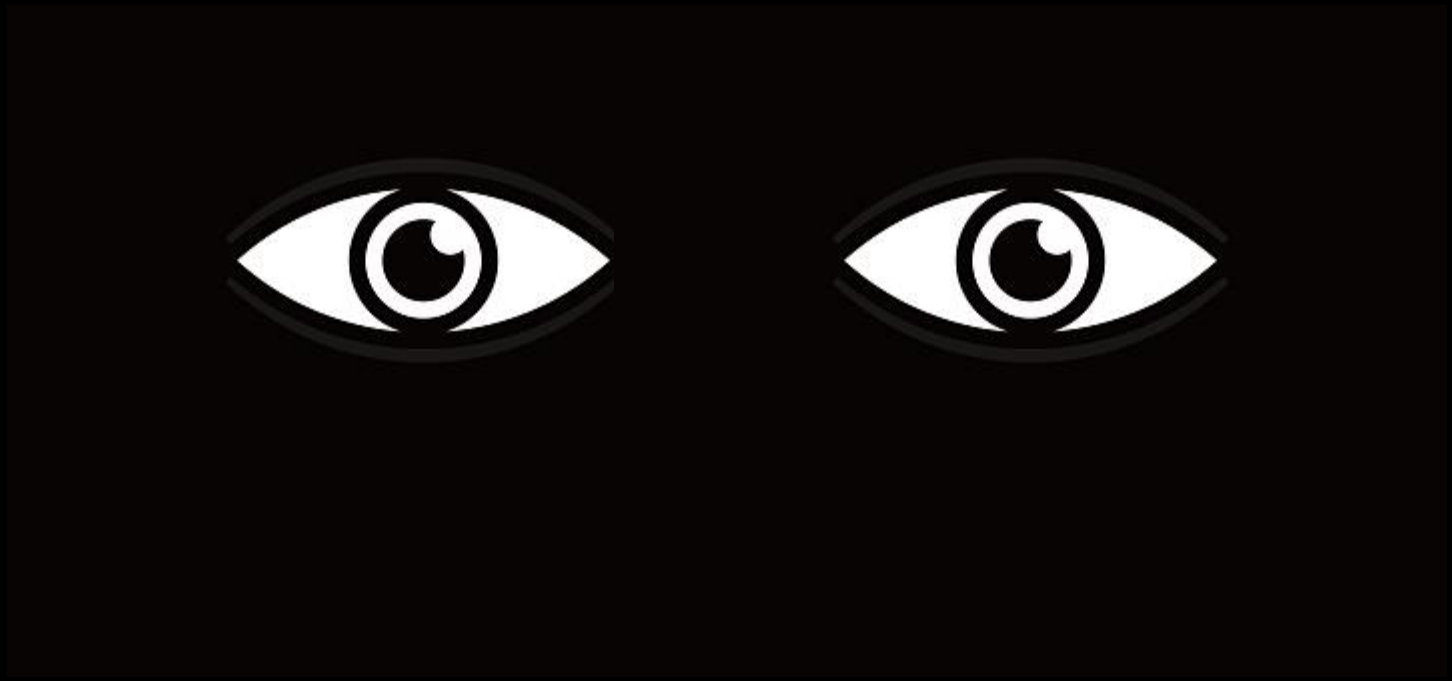
Mechano-*Wolbachia*

Uncovering the mechanisms of action of an antiviral bacterium

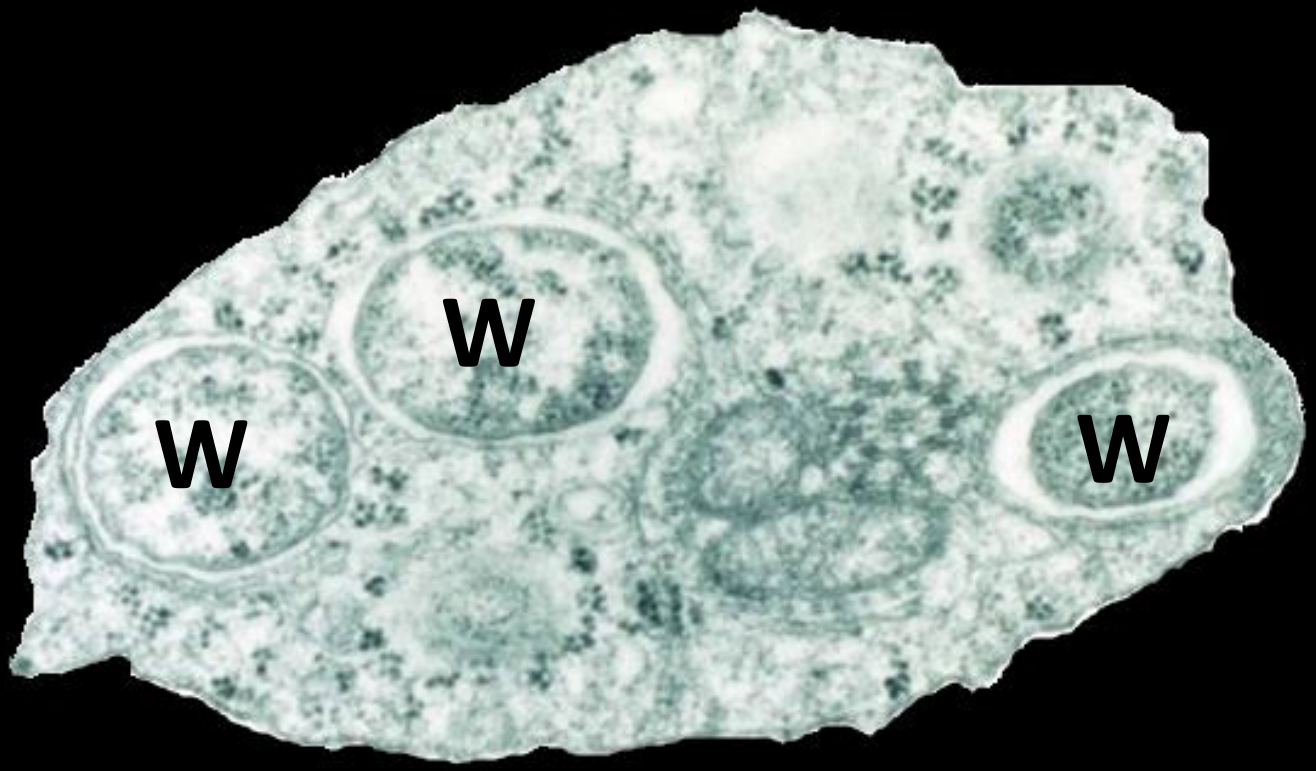
Ewa Chrostek
Jagiellonian University

I have a vision of how to transform *Wolbachia* research



Wolbachia

Intracellular bacterium



O'Neill *et al.,* PLoS Biol 2004

Wolbachia

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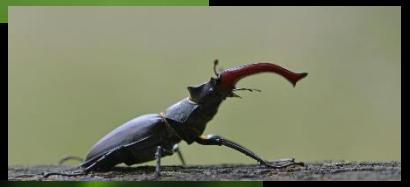
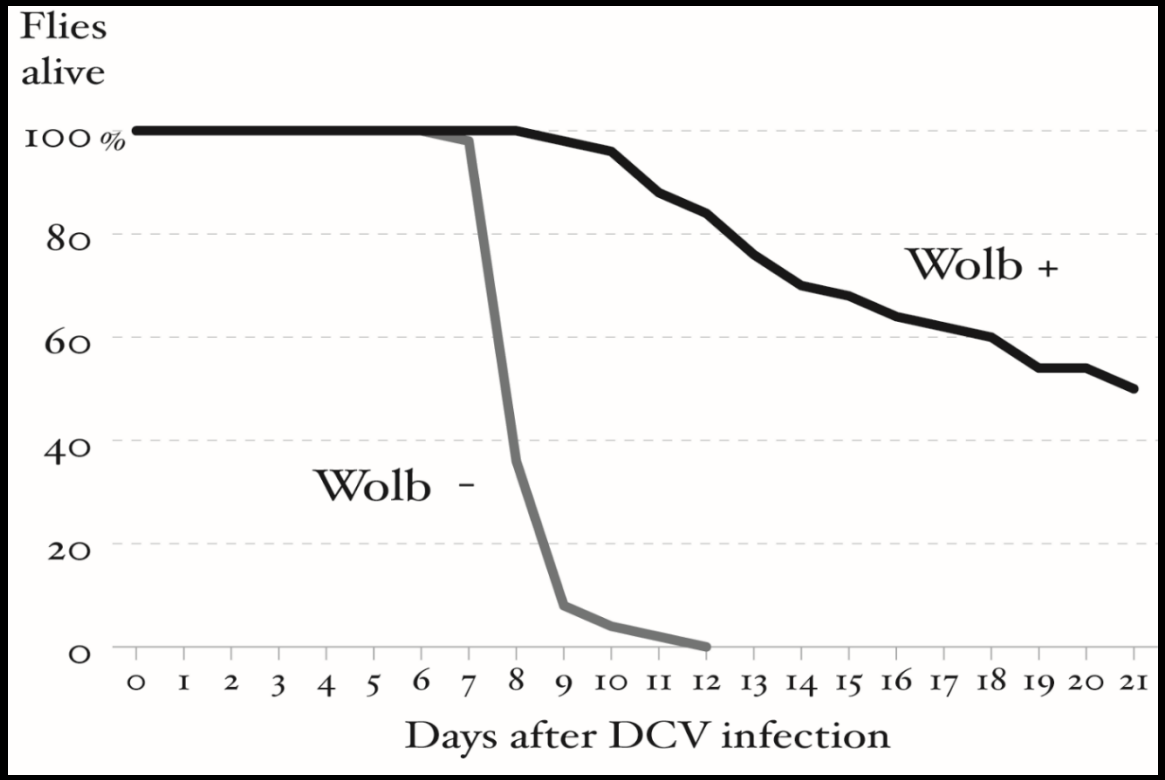


Wolbachia protects flies from viruses

Drosophila C virus infection



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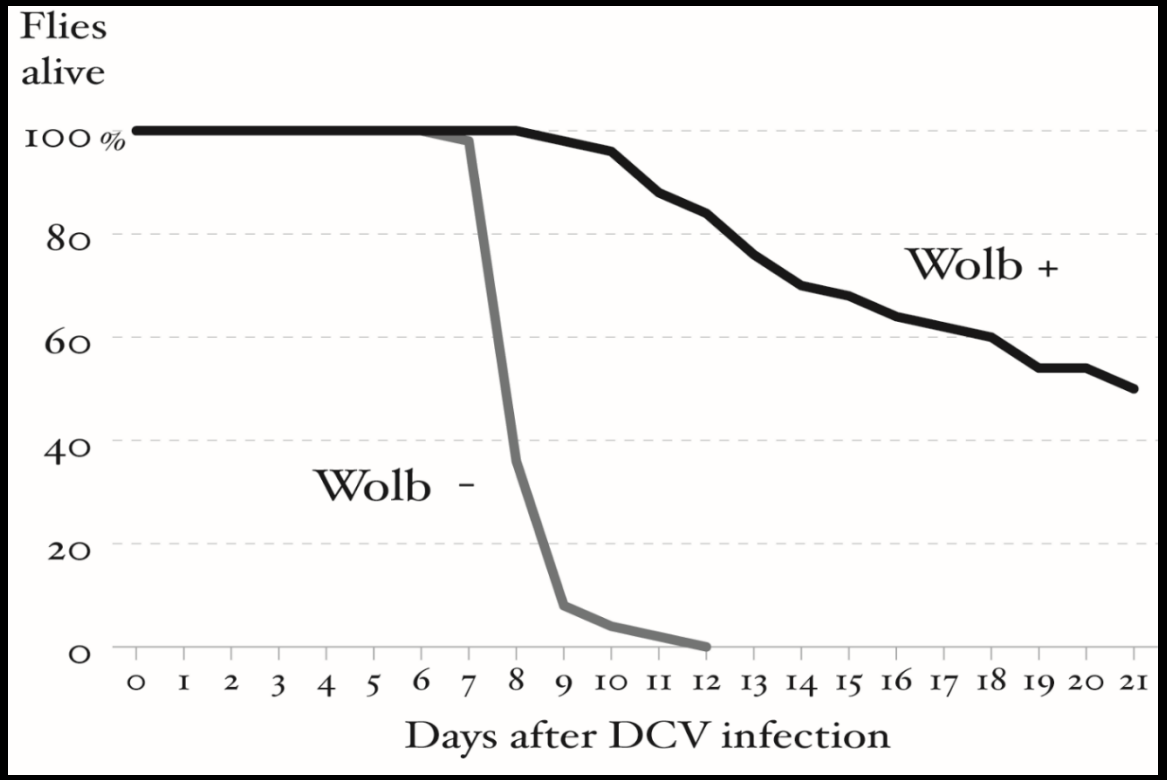

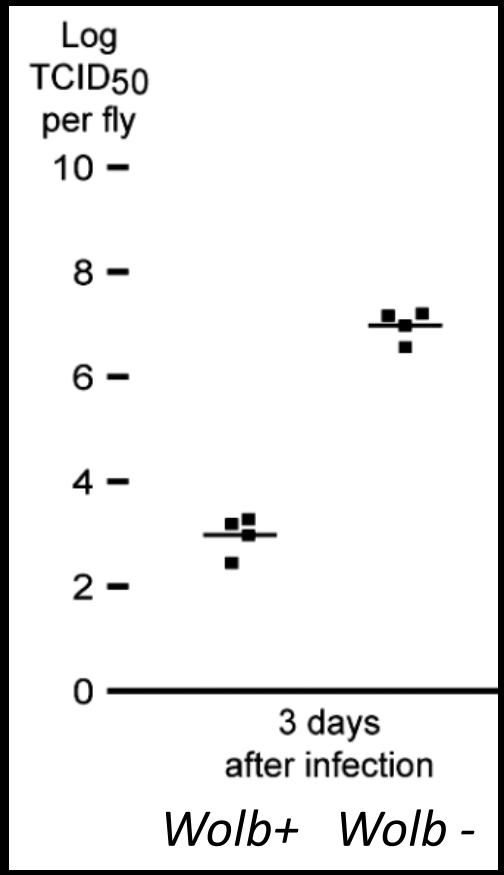

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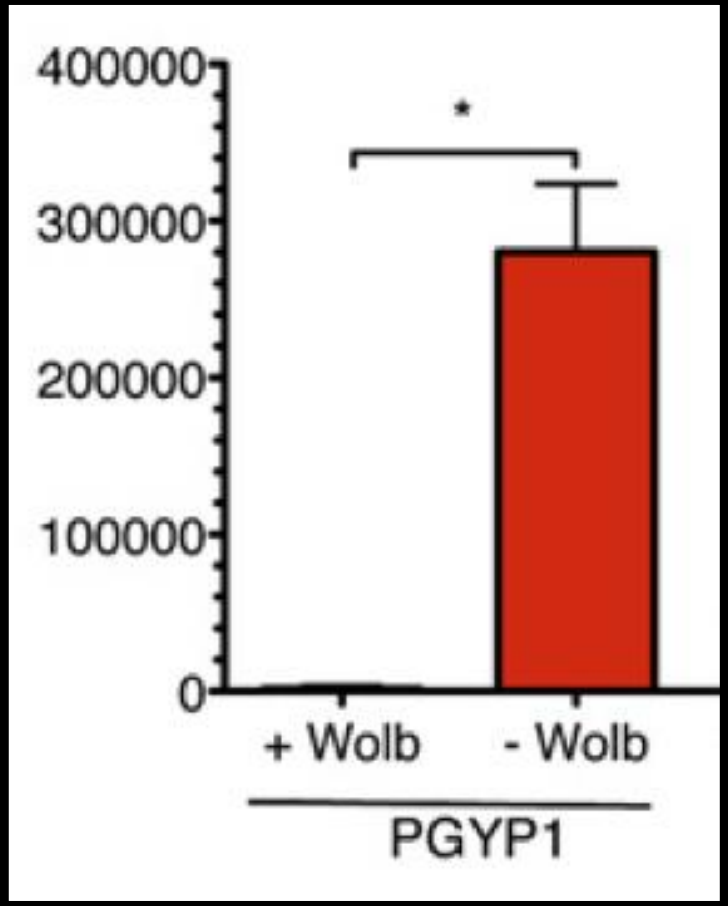
Wolbachia protects mosquitoes from viruses

Dengue virus RNA copies

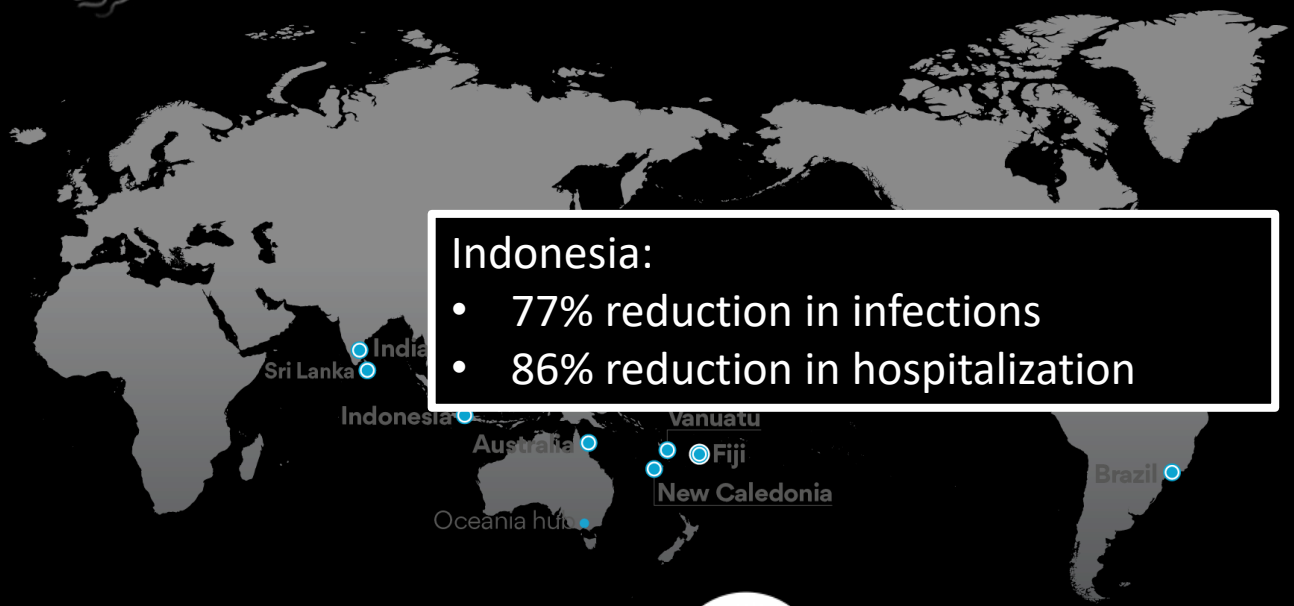


Moreira *et al*., 2009. *Cell*

Wolbachia-infected mosquito releases to fight dengue

World Mosquito Program™

Wolbachia-infected mosquito releases to fight dengue

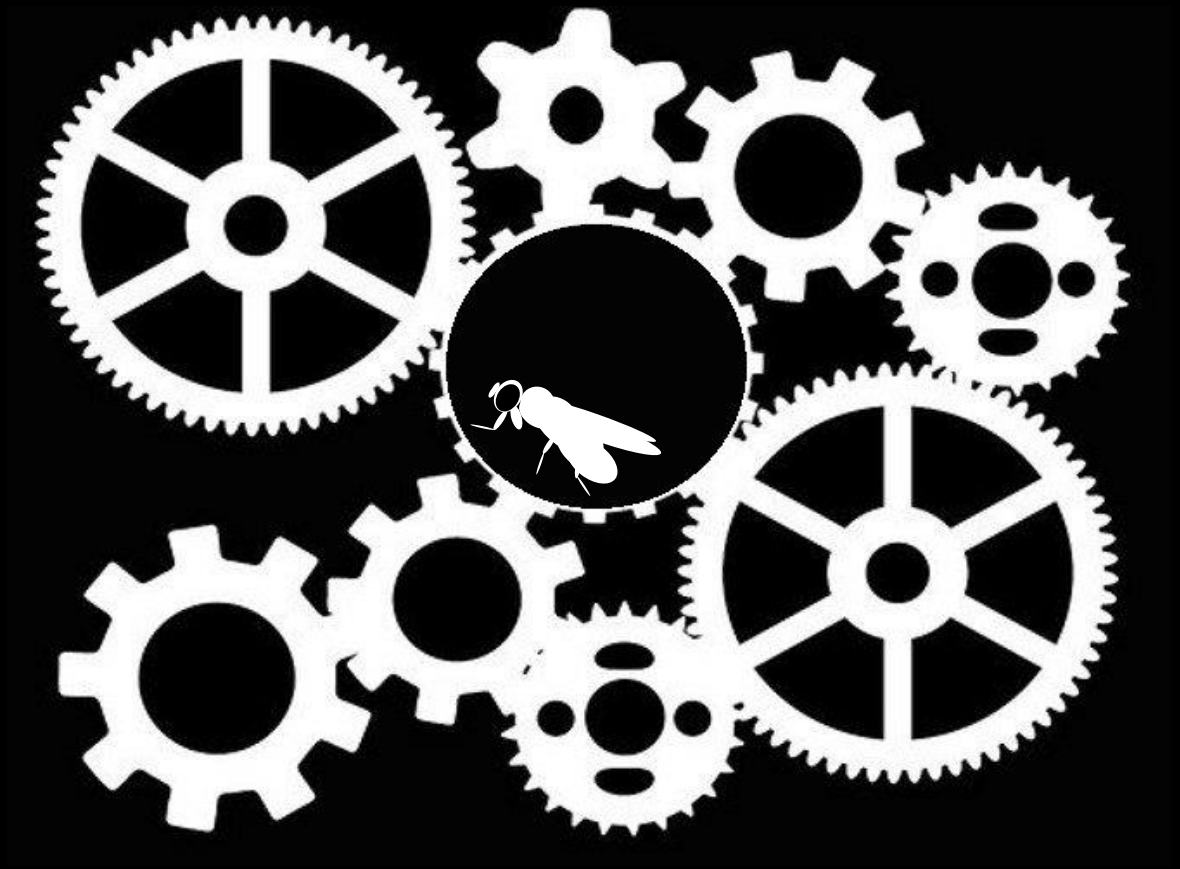


Indonesia:

- 77% reduction in infections
- 86% reduction in hospitalization

World Mosquito Program™

What is the mechanism of *Wolbachia*-conferred antiviral protection?



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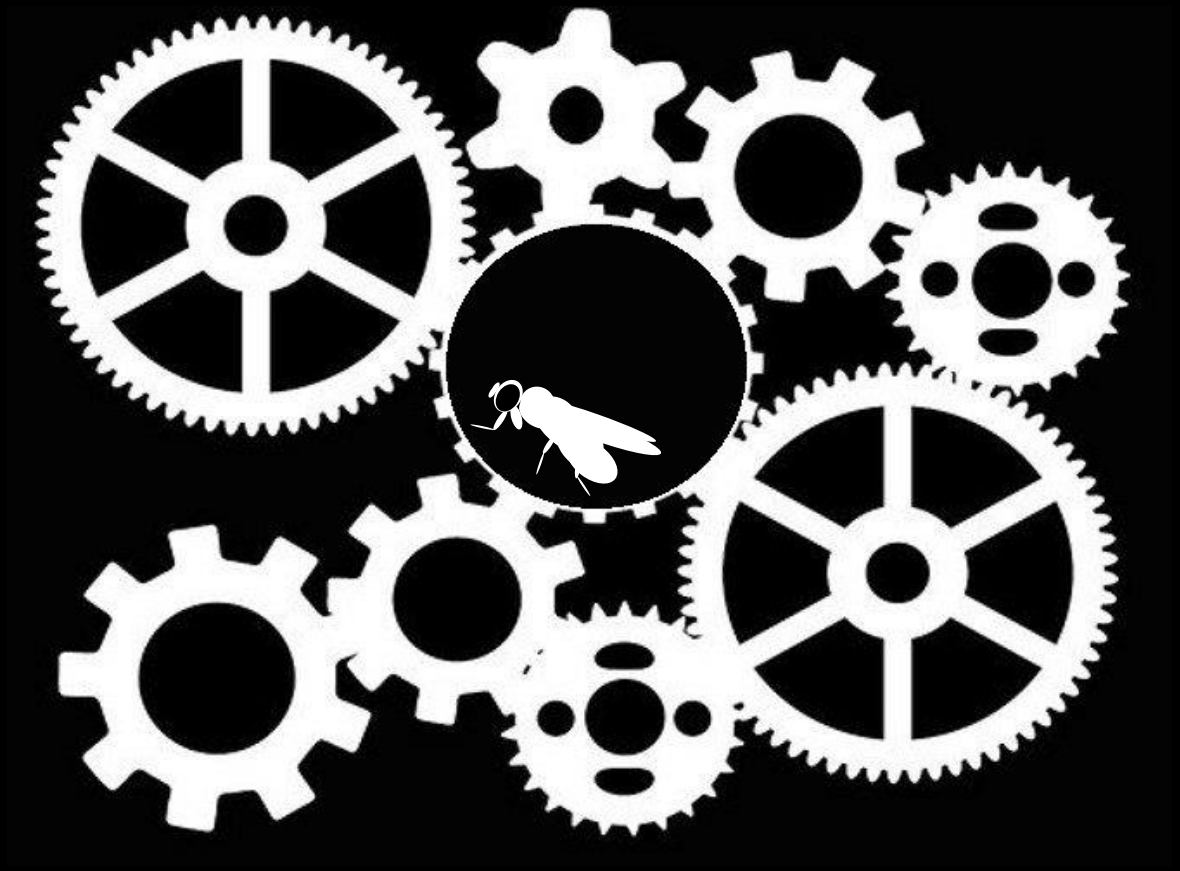


None of the known antiviral mechanisms…

ERC StG Mechano-*Wolbachia*

Obj. 1. Establish model system.

Obj. 1.1. Determine when and where protection starts. Discover which genes are involved.

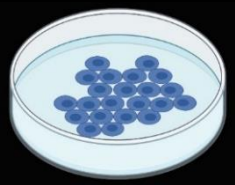
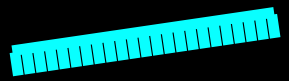
Obj. 1.2. Validate cell culture model.

Obj. 2. Discover molecular bases of antiviral protection.

Obj. 2.1. Use novel tools to pinpoint genes causing protection.

Obj. 2.2. Develop new tools.




1.1. Determine when and where protection starts

State-of-the art

Whole organisms

Late timepoints

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State-of-the art

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Mechano-*Wolbachia*

Tissues

Early timepoints

1.1. Discover which genes are involved

State-of-the art

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Genes involved in protection

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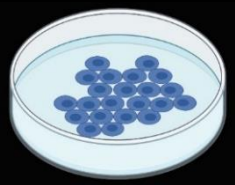
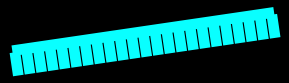


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Previously, no tools to study *Wolbachia* gene functions directly.

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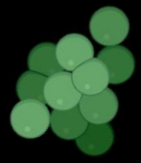
I developed tools to do it!

Long-term gains

Scientific:

- Discover mechanisms of *Wolbachia* phenotypes
- Develop tools to study other unculturable microbes
- Use *Wolbachia* as a vector in insects



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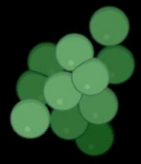

Societal:

- Improve vector control efforts
- Preserve health of beneficial insects
- Use beyond *Wolbachia* or insects…

Who was I?

4+1 year

Gulbenkian Institute

FCT PhD Fellowship

First genotype-phenotype link in unculturable *Wolbachia*

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4 individual fellowships

10 first-author publications

8 invited talks

7 awards for professional achievements

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I was first told to apply for an ERC StG on the day of my PhD Thesis defence!

I applied here

What did I do for those 6 years?

https://erc.europa.eu/apply-grant/starting-grant

Who can apply?

Researchers of any nationality with 2-7 years of experience since completion of PhD, a scientific track record showing great promise and an excellent research proposal can apply.

https://erc.europa.eu/apply-grant/starting-grant

ERC is a grant for the best scientists:

- Students of the best
- Collaborators of the best
- Mentees of the best

Get an idea

Combination of:

- Absolutely safe (but laborious and tedious) work no one has thought of doing before,

- Innovative/groundbreaking experiments.

What has helped me get the grant?

What has helped me get the grant?

National Contact Point and the lessons learned

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National Contact Point and the lessons learned

B1

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National Contact Point and the lessons learned

B1

CV & track record should tell a story

Stress on independence

International outlook

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International outlook

Write to generalists

Stress impact (if successful)

Ask as many people as possible to read/provide feedback

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National Contact Point and the lessons learned

B1

CV & track record should tell a story

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International outlook

Write to generalists

Stress impact (if successful)

Ask as many people as possible to read/provide feedback

B2

Write to people in your field – you've got this!

What has helped me get the grant?

National Contact Point and the lessons learned

Interview

Think about it as a “ted talk”

Practice!

Questions: 3 sentences and stop talking

Who has helped me get the grant?

Mentors and people who care

Seek people who are “good at getting grants”

Help others so that you get help when needed

Network, network, network!

Ask, ask, ask!

What has helped me get the grant?

The best science is brave;
it breaks the convention
and investigates new realms

Proposal must be innovative BUT
you have to prove it is feasible.

What has helped me get the grant?

Choose your panels wisely

PHYSICAL SCIENCES AND ENGINEERING (PE)
LIFE SCIENCES (LS)
SOCIAL SCIENCES AND HUMANITIES (SH)

What has helped me get the grant?

Choose your panels wisely

LIFE SCIENCES (LS)

Integrative Biology: From Genes and Genomes to Systems (LS2)

Immunity, Infection and Immunotherapy (LS6)

Prevention, Diagnosis and Treatment of Human Diseases (LS7)

Environmental Biology, Ecology and Evolution (LS8)

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What has helped me get the grant?

Do not underestimate your CV

No Nature, Science, Cell papers

Stress on international outlook

Stress every achievement

Acknowledgements

Team:

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Kayla King (Oxford)

Raquel Oliveira (Oeiras)

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Greg Hurst

Andrew Jackson

Marcus Blagrove

Alistair Darby

Ben Makepeace

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Luis Teixeira (Lisbon)

Frank Jiggins (Cambridge)

Casey Bergman (Athens, GA)

European Research Council
Established by the European Commission

Thank you for your attention

&

good luck with your proposals!