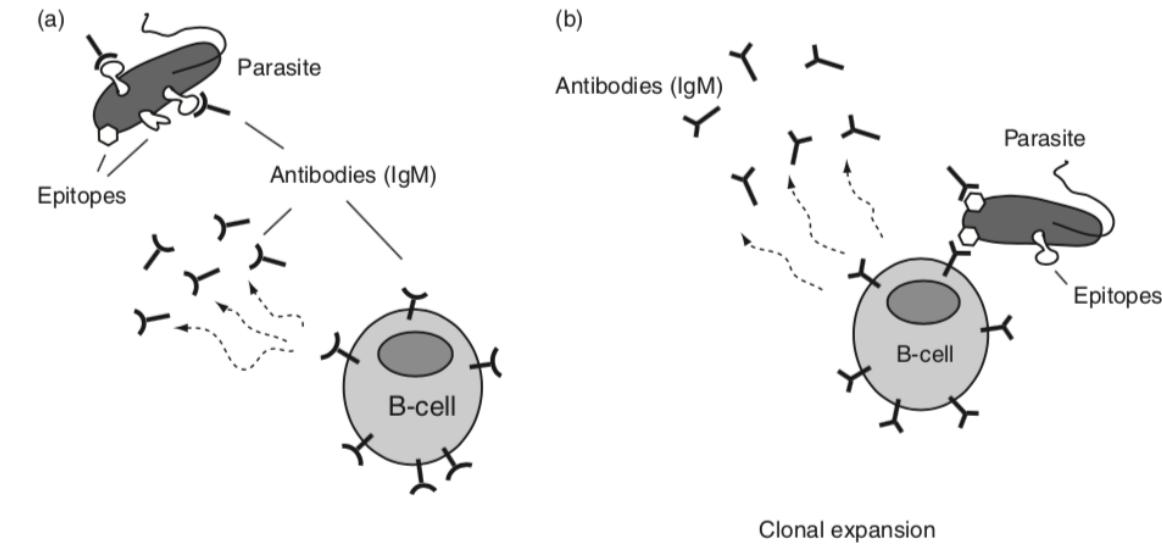
December 4, 2012 | By [Robert Martone](#)

The link between a mother and child is profound, and new research suggests a physical connection even deeper than anyone thought. The profound psychological and physical bonds shared by the mother and her child begin during gestation when the mother is everything for the developing fetus, supplying warmth and sustenance, while her heartbeat provides a

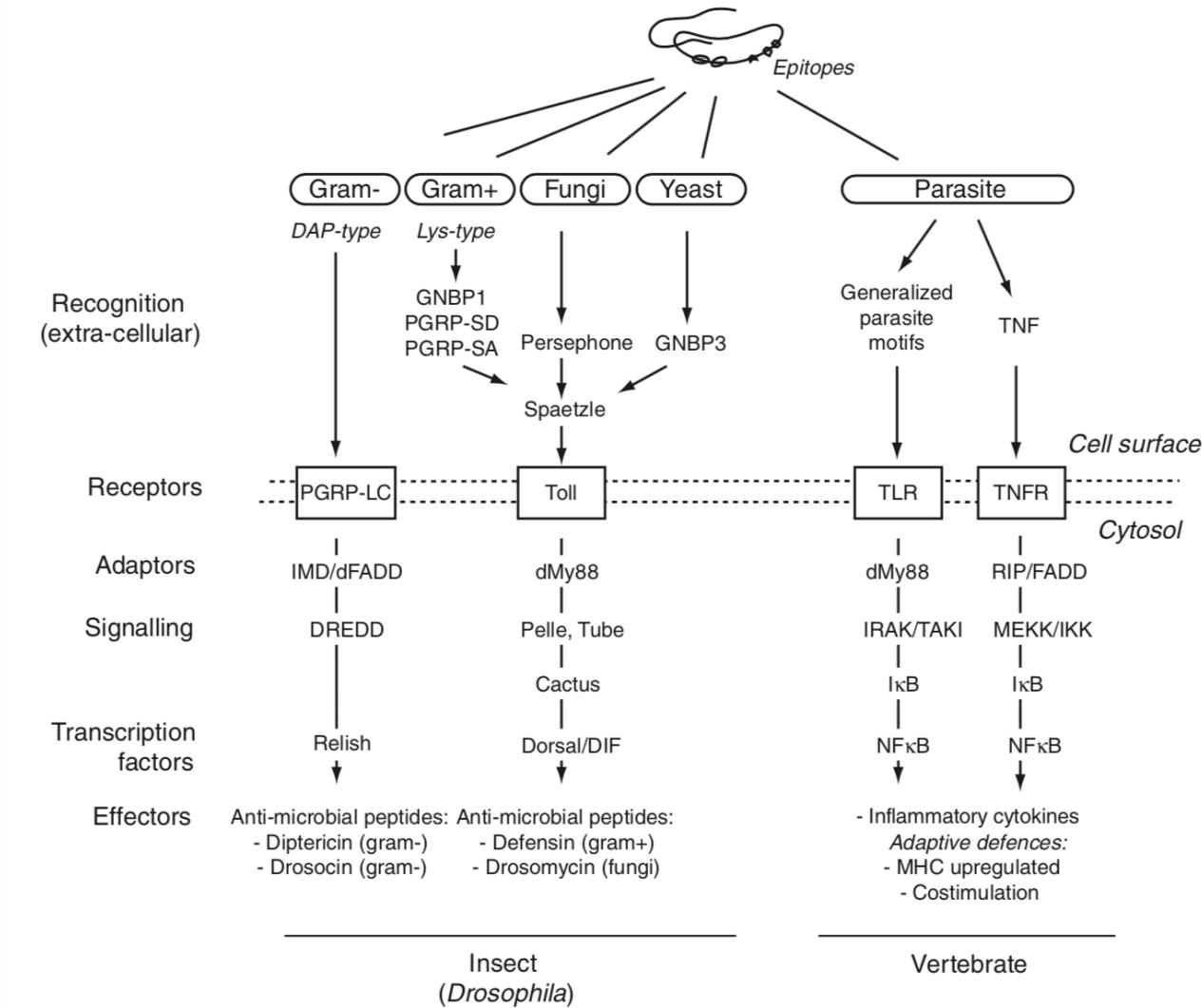


What is the immune system?

What is the immune system?

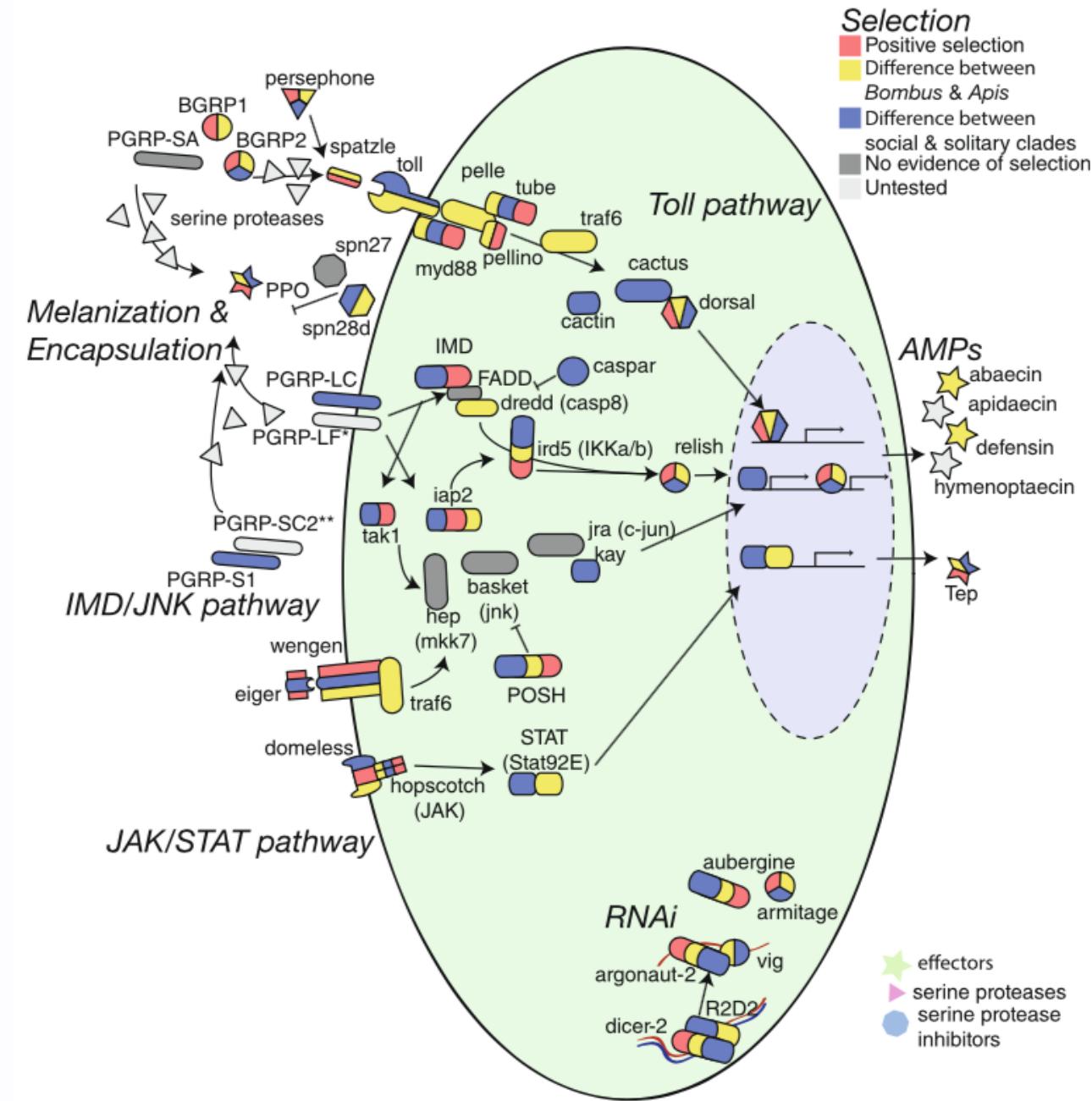


What is the immune system?



Immune systems evolve fast

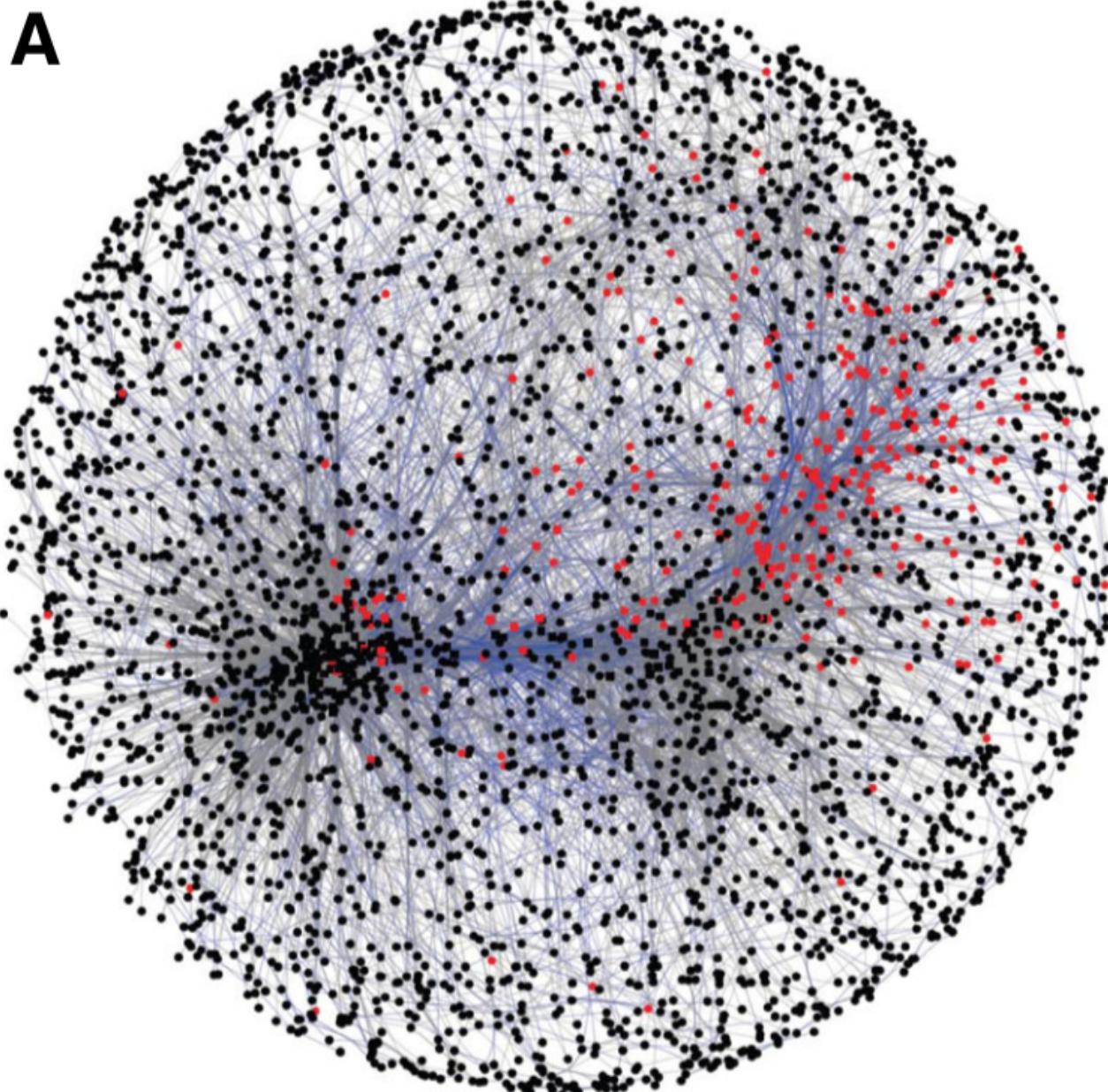
- At least, parts of them

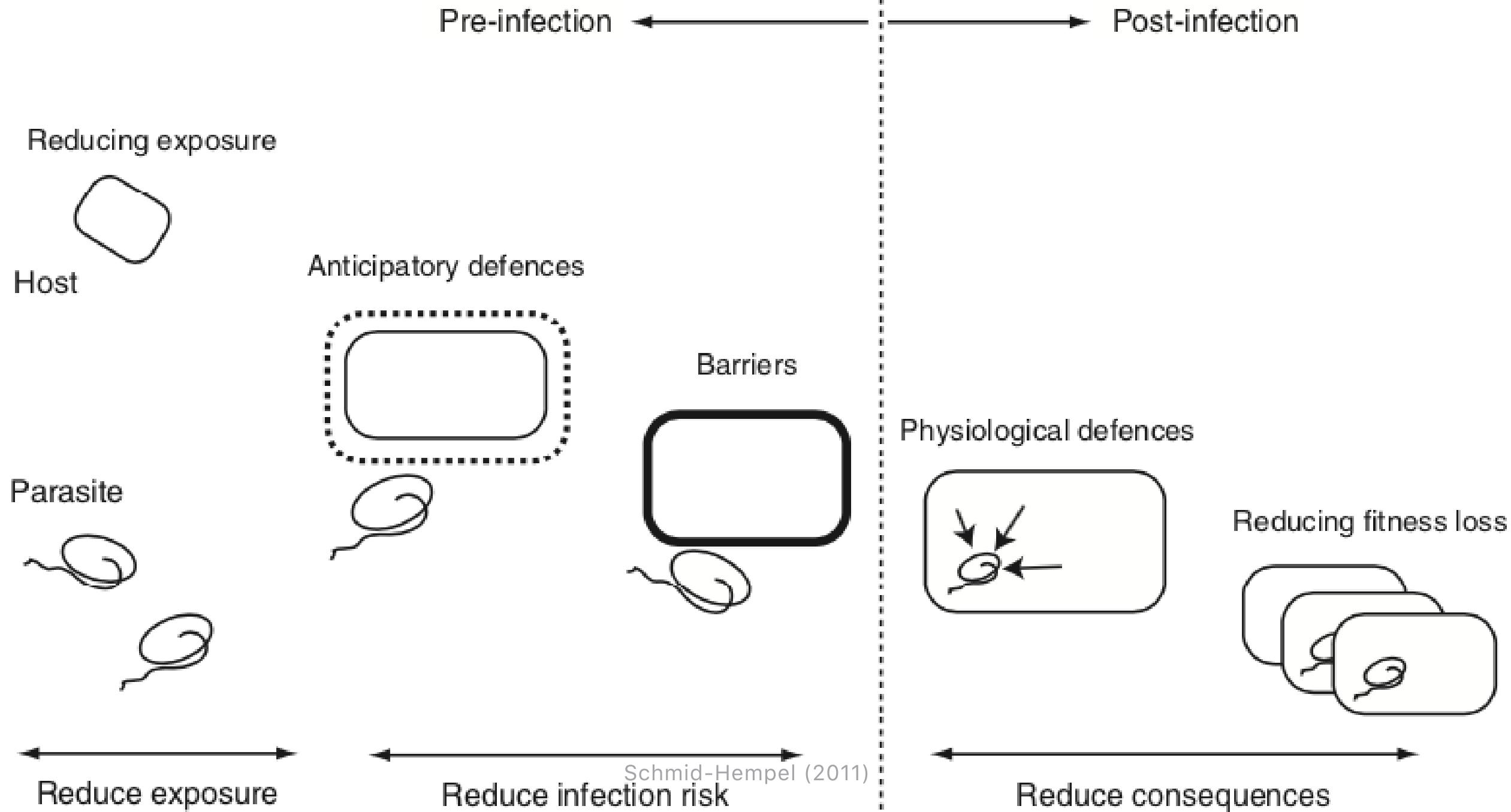


Is that all there is to immunity?

Is that all there is to immunity?

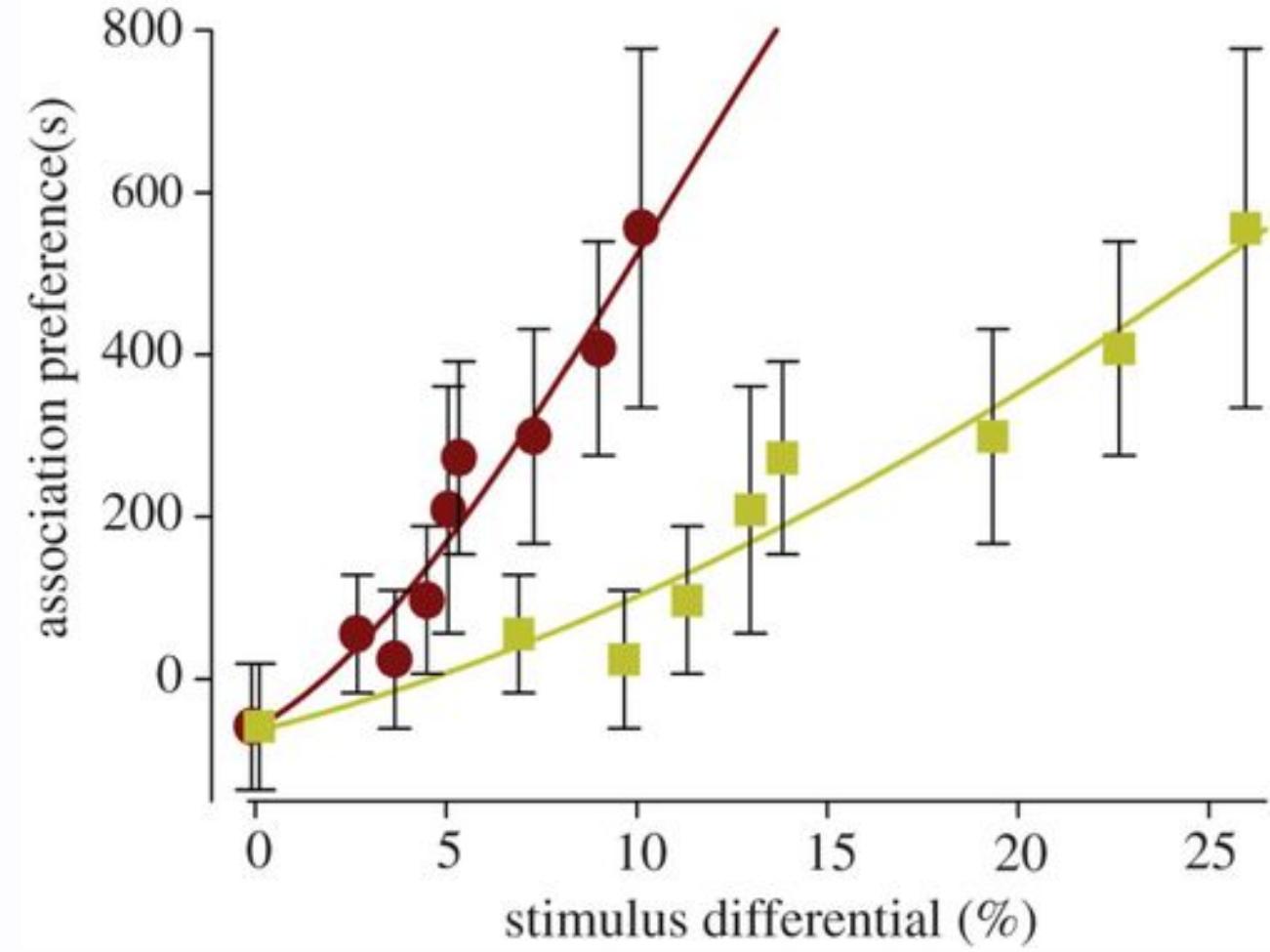
- Nope

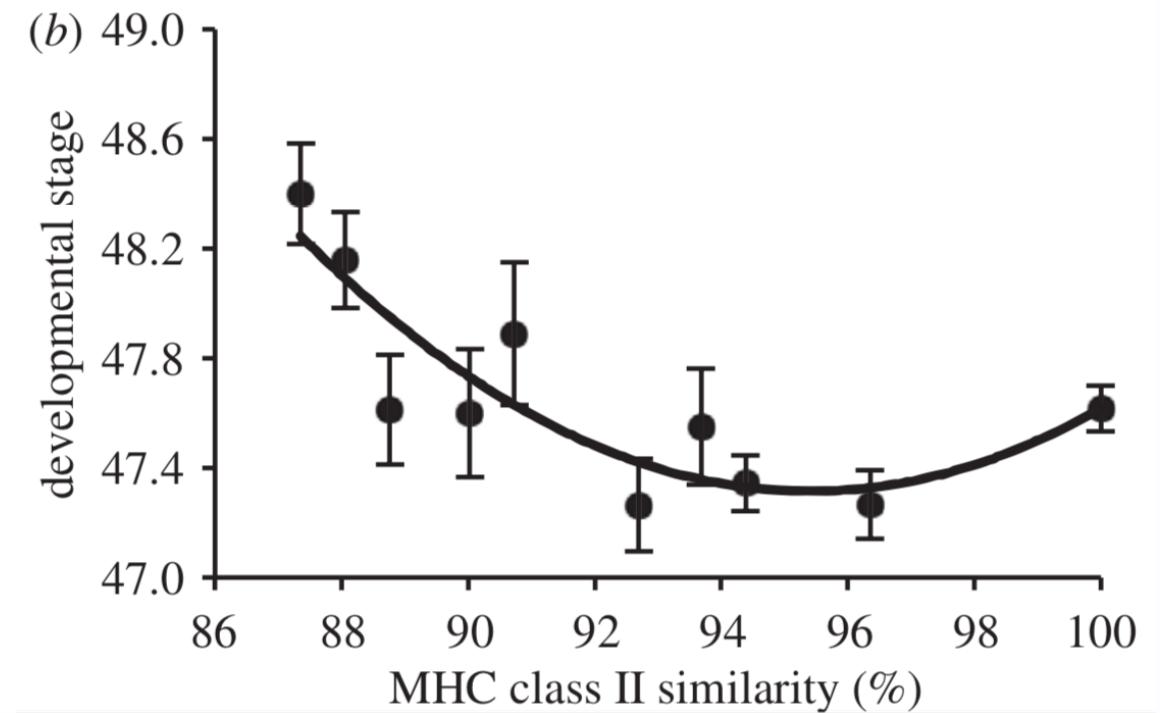
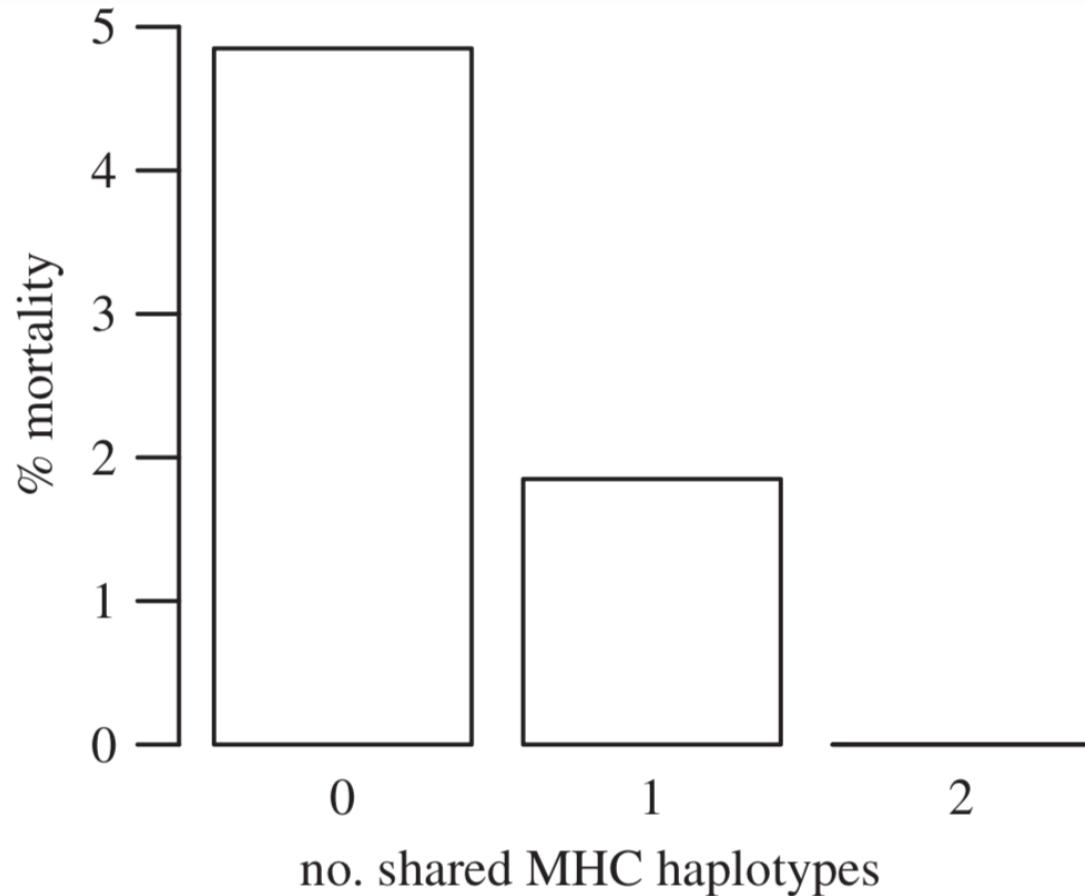




Pre-Infection

Associations



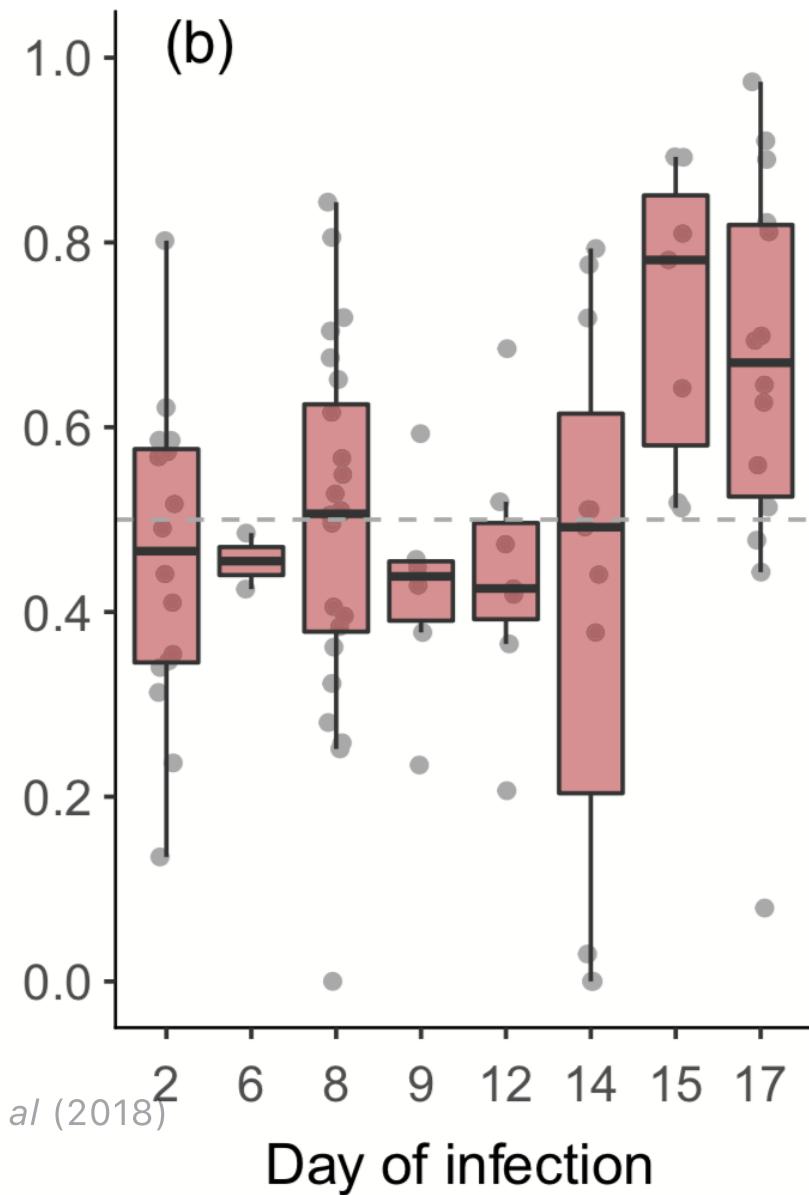
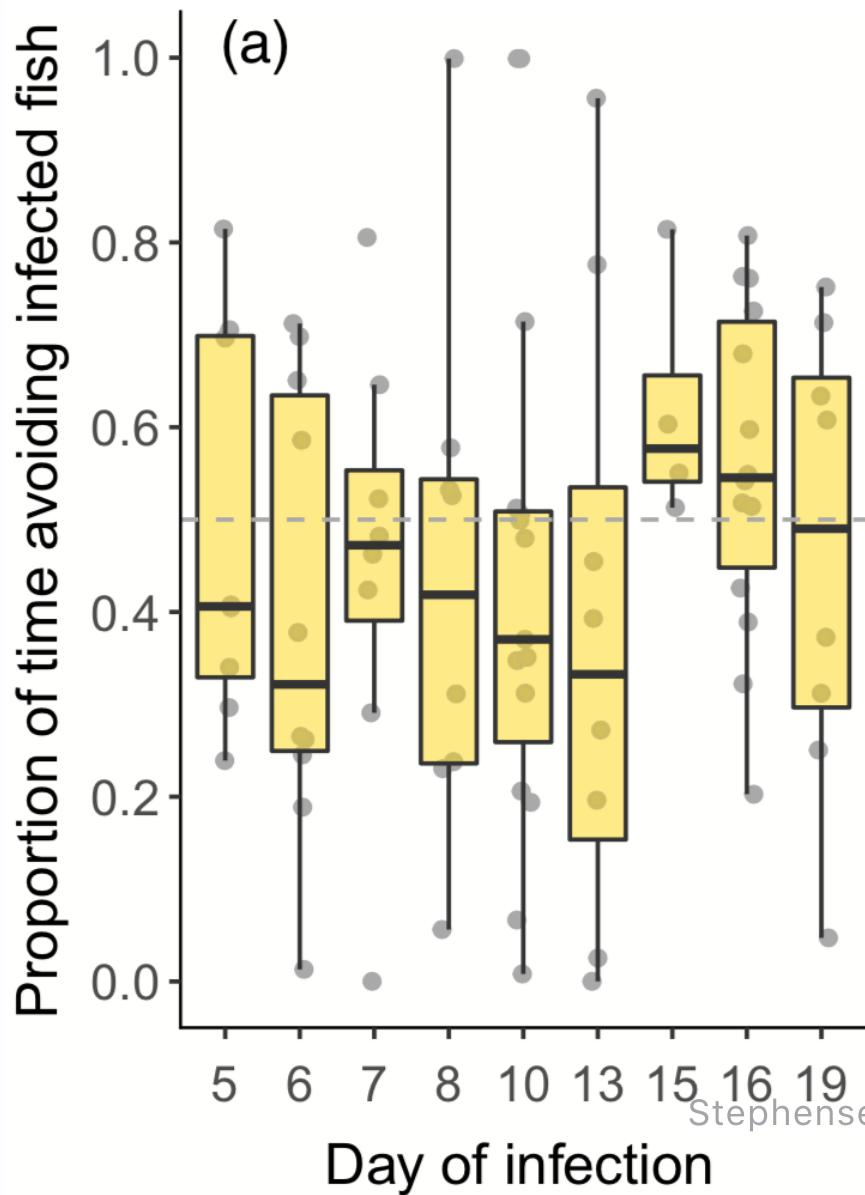


Associations

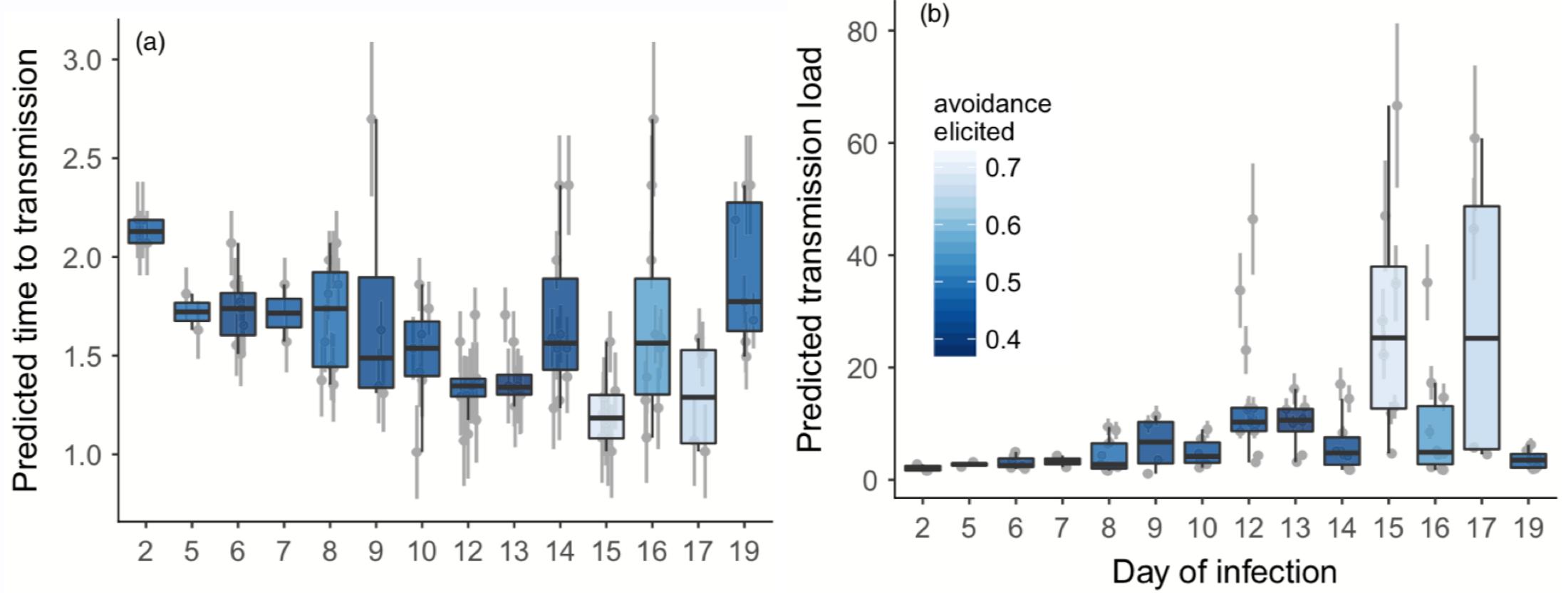


Stephensen et al (2018), image: Joanne Cable

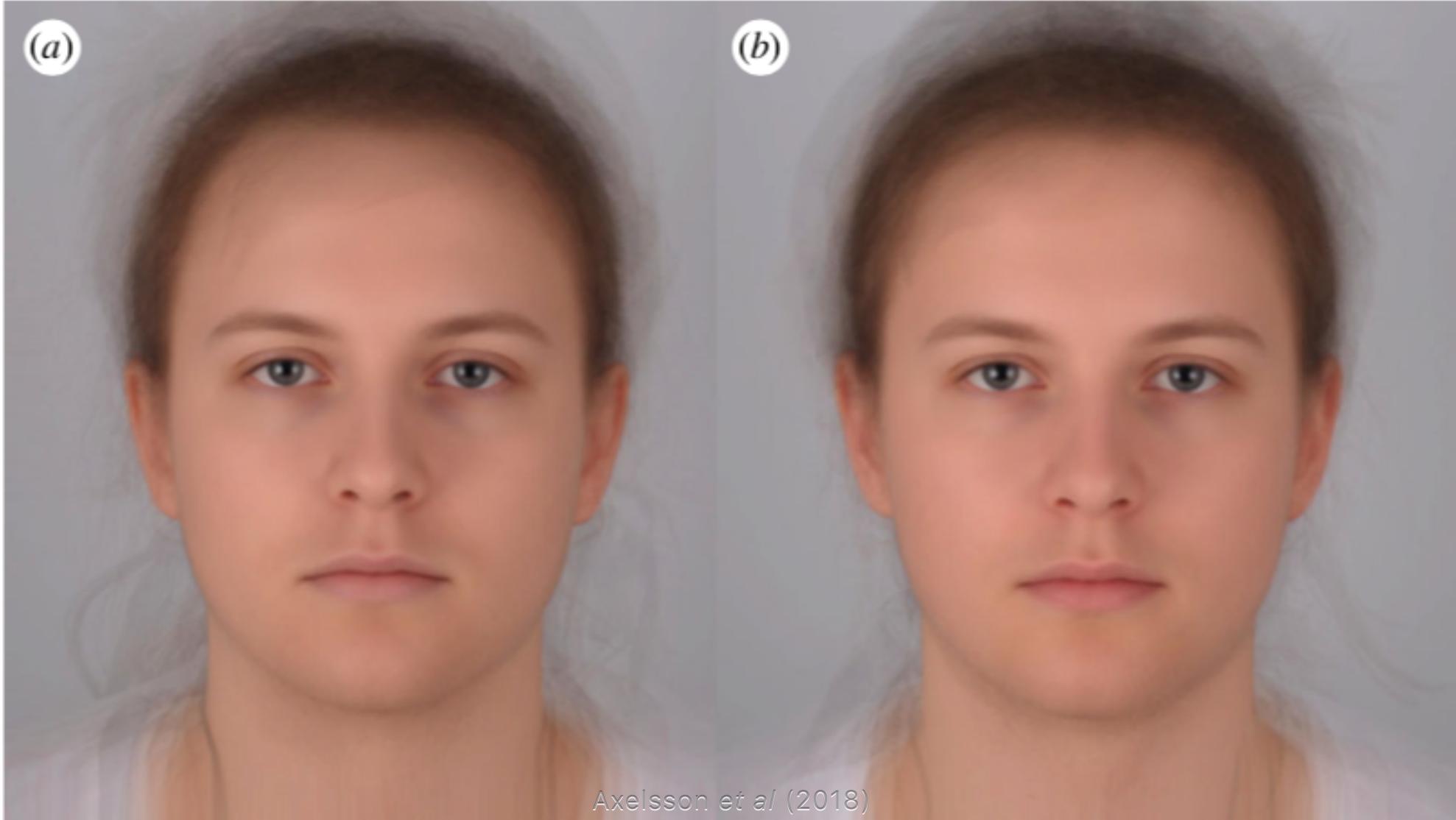
Avoidance



Avoidance

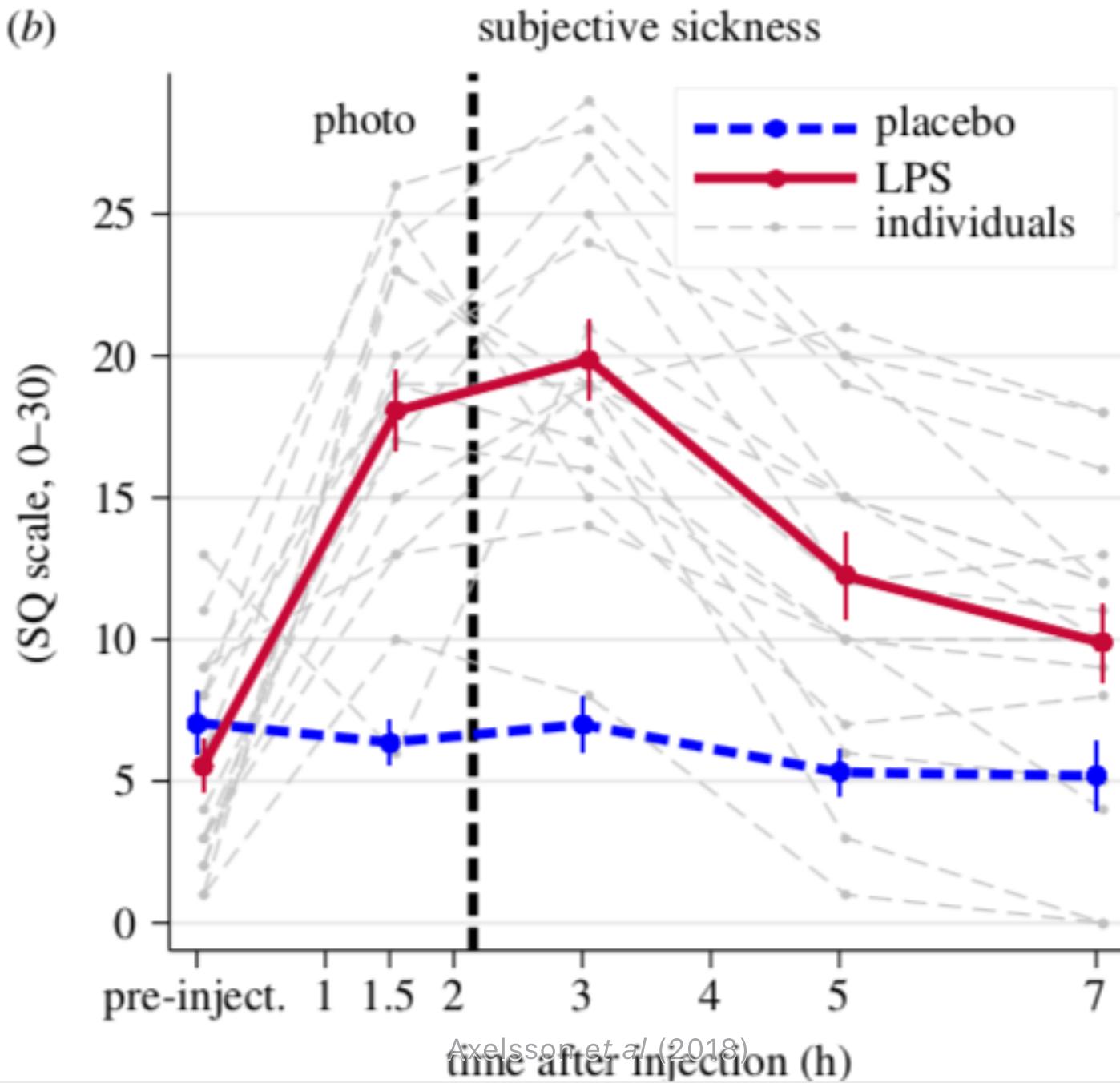


Avoidance

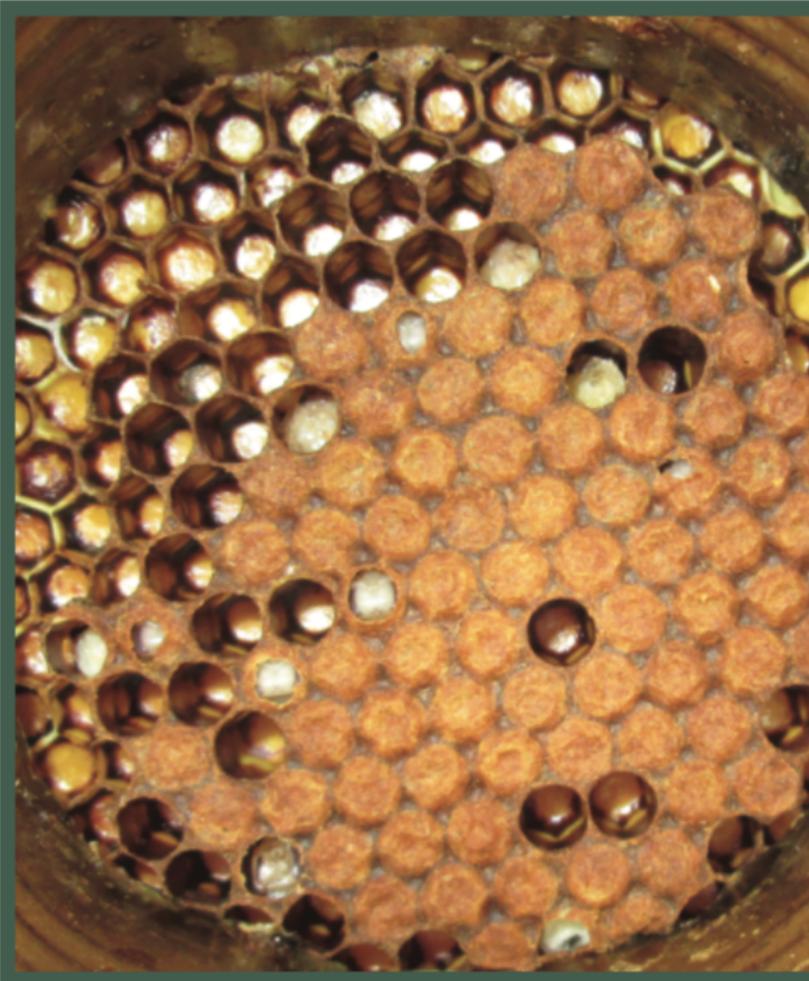


Axelsson et al (2018)

(b)

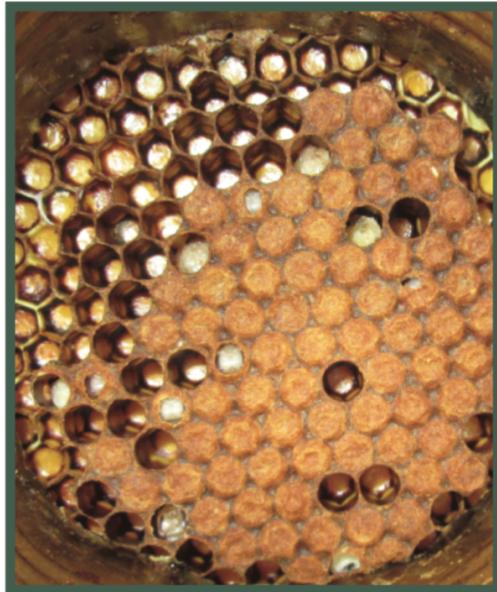


Hygiene

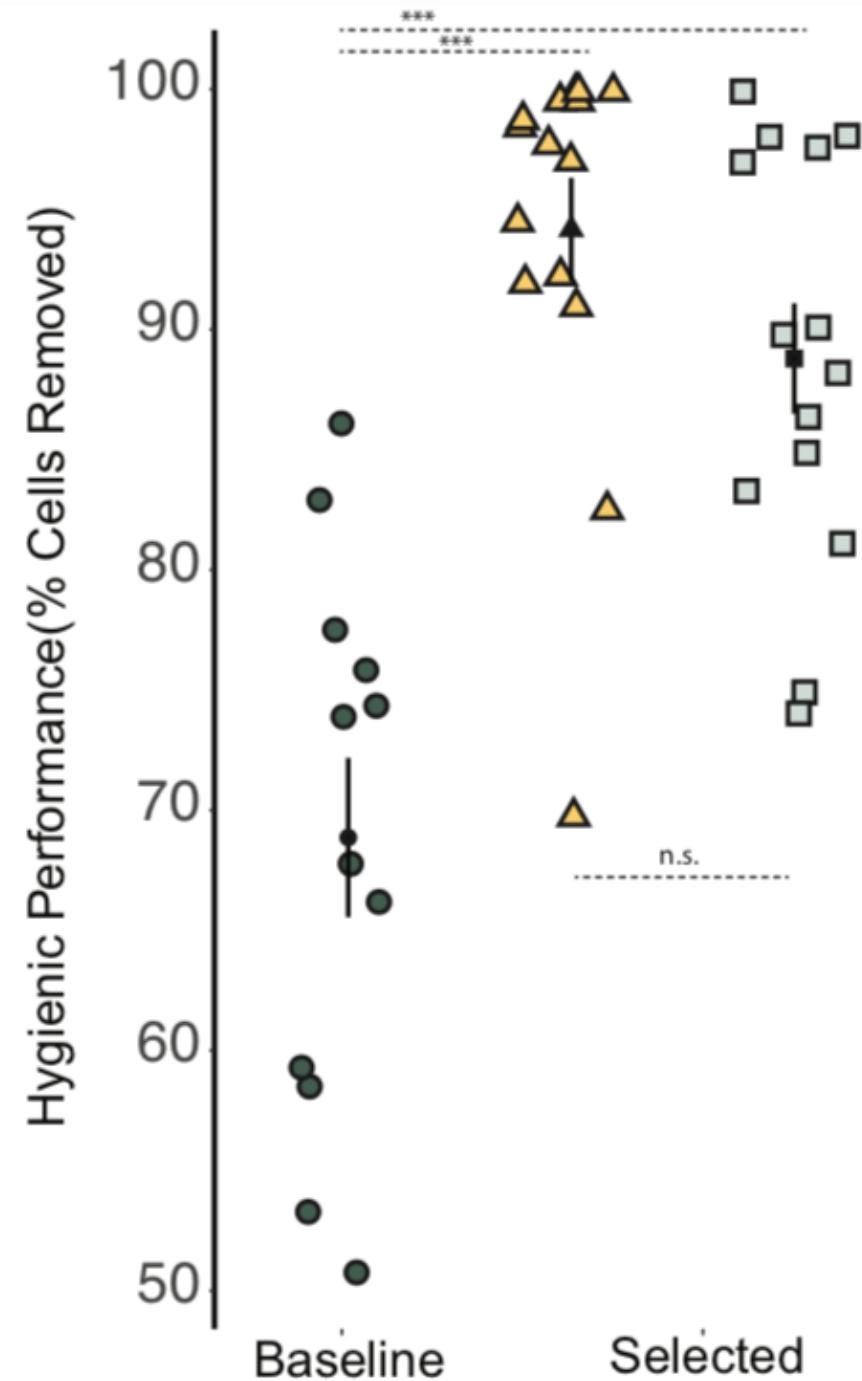


Harpur et al (2019)

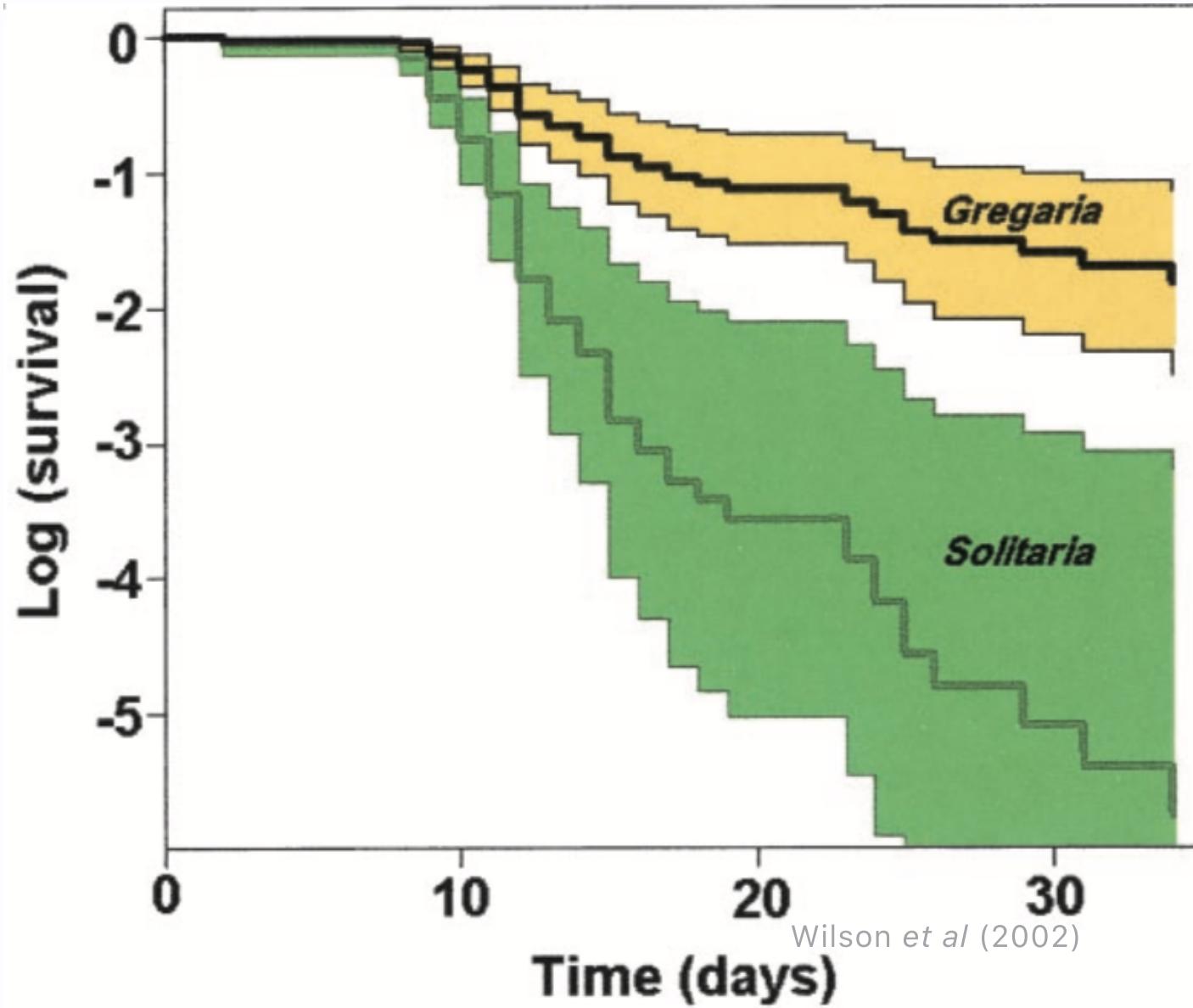
Hygiene



Harpur et al (2019)



Anticipatory Defenses



Prophylaxis

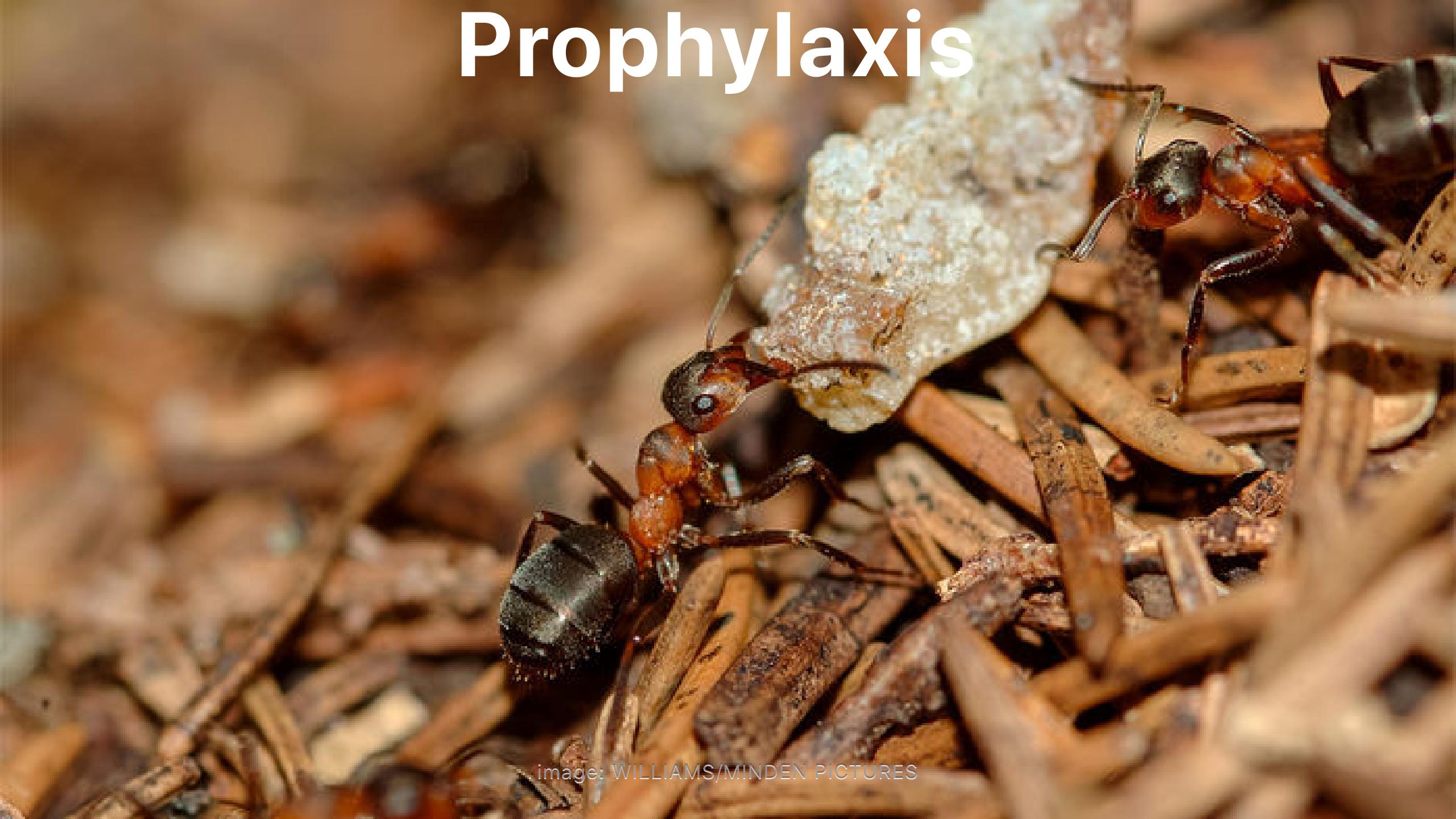
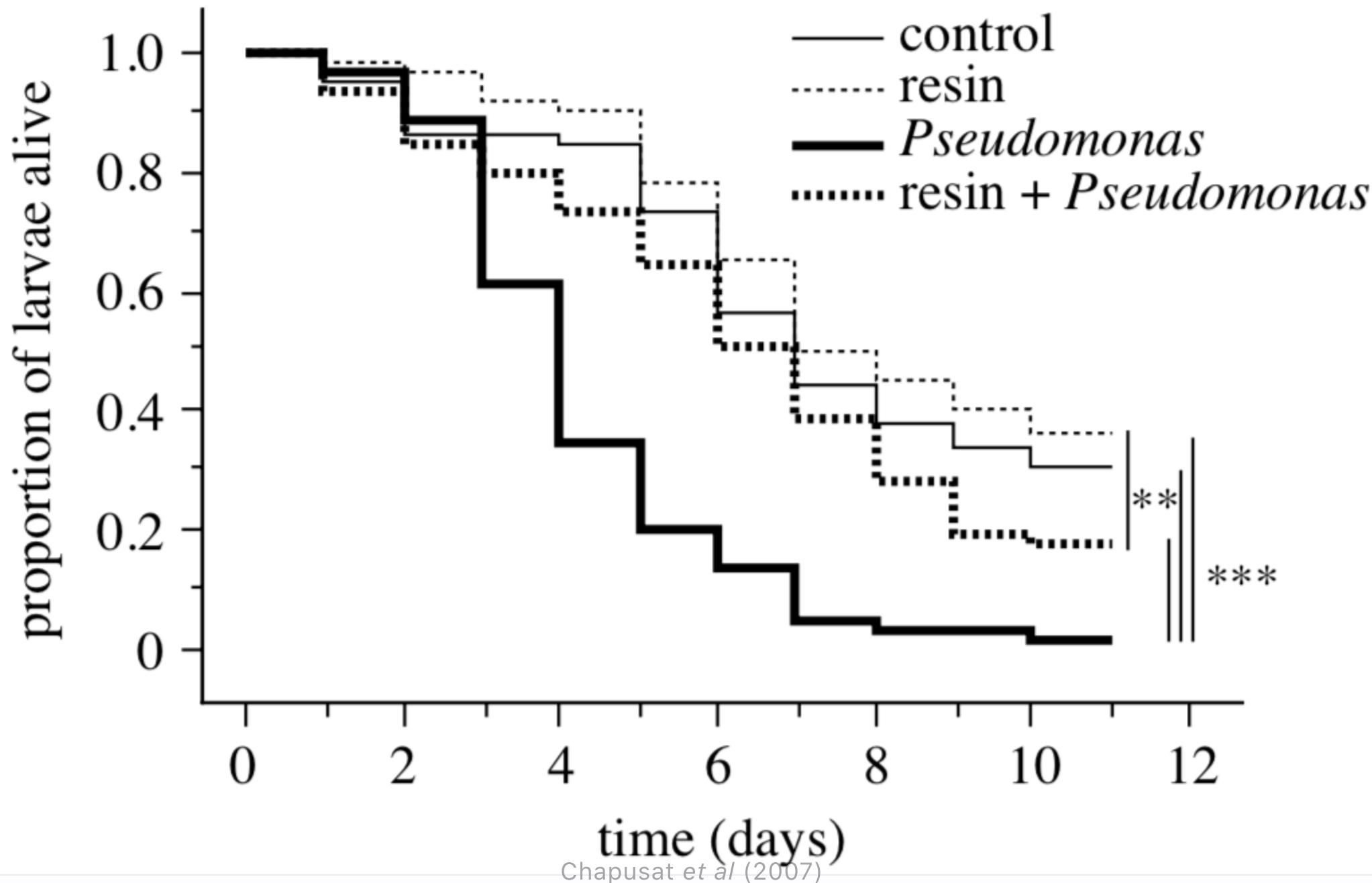


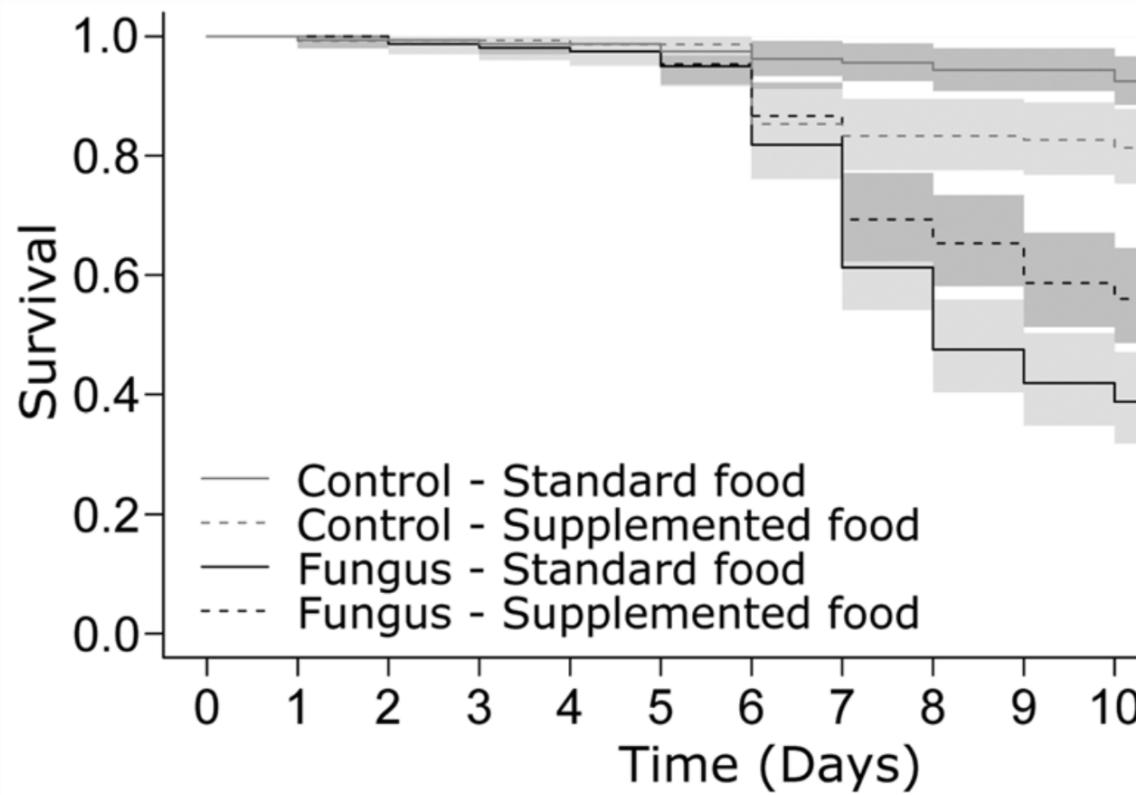
image: WILLIAMS/MINDEN PICTURES



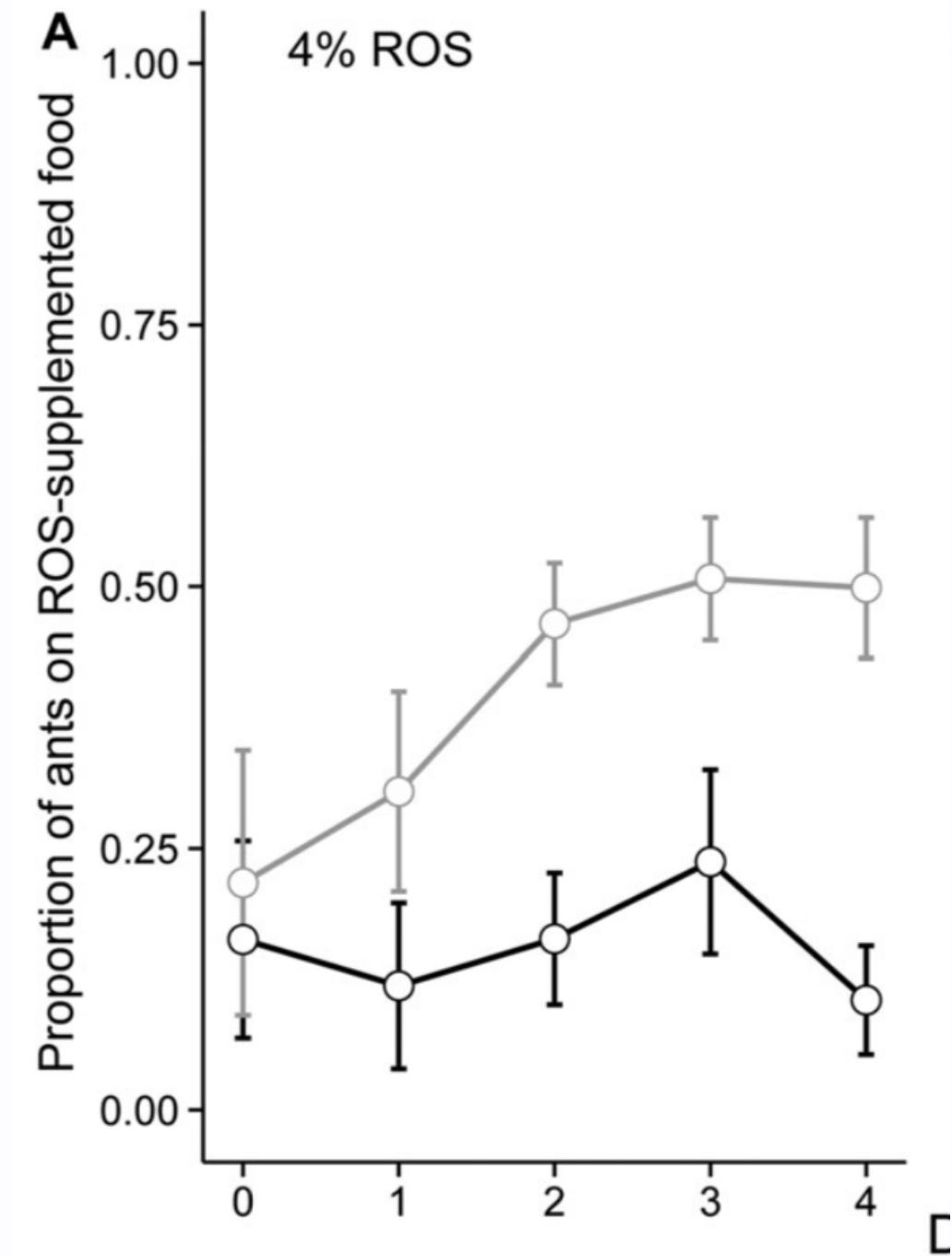
Chapusat et al (2007)

Post-Infection

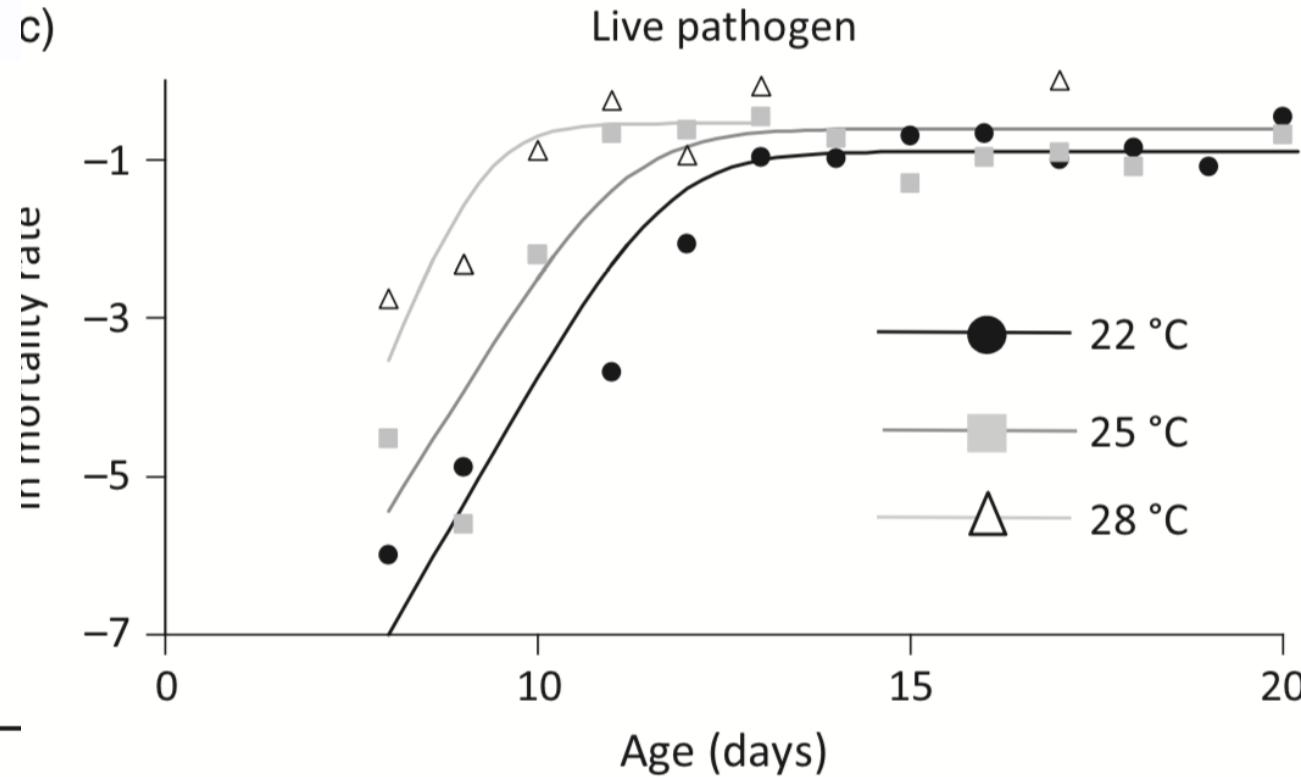
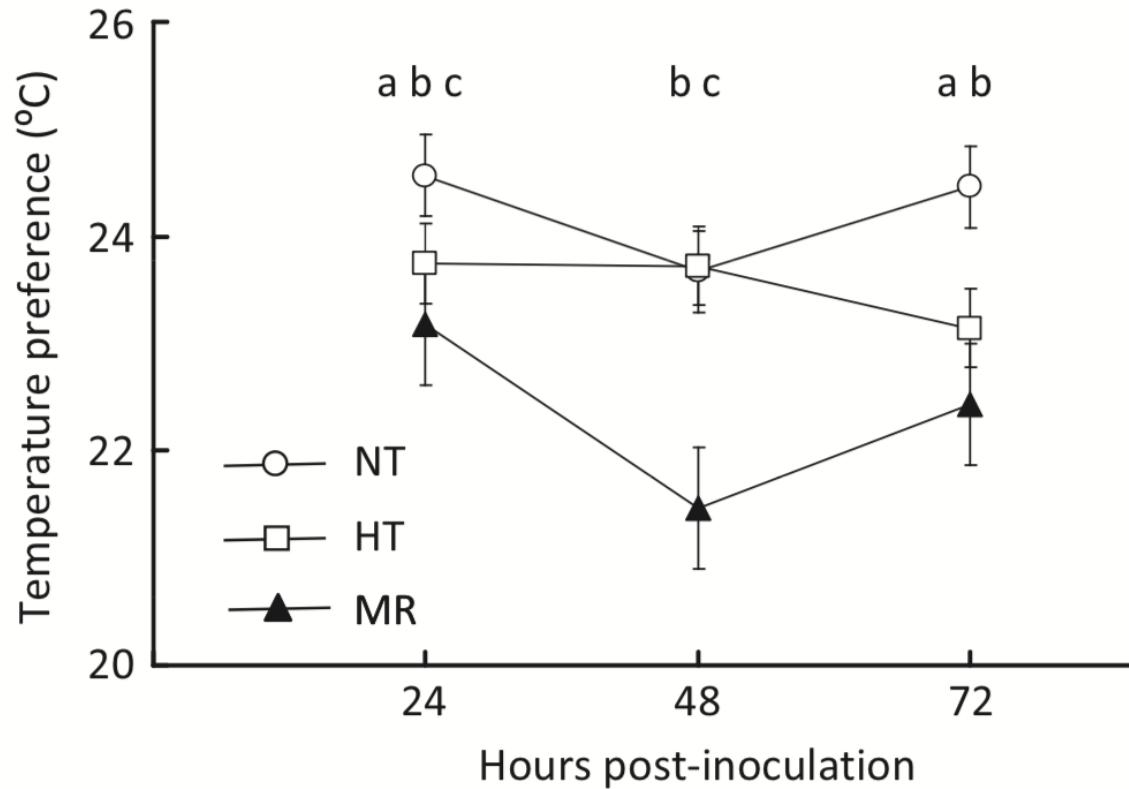
Therapeutic self-medication



Bos et al. (2015)

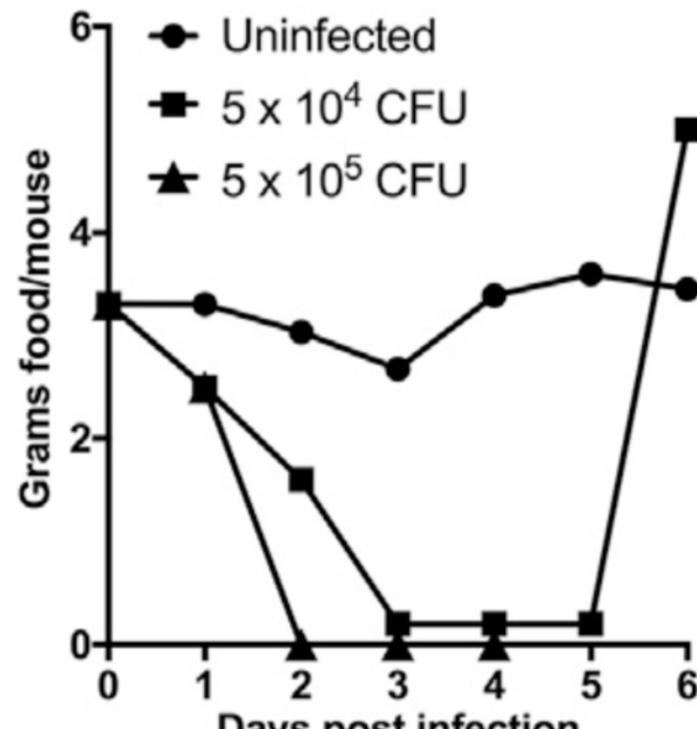


Behavioural Thermoregulation



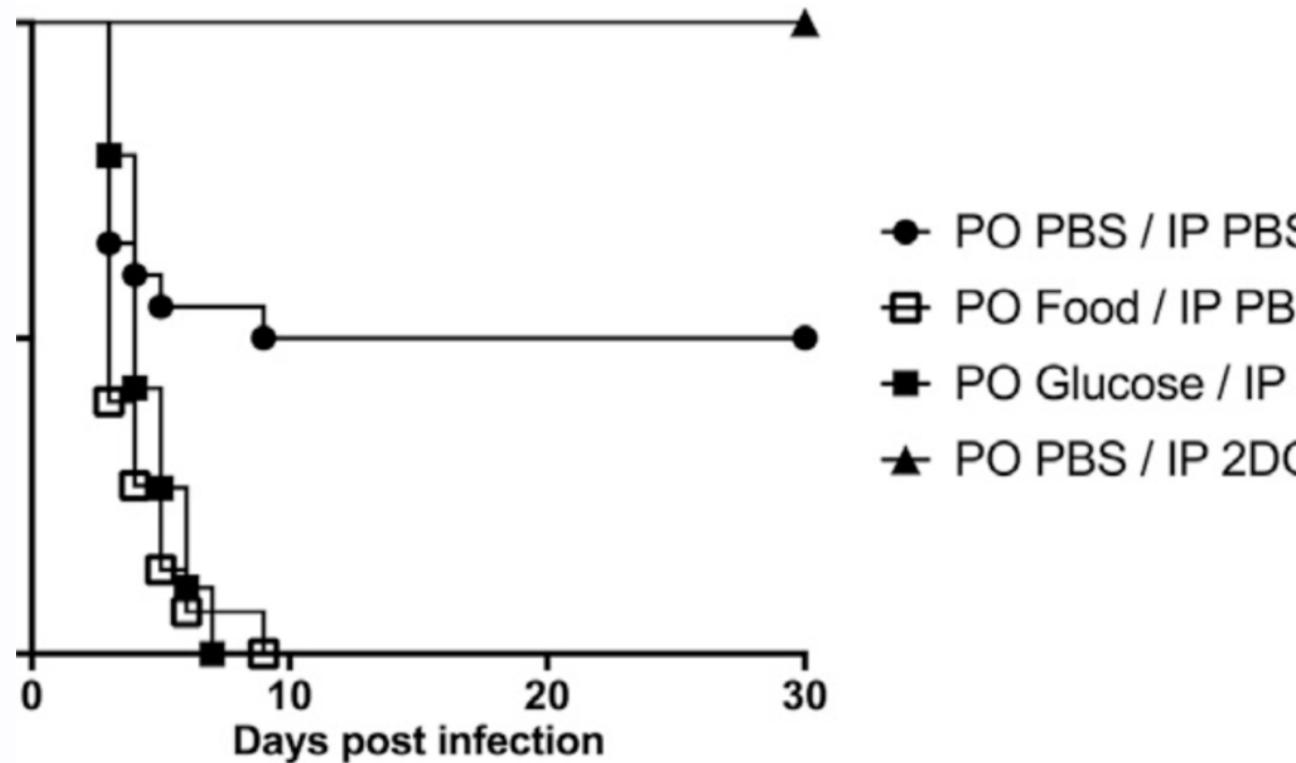
Anorexia

A Food Consumption after Listeria Infection



Wang et al. (2016)

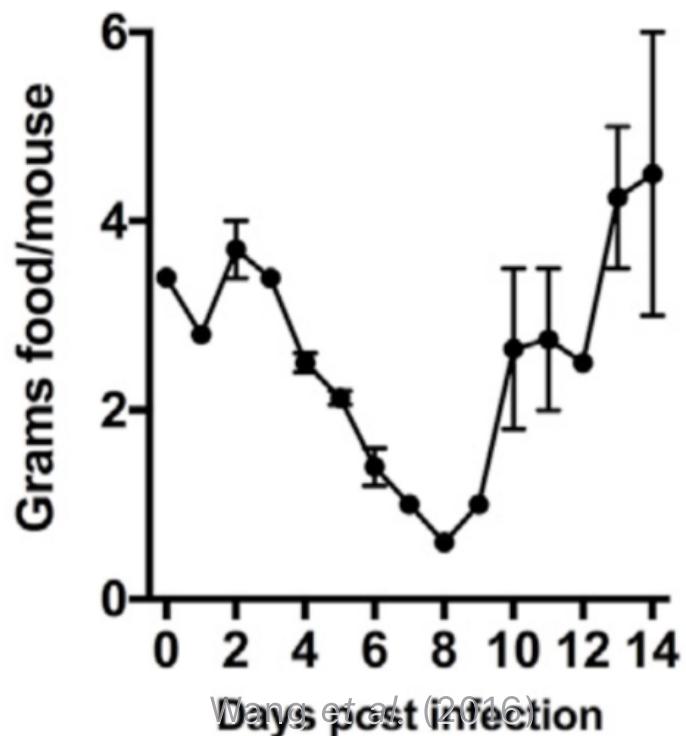
5×10^4 CFU Listeria Survival



Anorexia

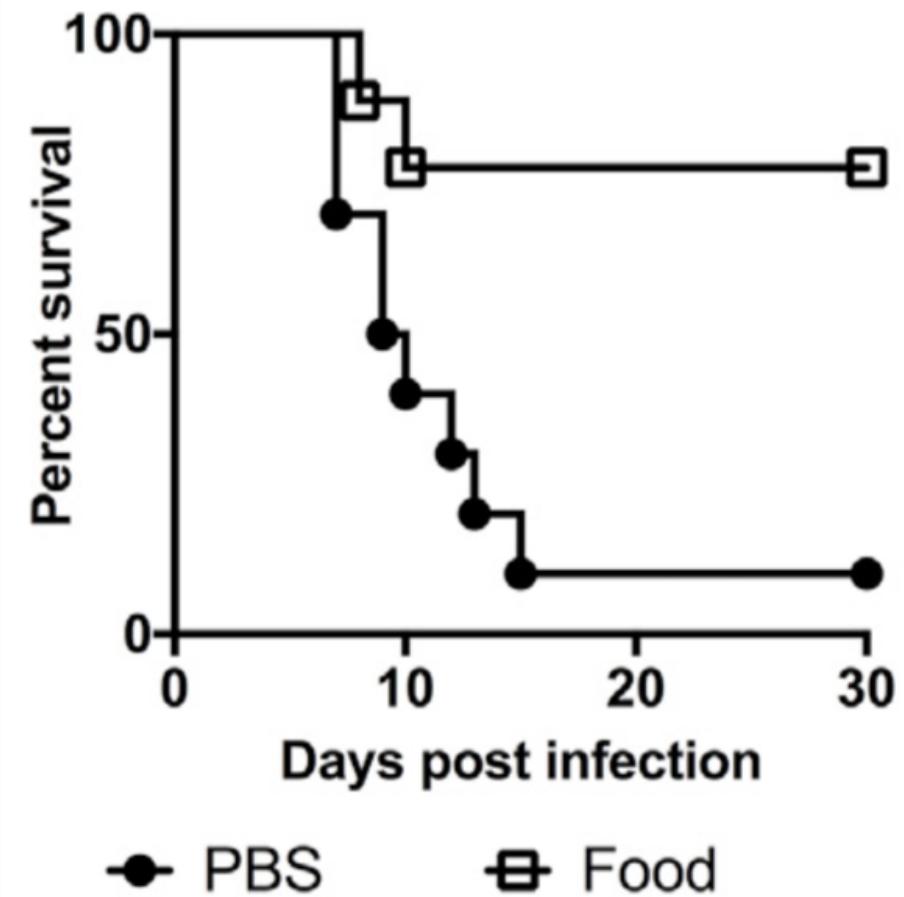
A

Food Consumption
after Influenza Infection



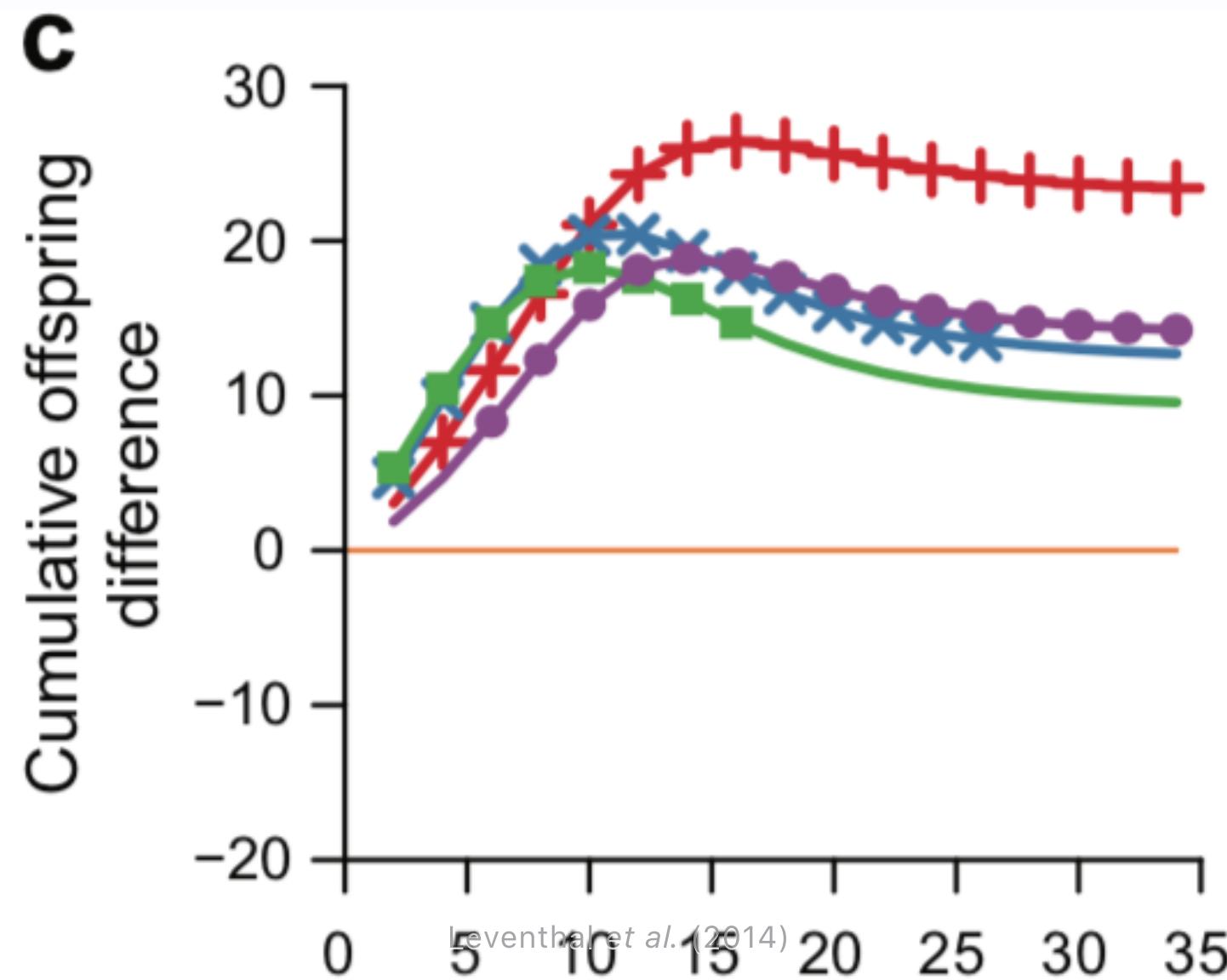
B

Influenza Survival:
Food Gavage



Wang et al (2016)

Fecundity Compensation



Questions

- If involved in immunity, are these 'non-immune' defenses also coevolving with parasites?

Questions

- If involved in immunity, are these 'non-immune' defenses also coevolving with parasites?
 - TBD

Questions

- If involved in immunity, are these 'non-immune' defenses also coevolving with parasites?
 - TBD
- How can we tell if they're adaptive?

Questions

- If involved in immunity, are these 'non-immune' defenses also coevolving with parasites?
 - TBD
- How can we tell if they're adaptive?
- Is there variation in these traits and if so, how is it maintained?

