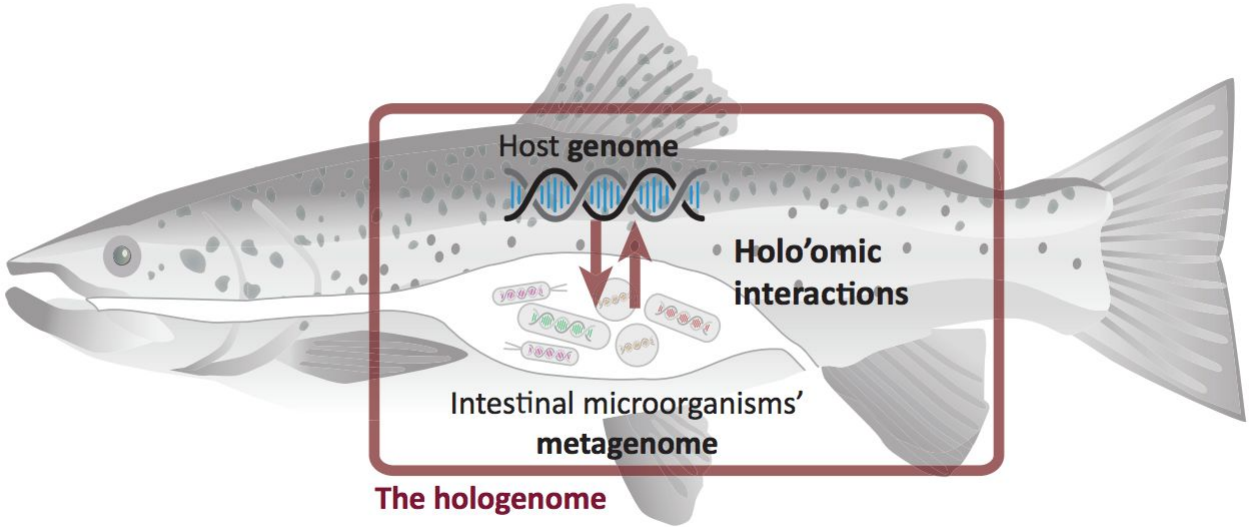
An overview of the holomic approach and Q&A



Why hologenomics ?

WE HAVE EVOLVED IN A MICROBIAL WORLD

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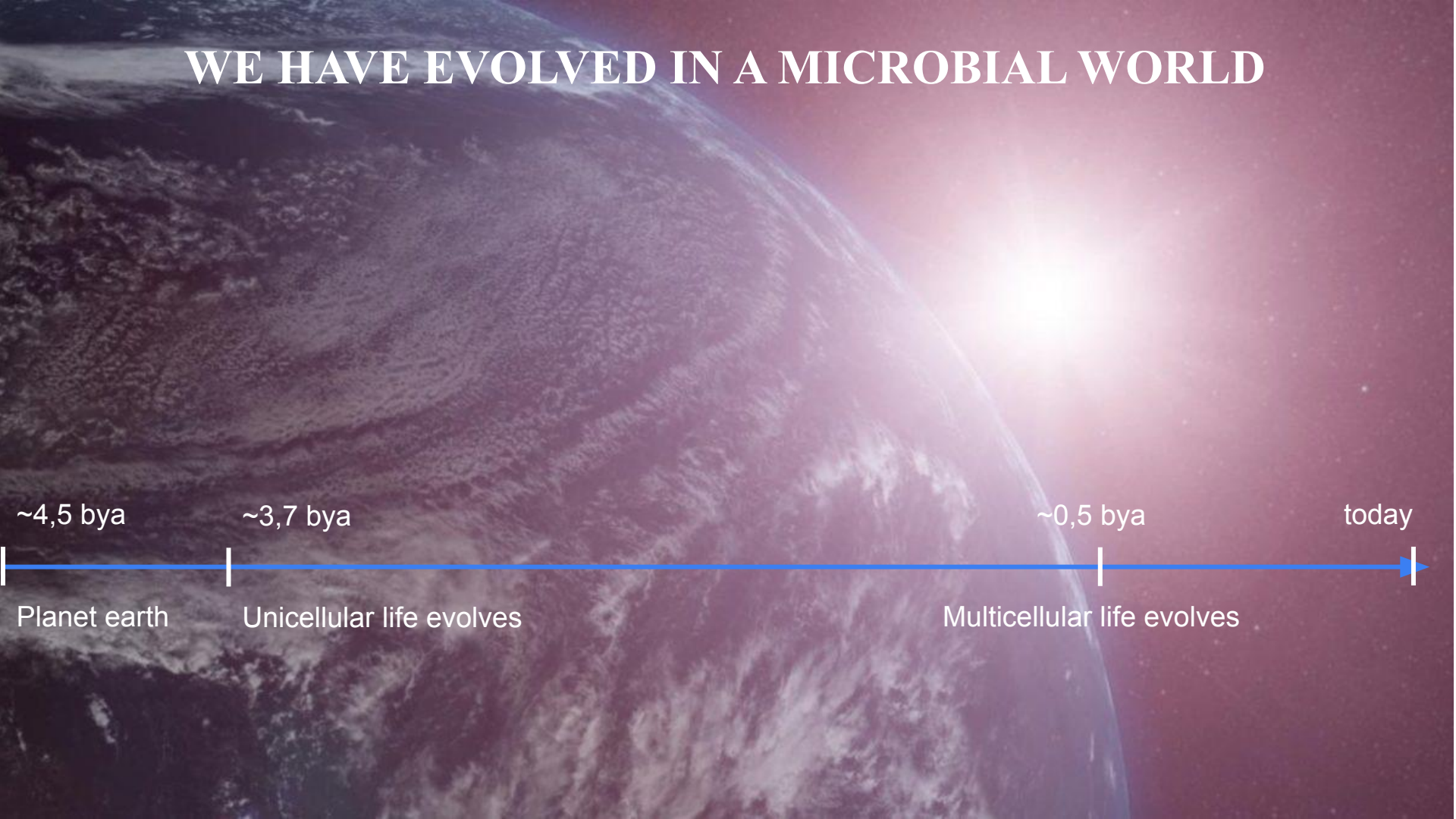

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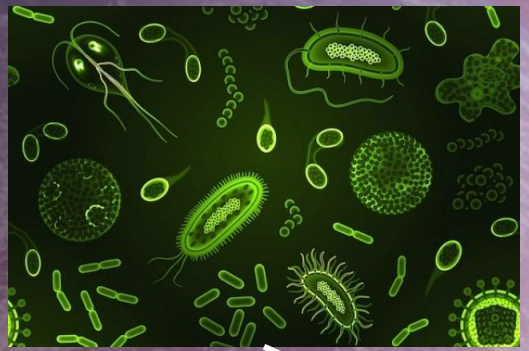


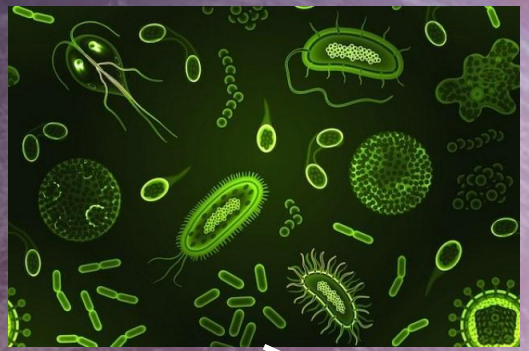
~4,5 bya — Planet earth

~3,7 bya — Unicellular life evolves

~0,5 bya — Multicellular life evolves

today

WE HAVE EVOLVED IN A MICROBIAL WORLD



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WHAT IS HOLOGENOMICS AND WHY SHOULD WE CARE?

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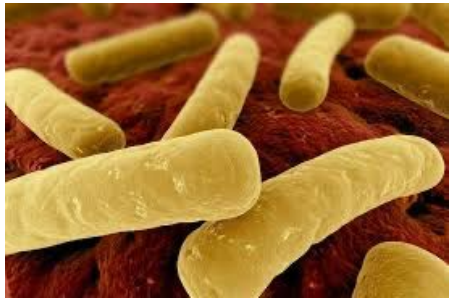
HOST + MICROBIOME = HOLOBIONT

MOLECULAR STUDY OF HOLOBIONTS = <u>HOLOGENOMICS</u>

+



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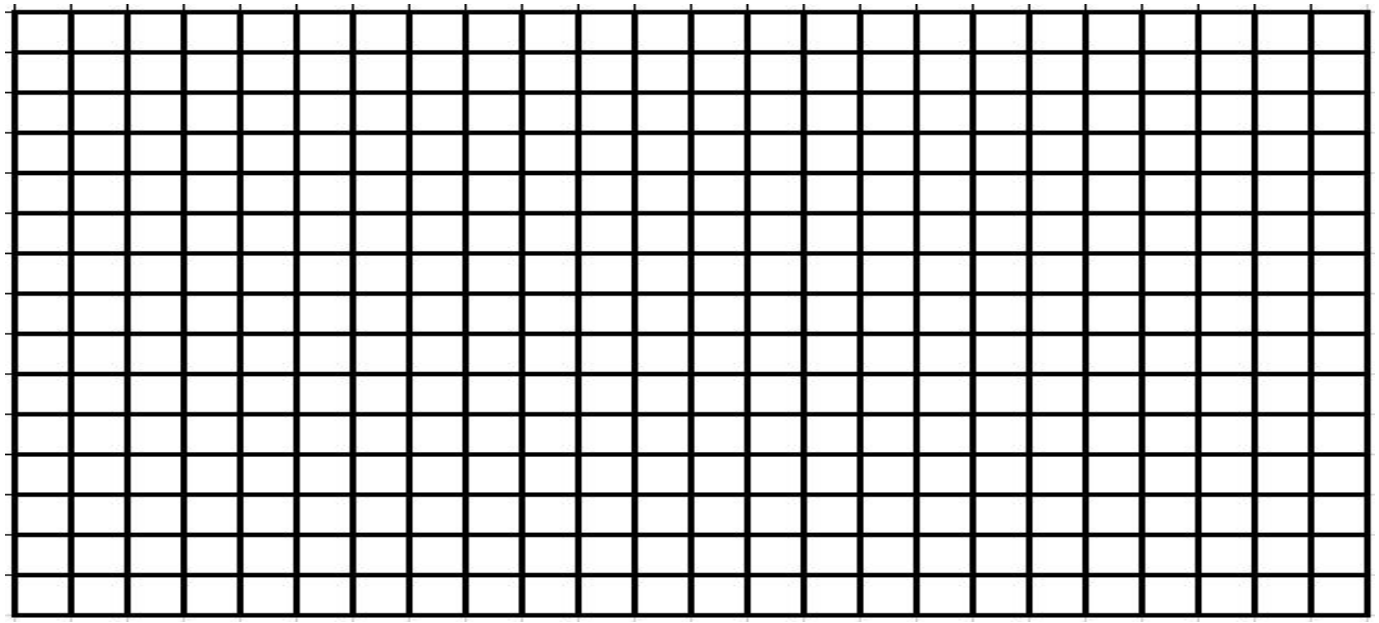
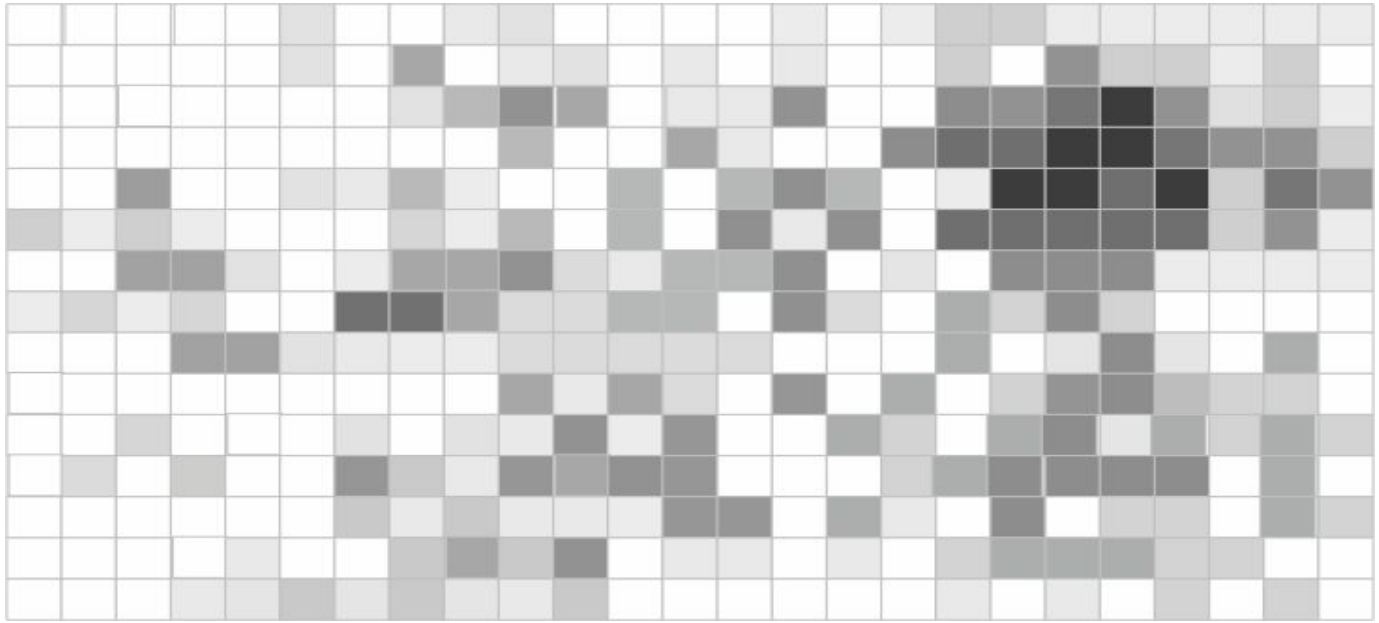
Roggenbuck *et al.* 2014; Zepeda Mendoza *et al.* 2018

The microbiome as a phenotype

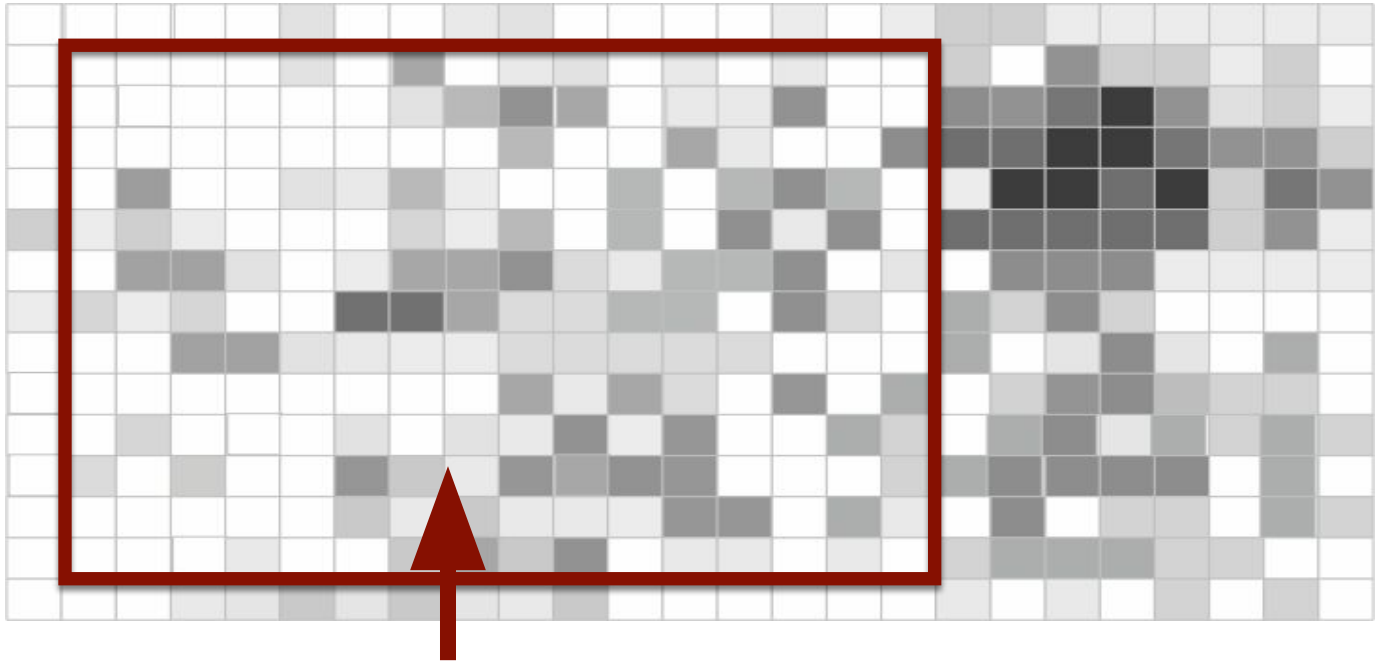


Microbes in an environment



Genome shapes which microbes exist in (on) a host

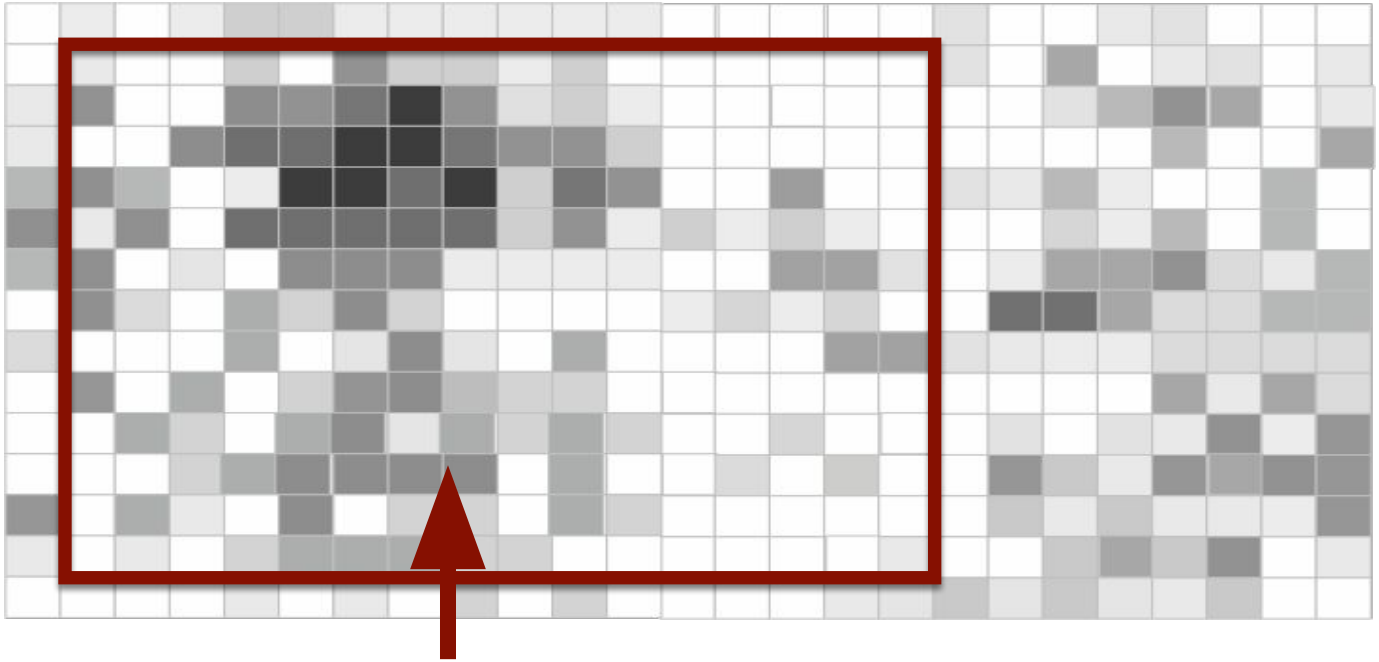
Host A



"Microbiome Space"

The environment will change which microbes are there

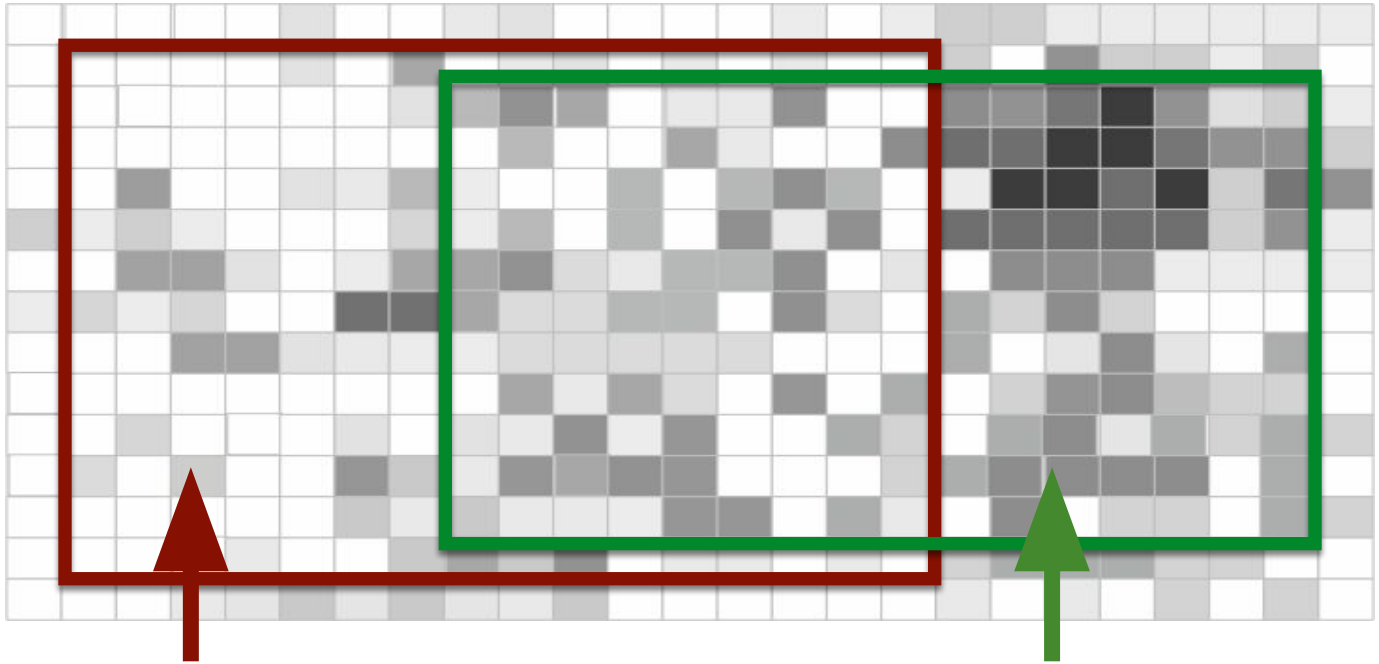
Host A



"Microbiome Space"

Genetic variation *must* control the baseline

Host A

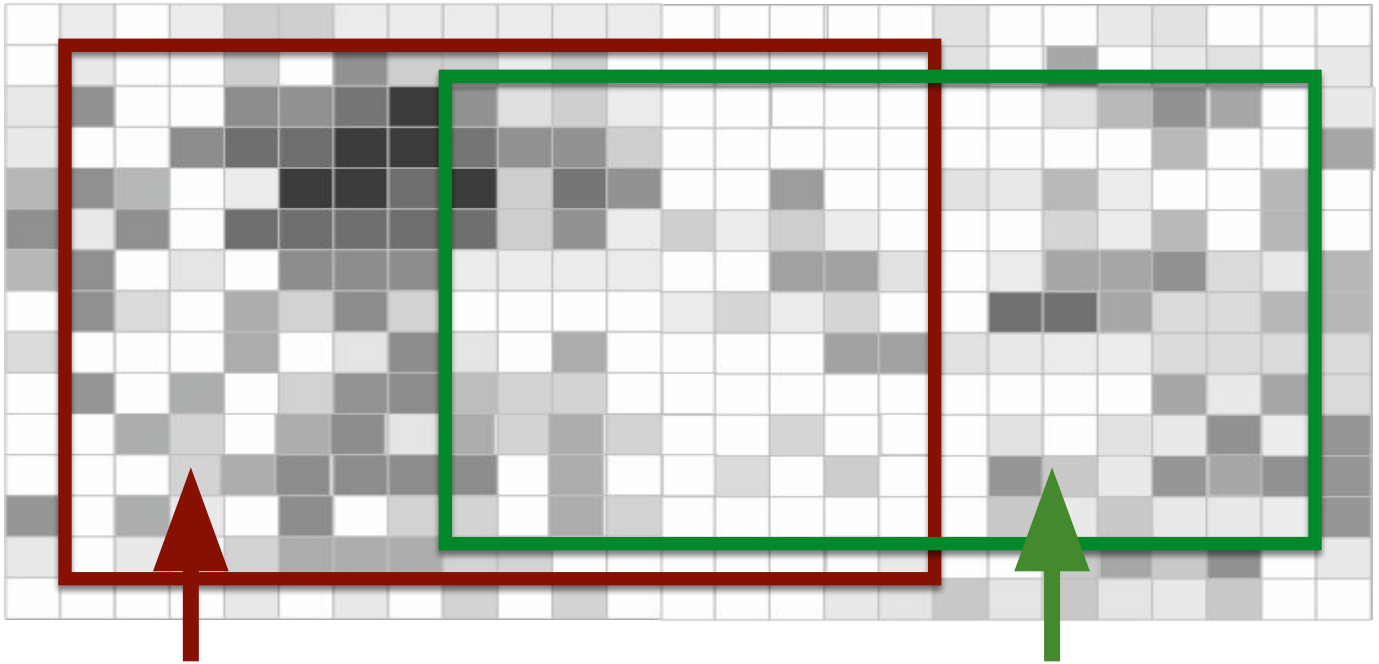


Host B

Different “Microbiome Spaces”

Genetic variation *must* control the baseline - irrespective of the environment

Host A

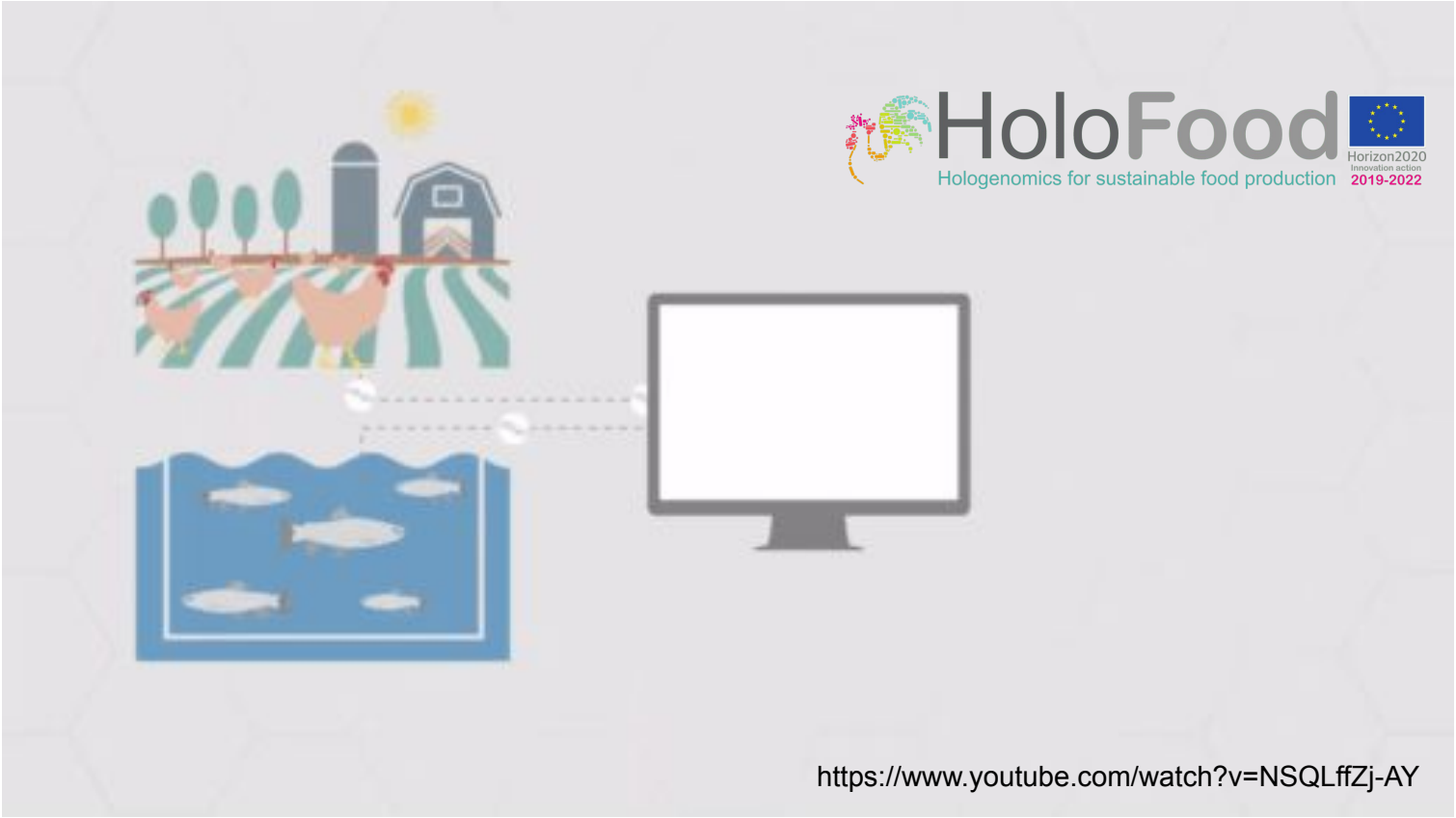


Host B

Different “Microbiome Spaces”

The hologenomics approach

So, what is Applied Hologenomics ?



Trends in Biotechnology

CellPress
REVIEWS

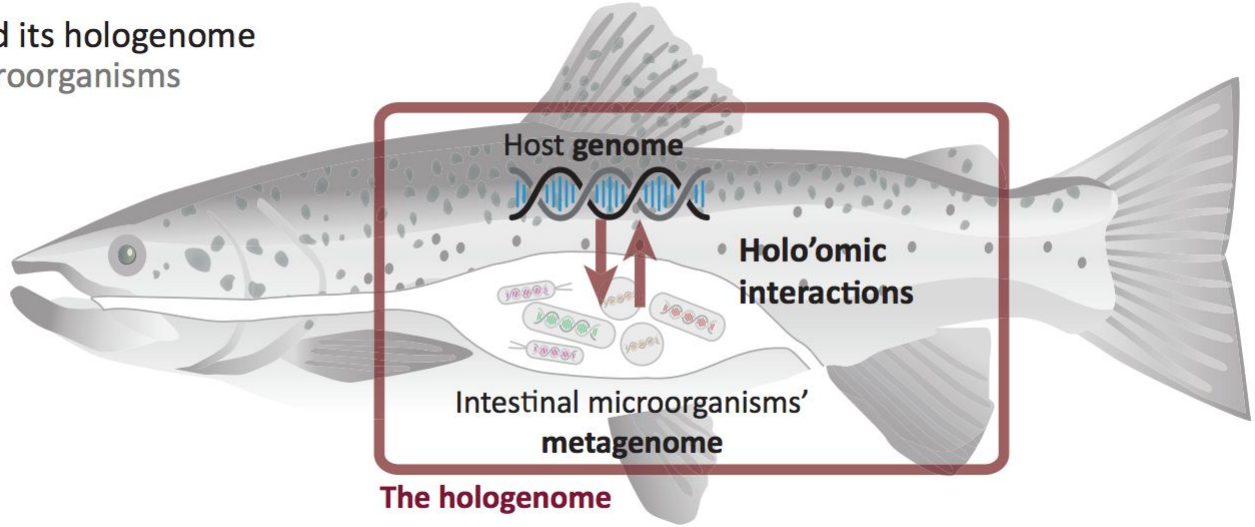
Opinion

Applied Hologenomics: Feasibility and Potential in Aquaculture

Morten T. Limborg,[1,*,@] Antton Alberdi,[1] Miyako Kodama,[1] Michael Roggenbuck,[2] Karsten Kristiansen,[3,4] and M. Thomas P. Gilbert[1,5]

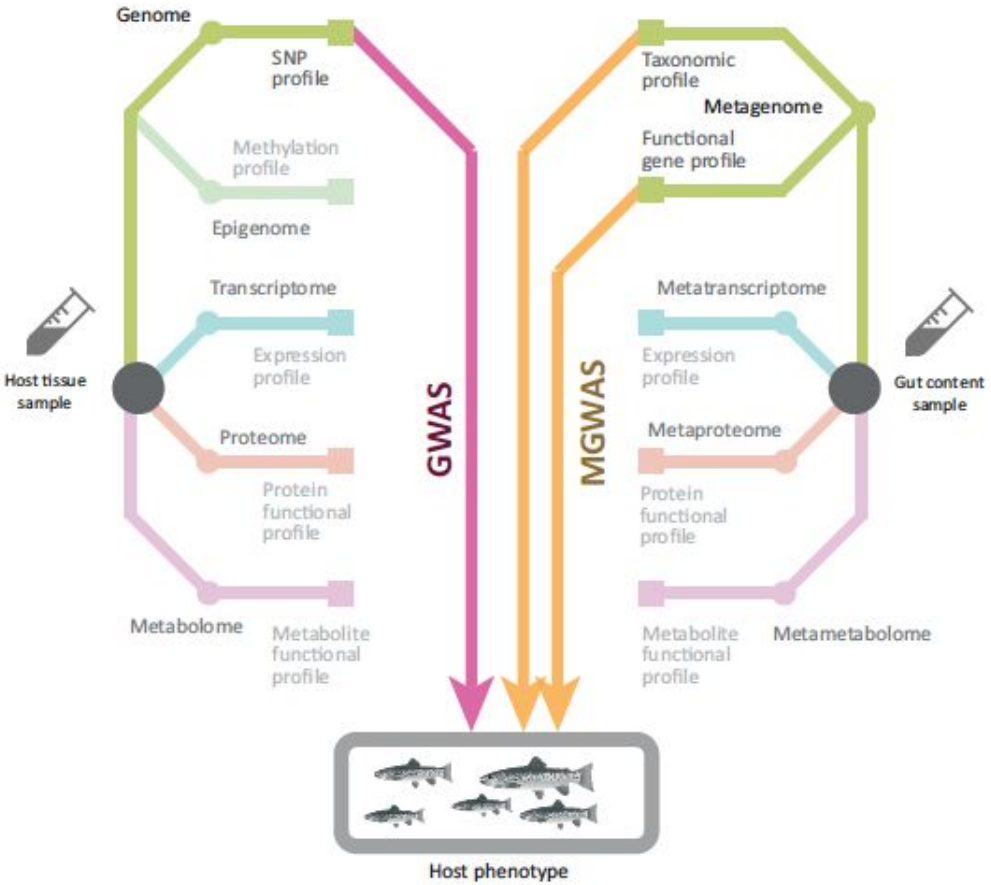
Conceptual idea

(A) The holobiont and its hologenome
Host + intestinal microorganisms



Limborg et al. 2018 TIBTECH

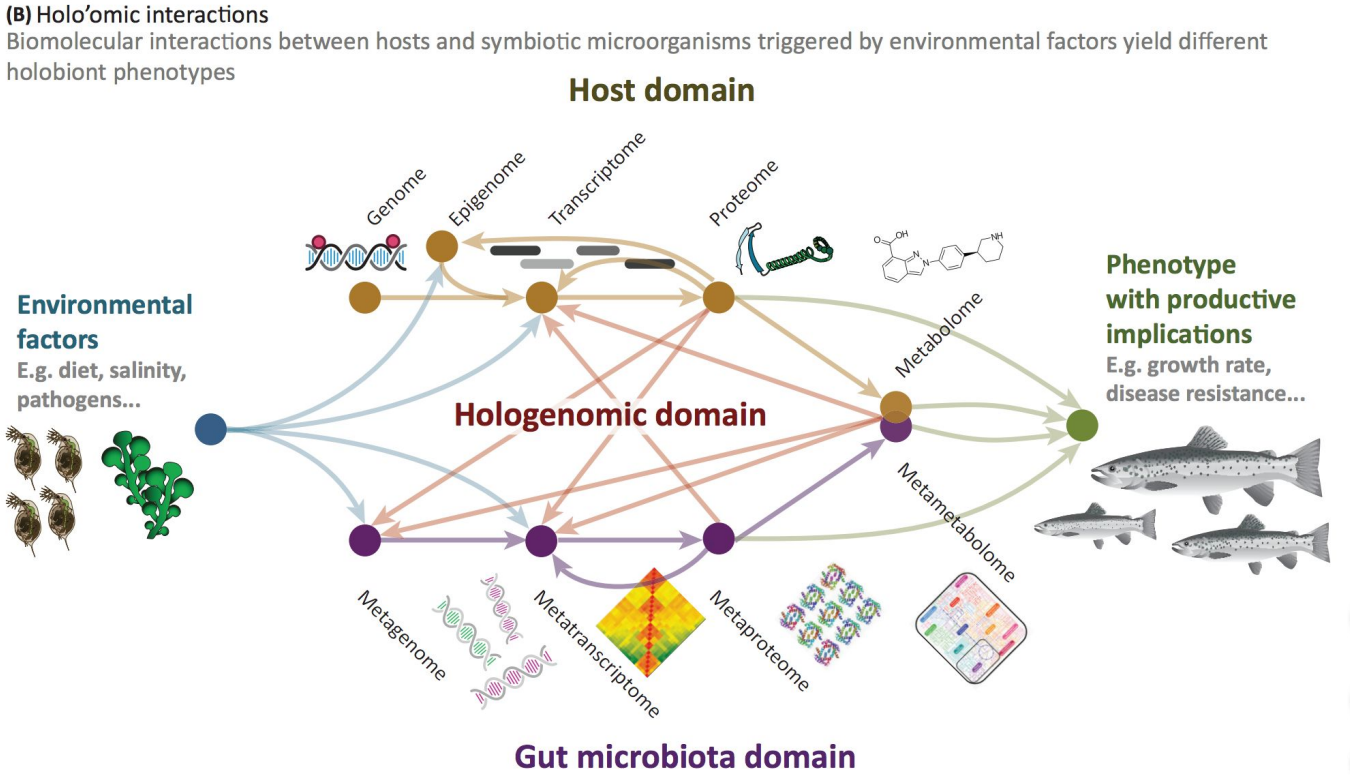
Traditional approaches



HoloFoo

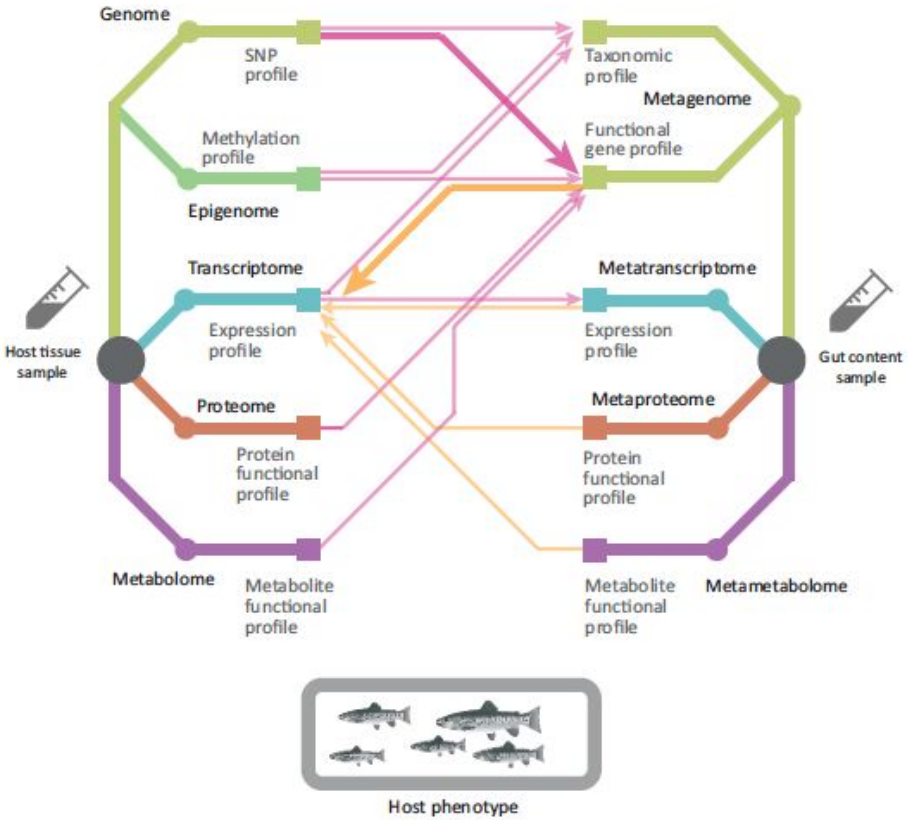
Limborg et al. 2018 TIBTECH

True biological landscape



Limborg et al. 2018 TIBTECH

The Hologenomics approach



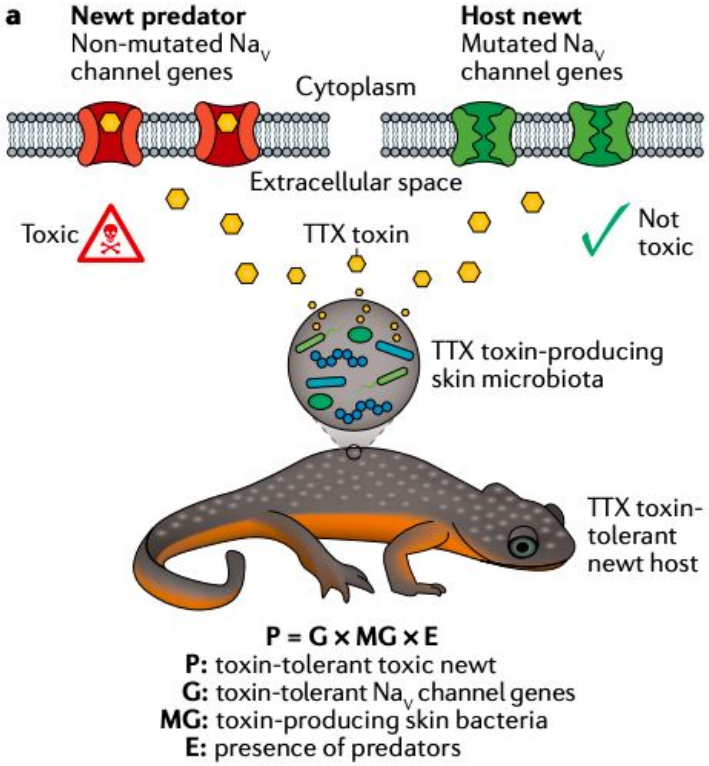
Trends in Biotechnology

Limborg et al. 2018 TIBTECH

A note on “*research questions*”

Remember the vulture

Another holobiont example



Vaelli et al. eLife (2020).

NEW EXPLANATIONS FOR OLD EVOLUTIONARY QUESTIONS

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NEW PERSPECTIVES ON APPLIED RESEARCH

COMPARE TO PERSONALISED MEDICINE

Our genes dictate type and dose of medicine

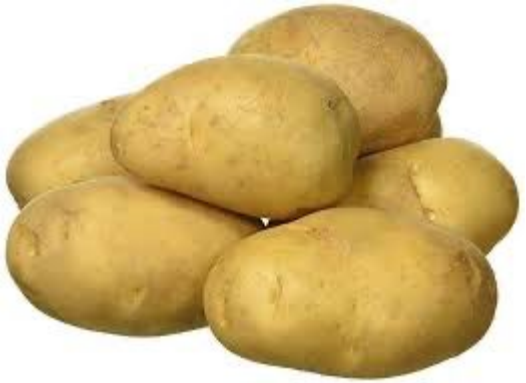
PERSONALISED MICROBIOME-THERAPY

Our genes dictate type and dose of microbial therapy

PRODUCTION ANIMALS

PETS

EVEN PLANTS ARE HOLOBIONTS



GROUP EXERCISE

GROUP EXERCISE

Think about your current research project

a. List your overall question

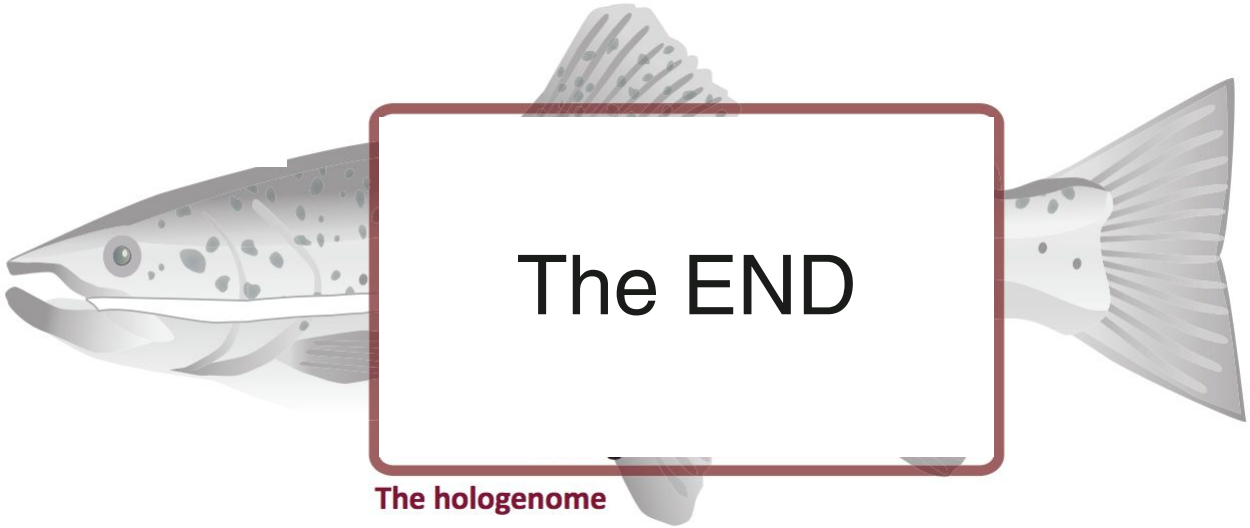
b. Outline the methods originally planned to use

c. Re-think your methods around the same question to try and make it more hologenomics

d. Speed presentations by all

NB. *If you're project is already hologenomics by nature: go make it even more HOLO and/or help your group bodies.*

An overview of a holomic approach and Q&A



September 11th-12th 2022