

# The planarian microbiome in response to external stressors

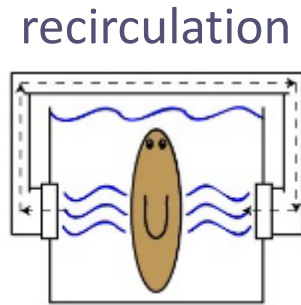
Karolien Bijnens, Sofie Thijs, Tom Artois & Karen Smeets  
Centre for environmental sciences, Hasselt University, Belgium

Did you know....



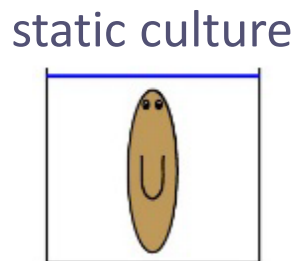
You are more microbe than human!

# Little is known about the planarian microbiome

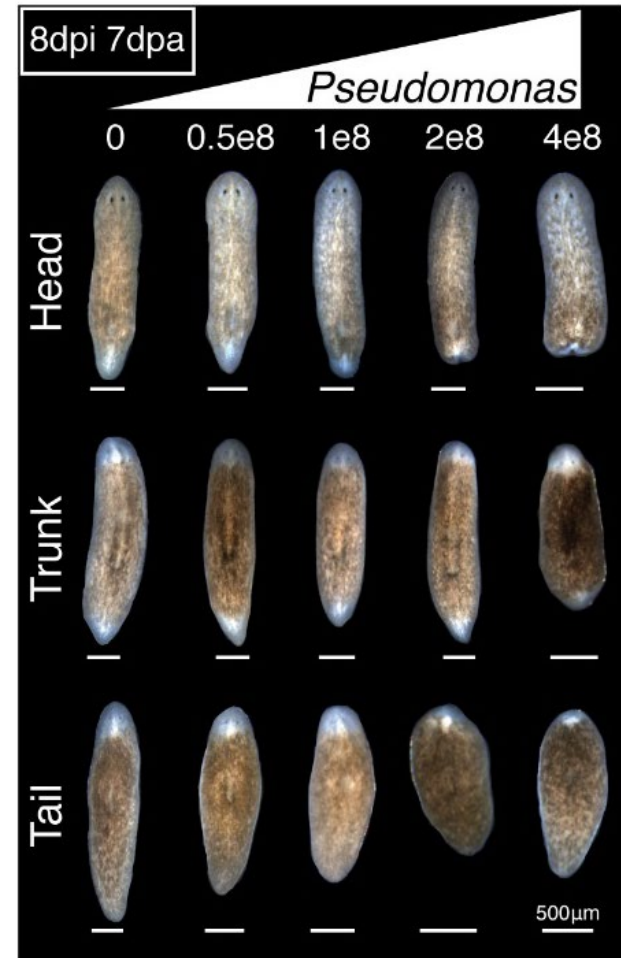


1. Bacteroidetes
2. Proteobacteria

VS

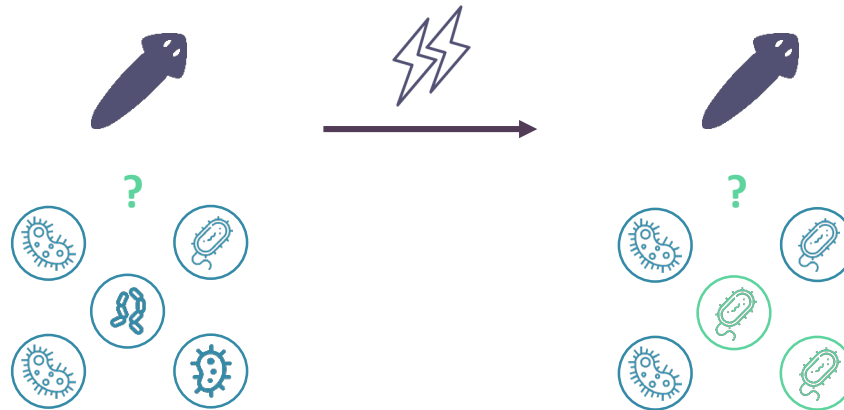


1. Proteobacteria
2. Bacteroidetes



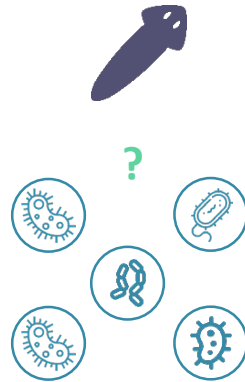
Innate immune system

# Research questions



1. Do planaria have associated bacteria and where are they residing?
2. Where does the microbiome come from and how stable is the microbiome?
3. Does the microbial composition change by external stressors?

# Research questions

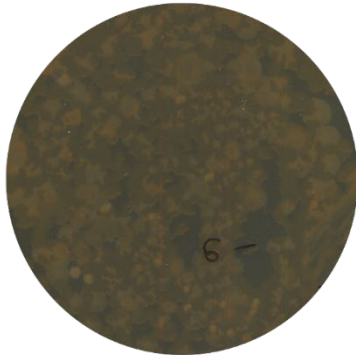


1. **Do planaria have associated bacteria and where are they residing?**
2. Where does the microbiome come from and how stable is the microbiome?
3. Does the microbial composition change by external stressors?

# Who is where?

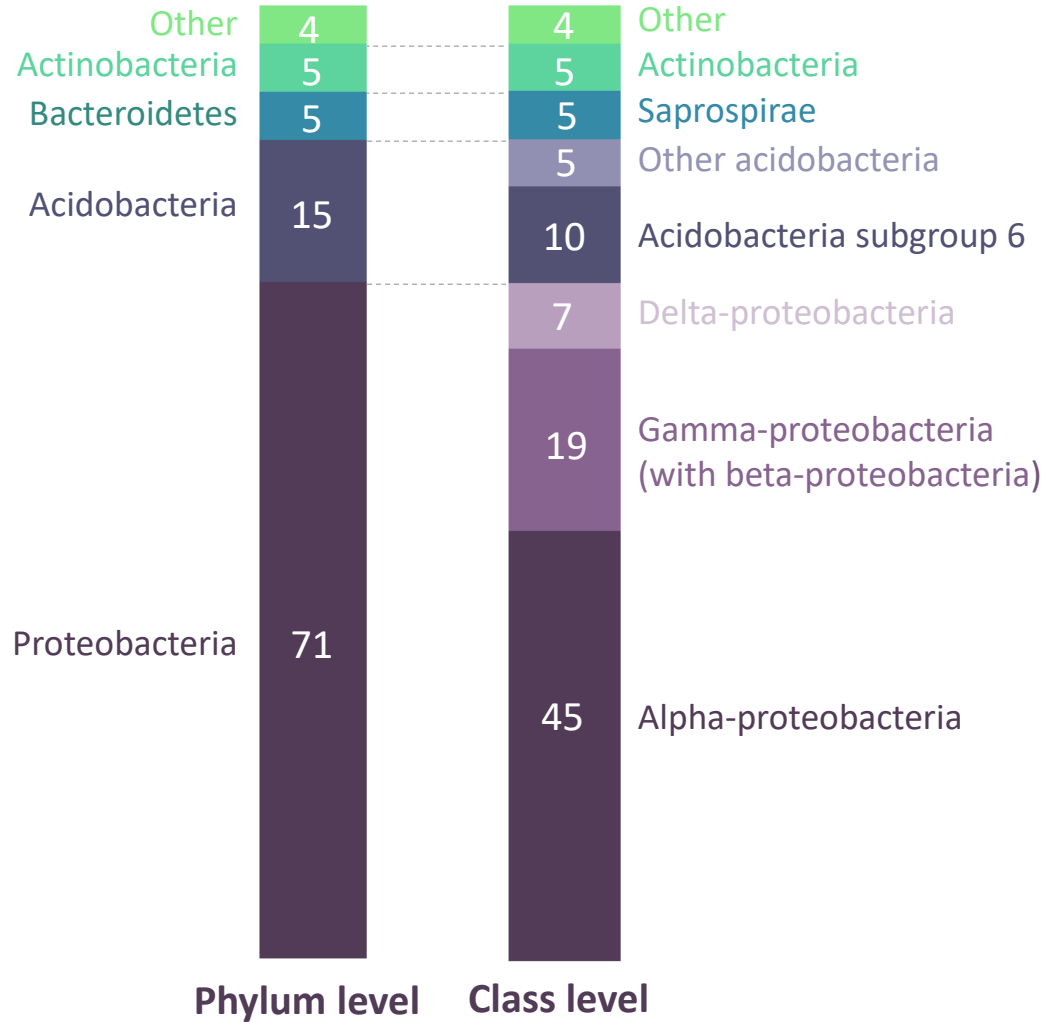
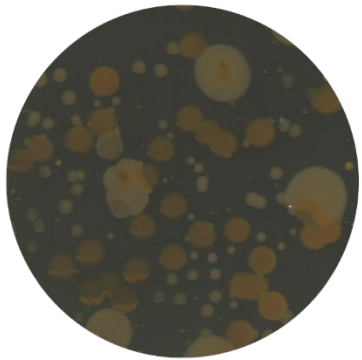
Fresh planarian medium

Used planarian medium



Not-rinsed crushed worm

Rinsed crushed worm

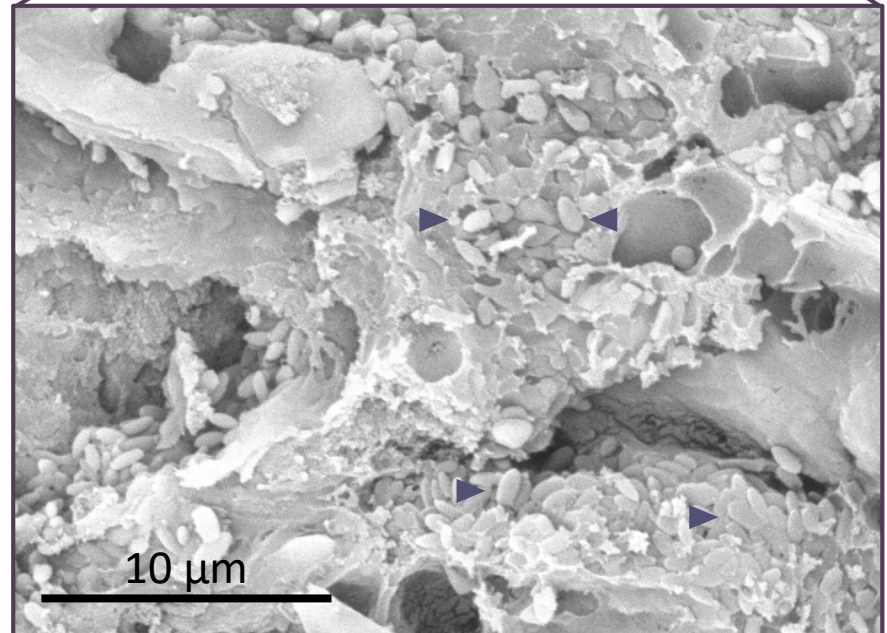
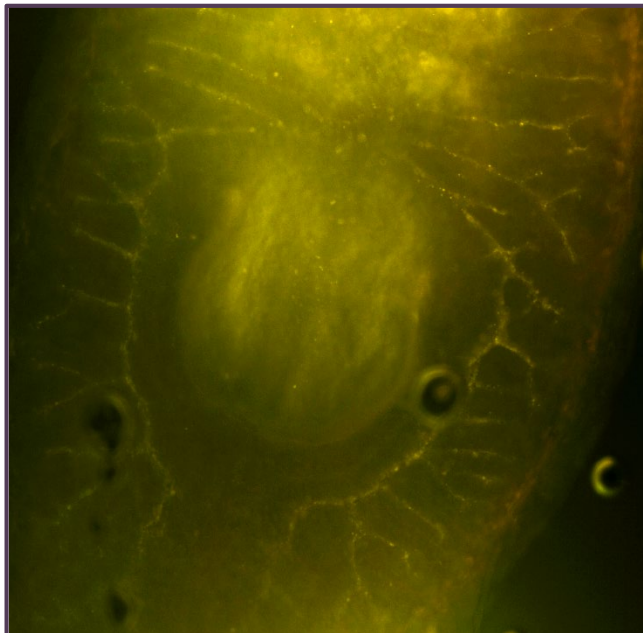
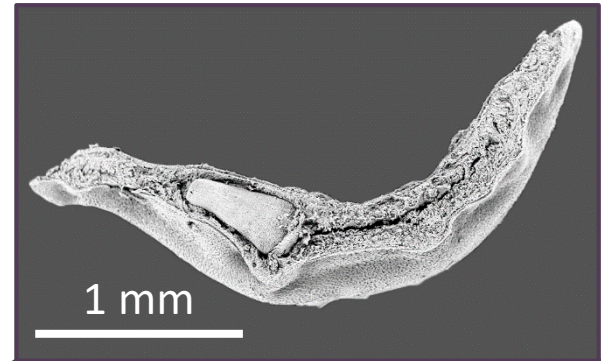
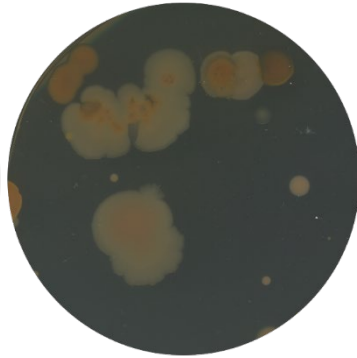


# Who is where?

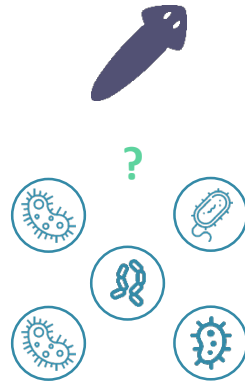
Worm without mucus



Mucus only



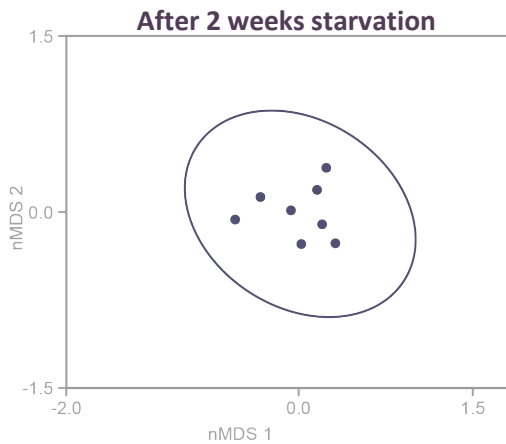
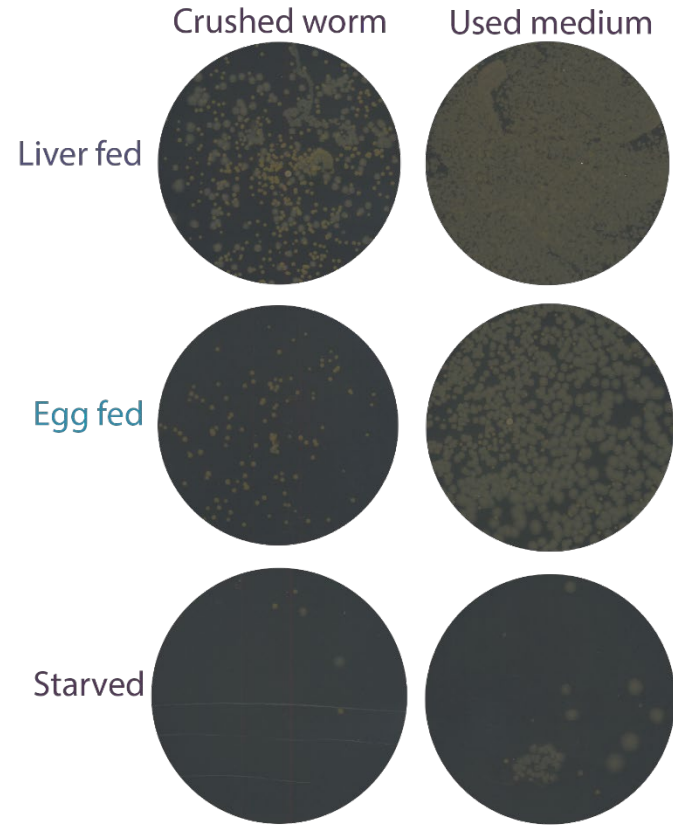
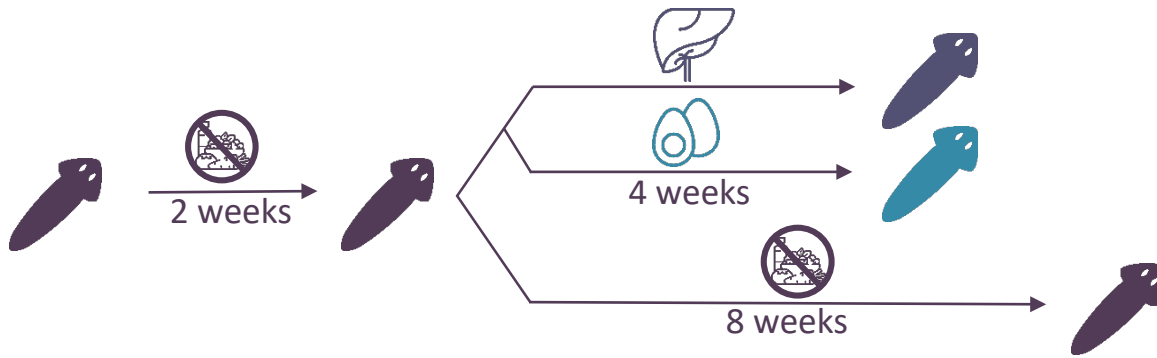
# Research questions



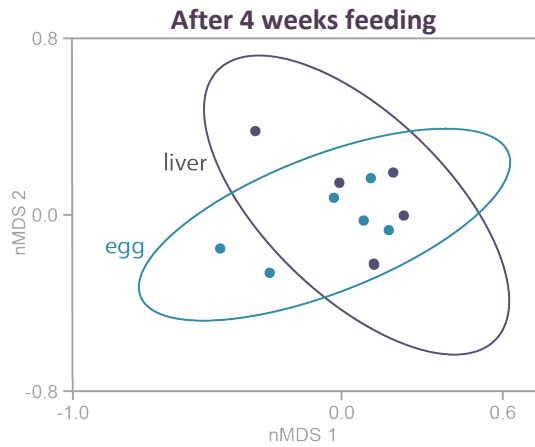
1. Do planaria have associated bacteria and where are they residing?
2. **Where does the microbiome come from and how stable is the microbiome?**
3. Does the microbial composition change by external stressors?



# Longterm starvation has a serious effect on the bacterial composition

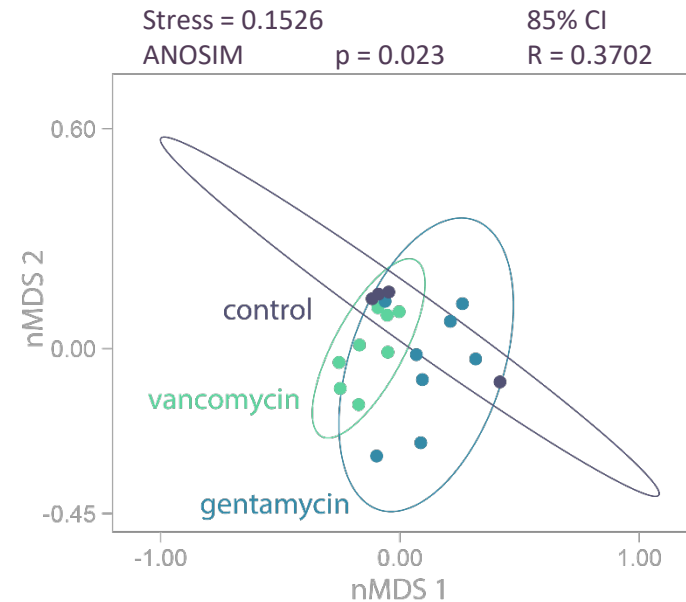
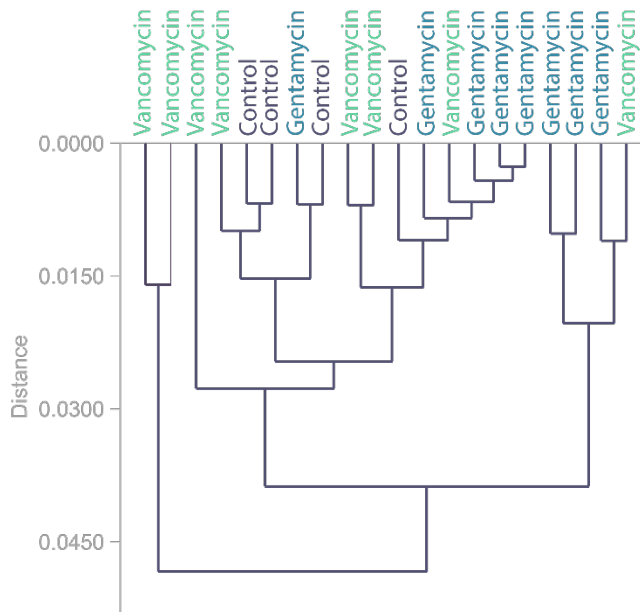
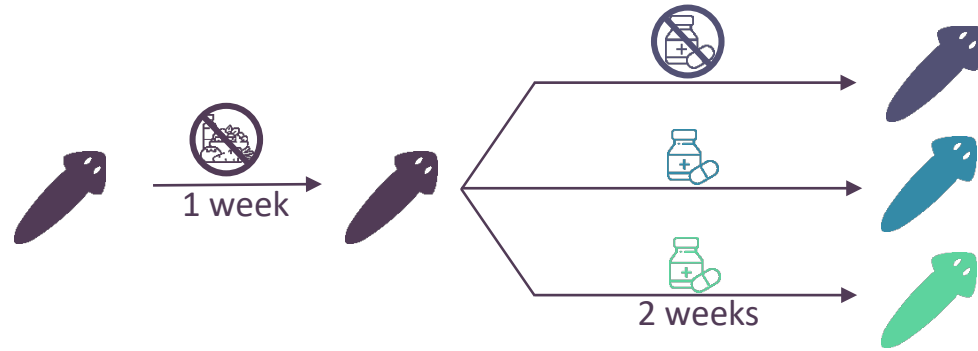


Stress = 0.1622      85% CI



Stress = 0.1633      85% CI  
 ANOSIM      p = 0.4835      R = 0

# Two weeks of antibiotics use have a limited effect on the bacterial composition

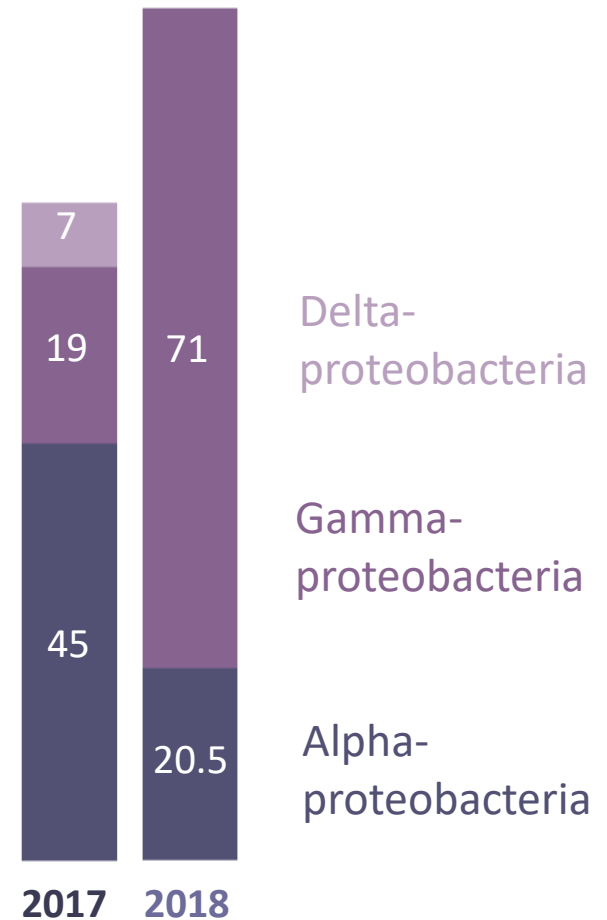


# The planarian microbiome changes over time

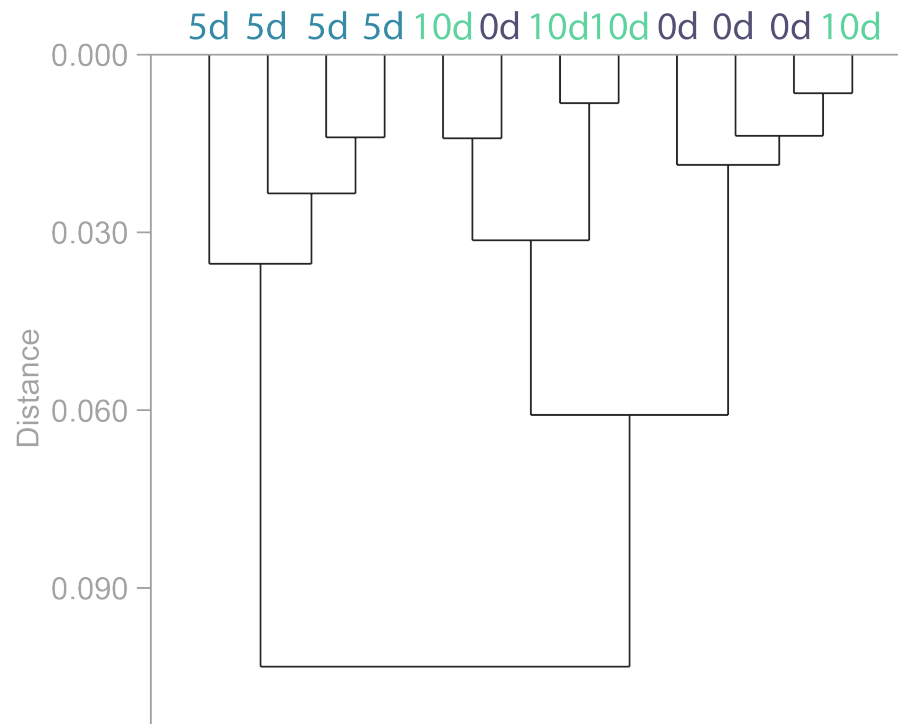
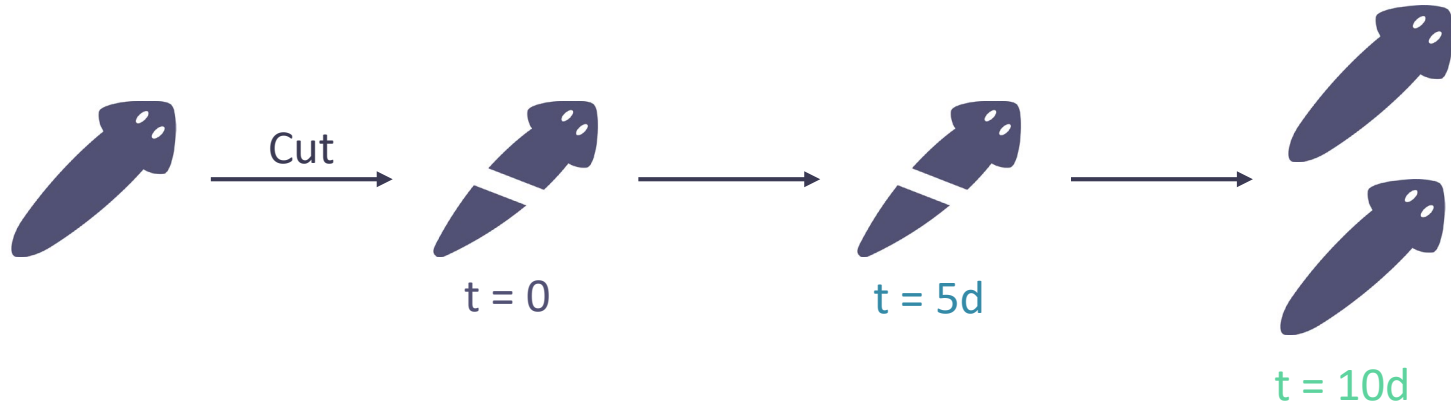
Relative abundance of phylum Proteobacteria



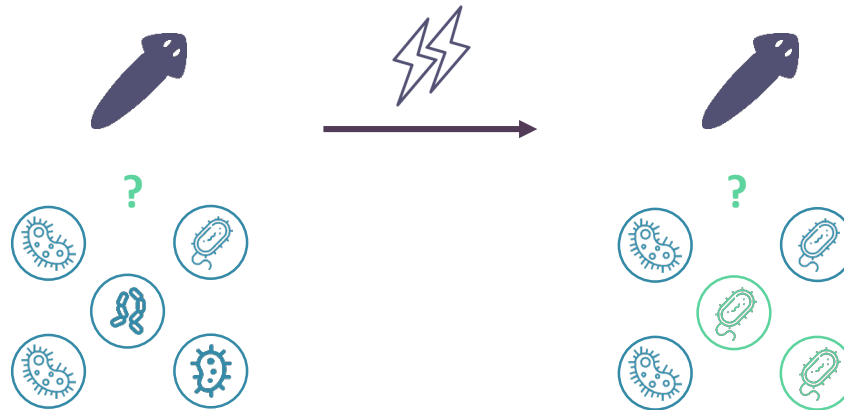
Relative abundance of classes of Proteobacteria



# The microbiome changes during regeneration

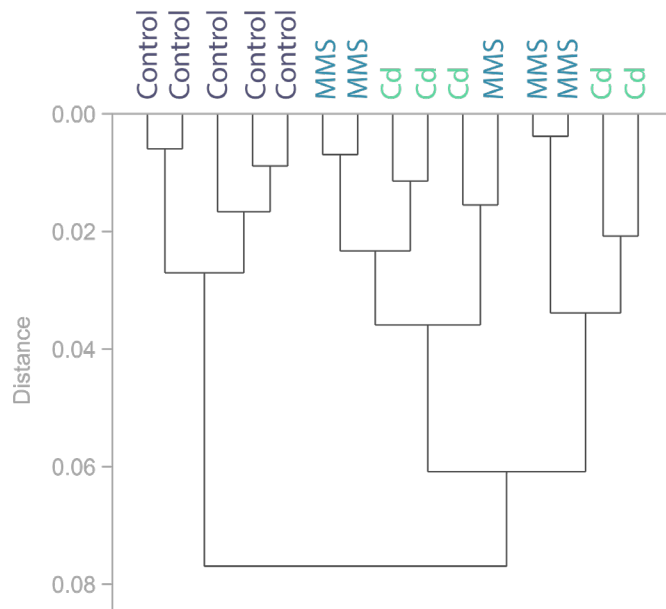
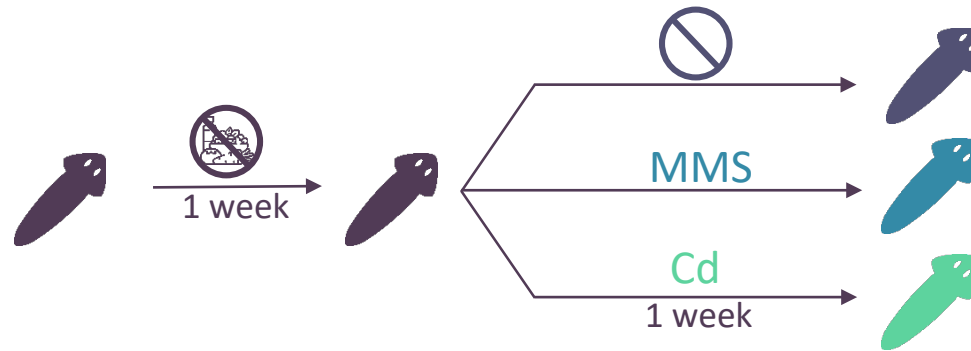


# Research questions



1. Do planaria have associated bacteria and where are they residing?
2. Where does the microbiome come from and how stable is the microbiome?
3. **Does the microbial composition change by external stressors?**

# 7 day-exposure to Cd and MMS changes the bacterial composition



Stress = 0.084

ANOSIM

Ctrl vs MMS

Ctrl vs Cd

p = 0.00007

p = 0.0384

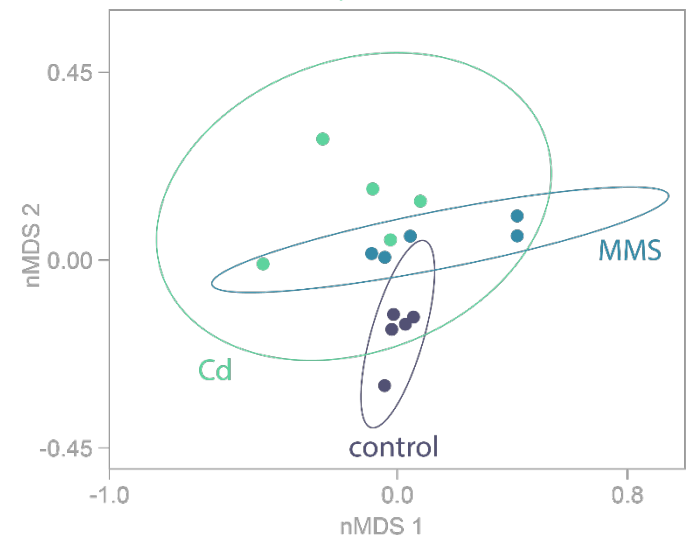
p = 0.0081

85% CI

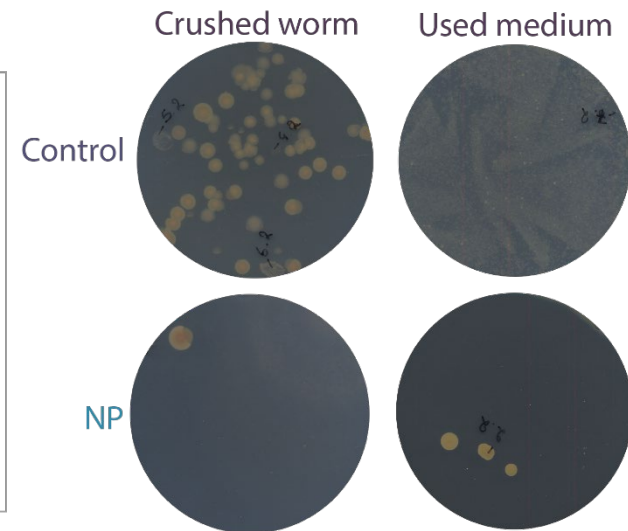
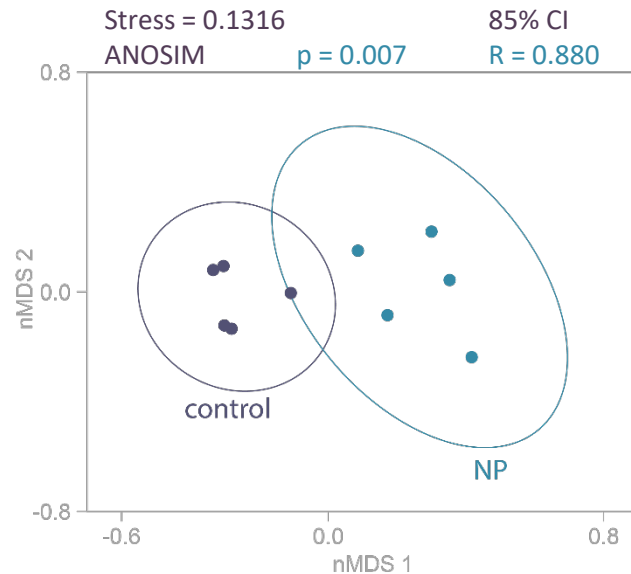
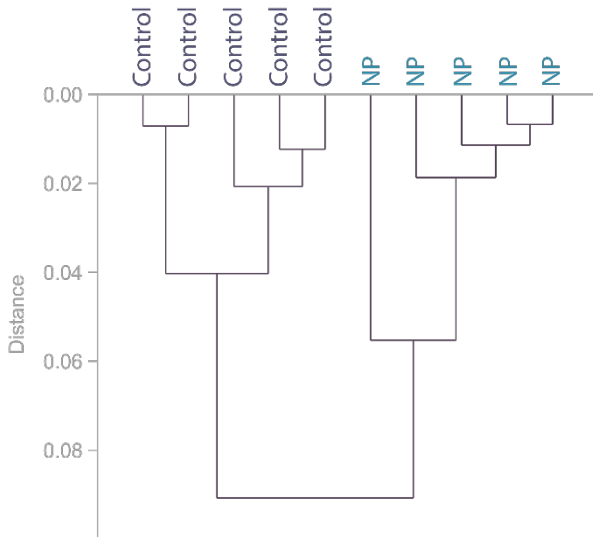
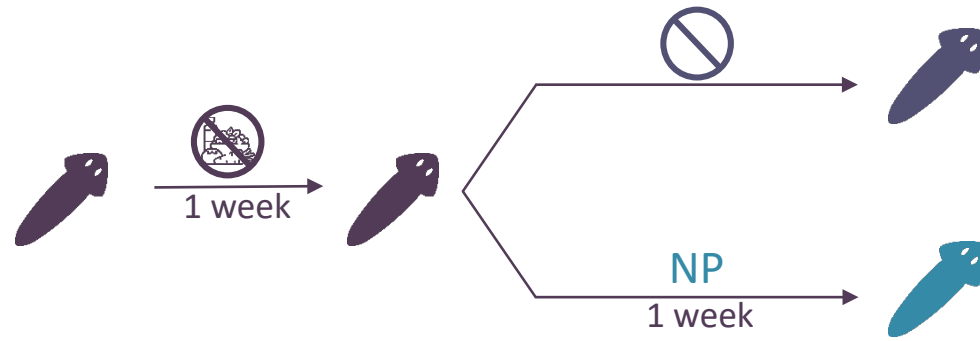
R = 0.35

R = 0.468

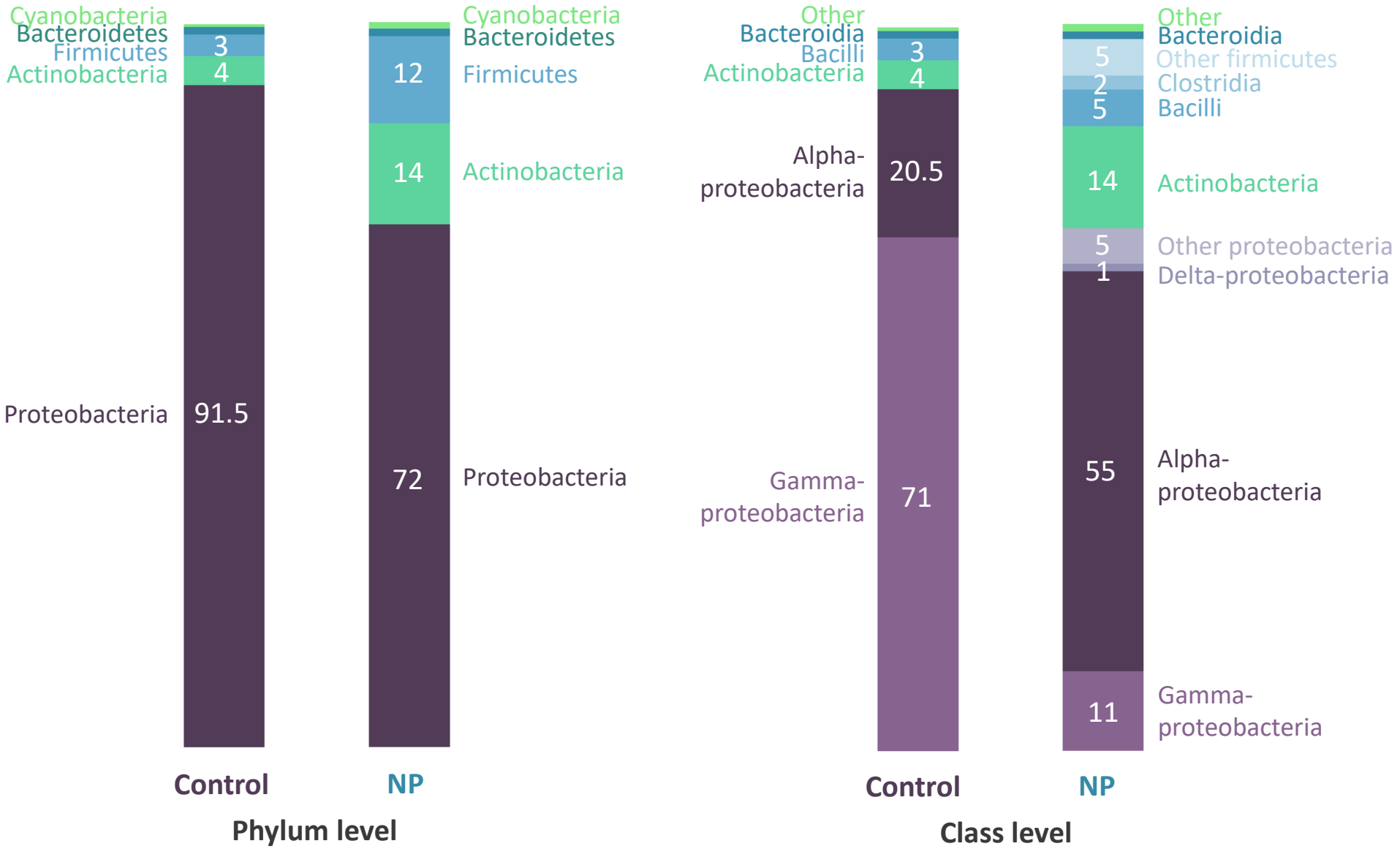
R = 0.660



# 7 day-exposure to silver nanoparticles significantly changes the bacterial composition



# Silver nanoparticle exposure causes shifts





So, did you know....



The composition of *Schmidtea mediterranea*'s microbiome is altered by external stressors and by its physiological state.

# Acknowledgements

## Zoology: biodiversity and toxicology, Hasselt University

Prof. dr. Karen Smeets

Nathalie Leynen

Annelies Wouters

Jan-Pieter Ploem

Vincent Jaenen

Sanah Majid

Dr. Frank Van Belleghem

Prof. dr. Tom Artois

Ria Vanderspikken

Natascha Steffanie

## Environmental biology, Hasselt University

Dr. Sofie Thijs

## TRUGen, Thompson Rivers University

Dr. Jonathan Van Hamme

Breanne McAmmond

## Department of Biology, Winthrop University

Prof. dr. Julian Smith

