



Marco.van.es@Bac2nature.org

May 2023

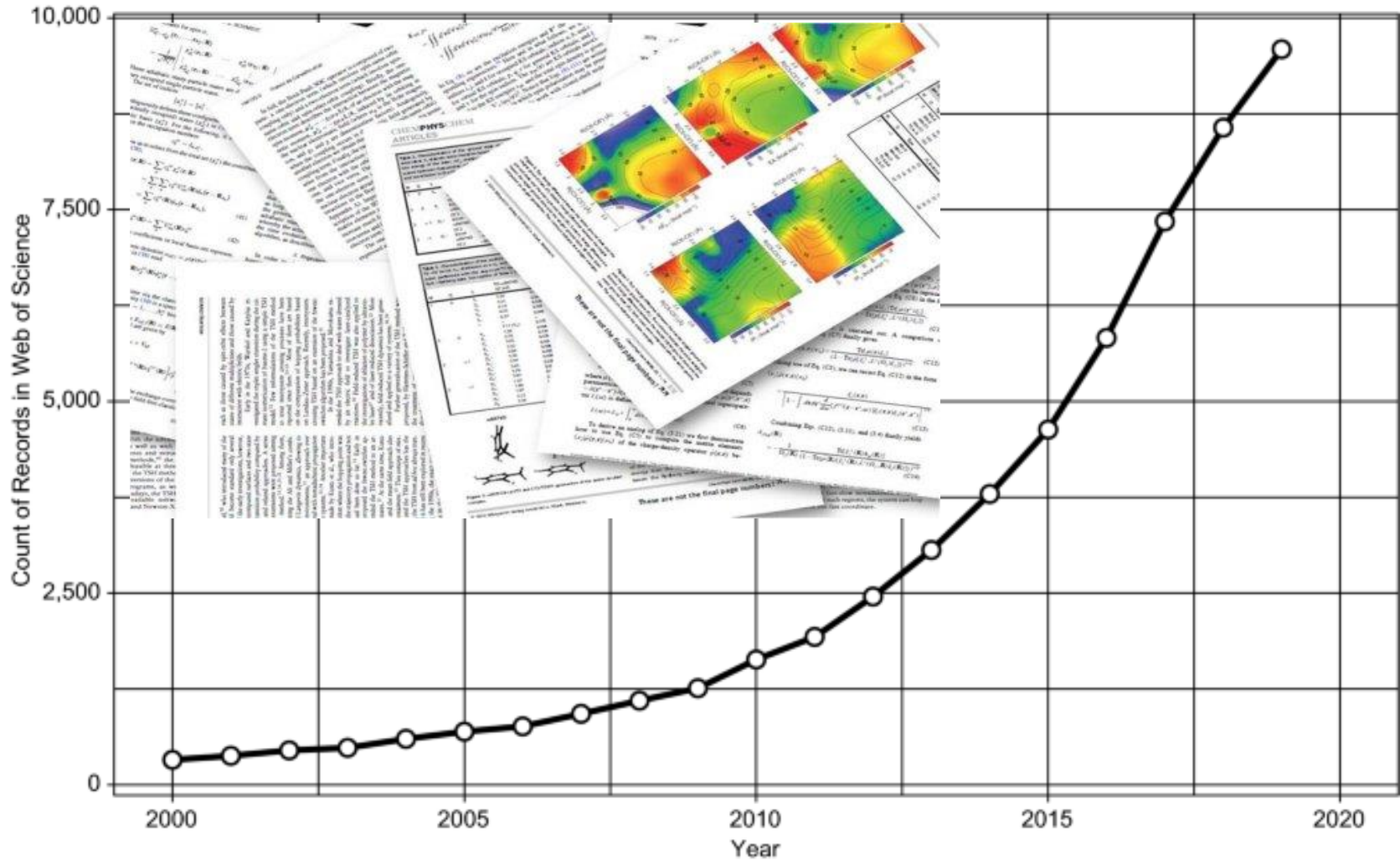




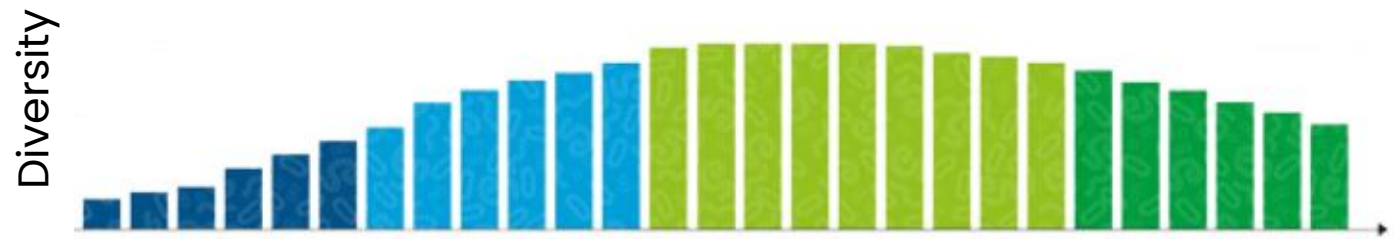
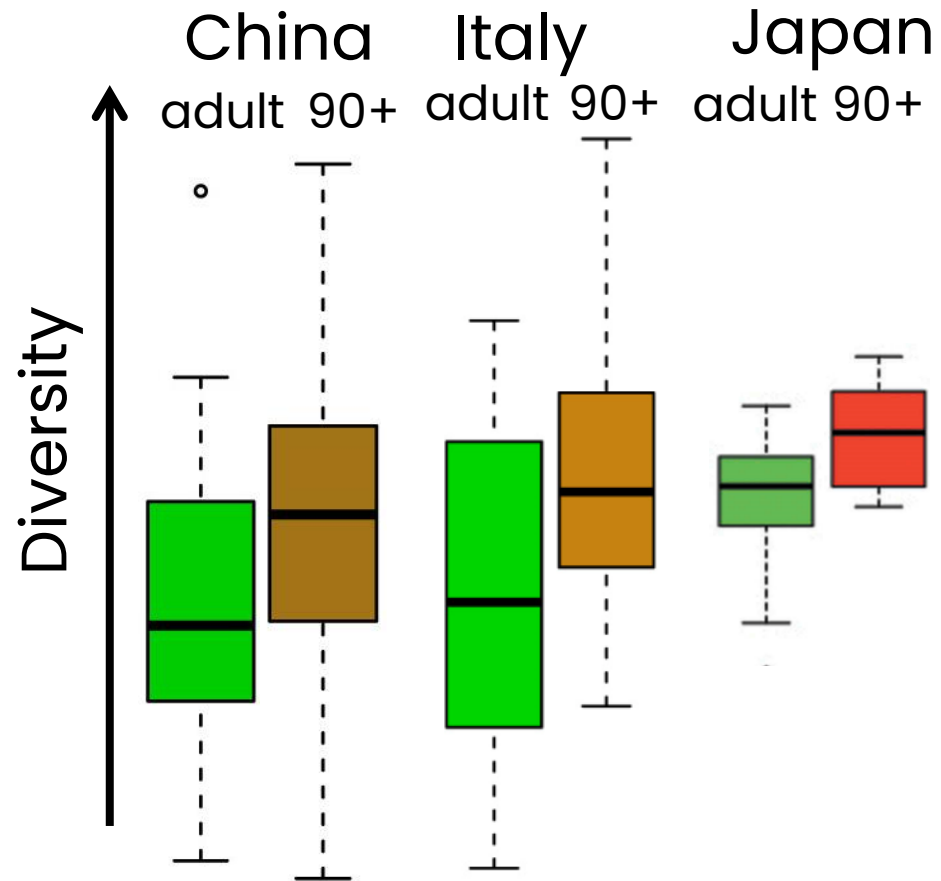
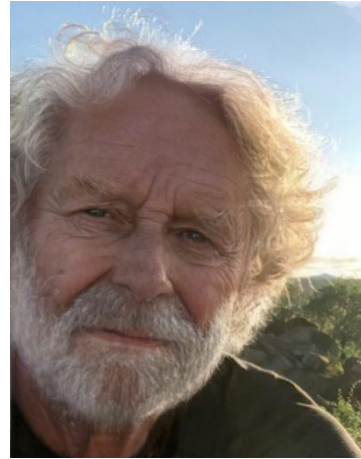
Healthy aging



Outdoor activity & Fresh local food



Healthy aging



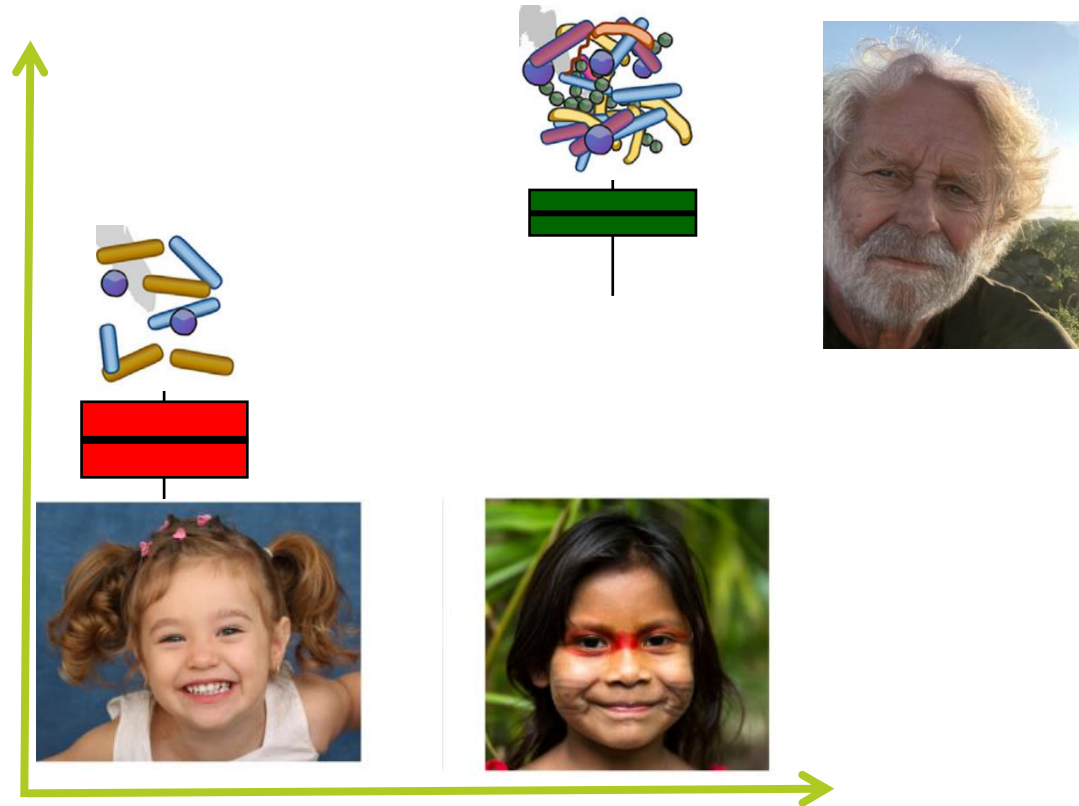


OUR PLANET



Biodiversity

Connection with Nature

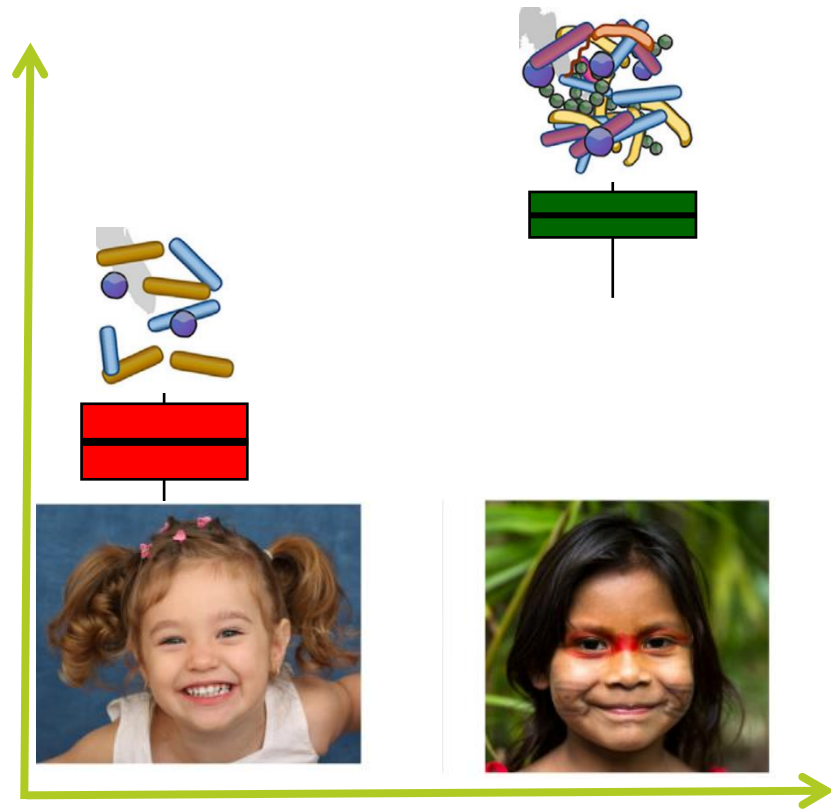




Biodiversity

Connection
with
Nature

Functionality
Resilience
Evolution

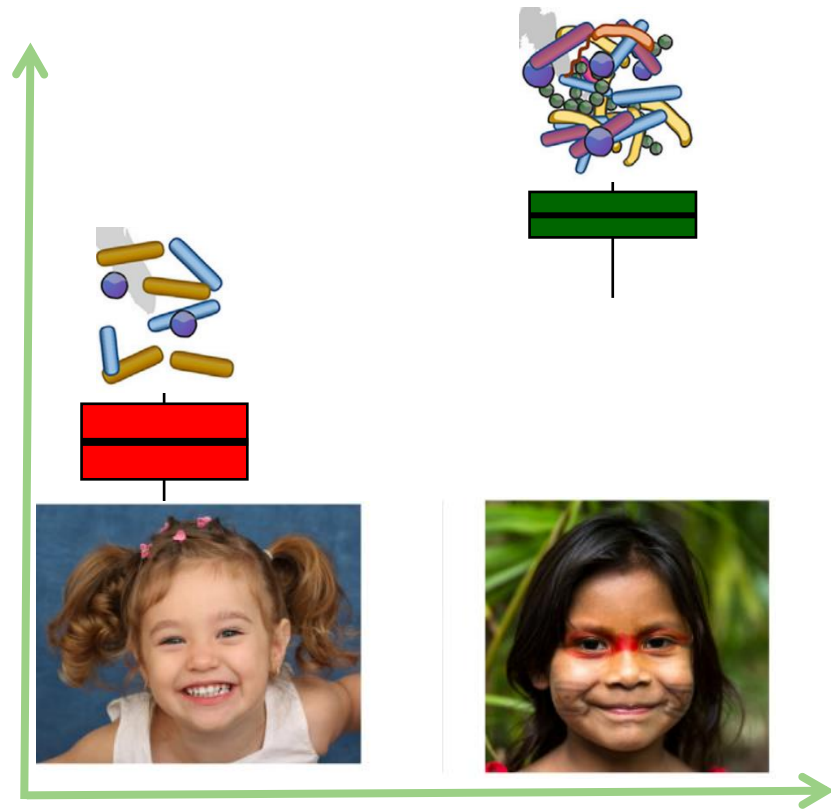




Biodiversity

Connection
with
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Functionality
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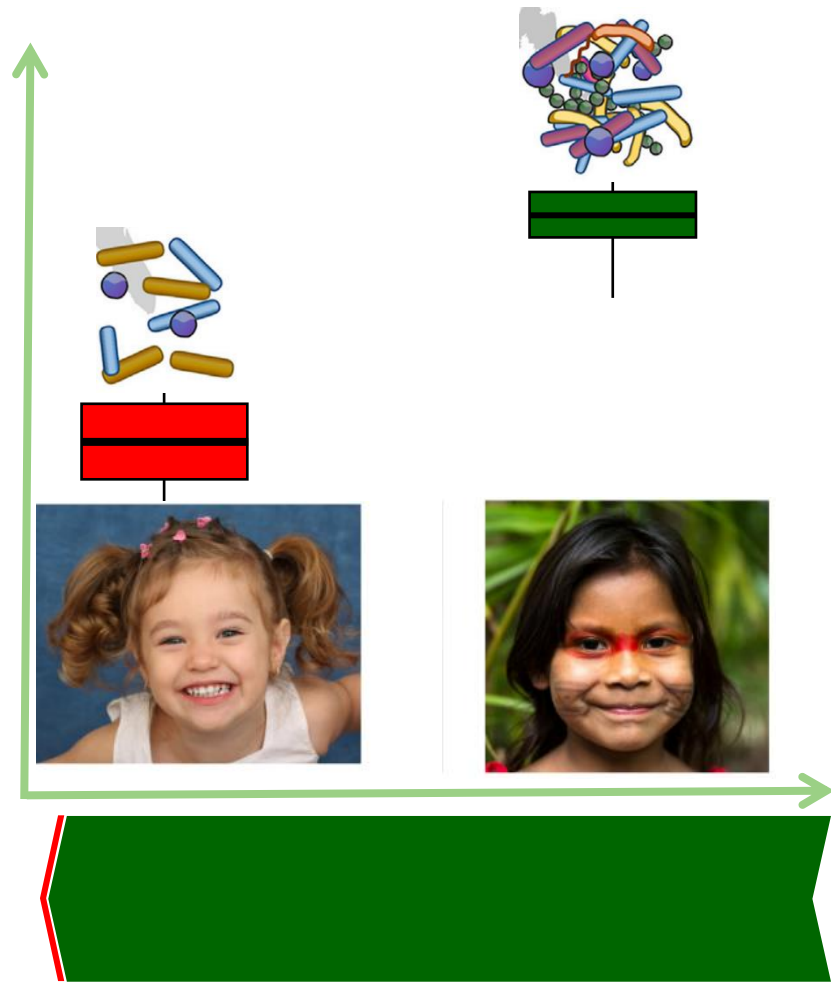




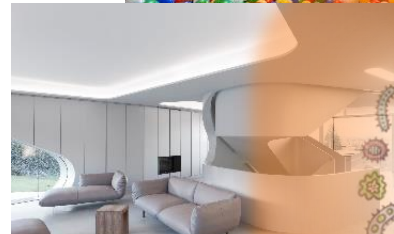
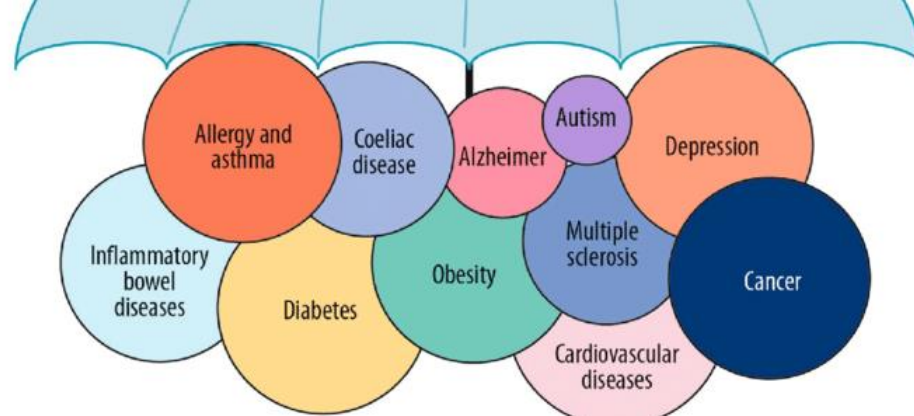
Biodiversity

Connection with Nature

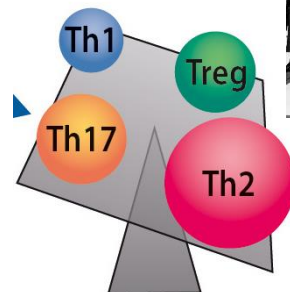
Functionality Resilience Evolution



Biodiversity hypothesis of health



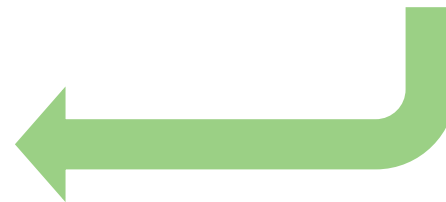
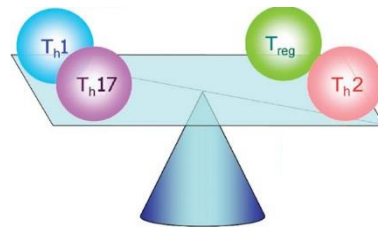
Low contact with microbial biodiversity

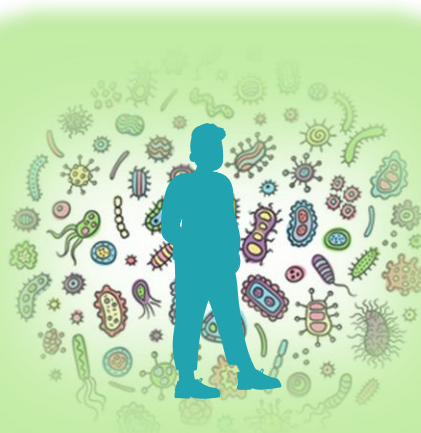
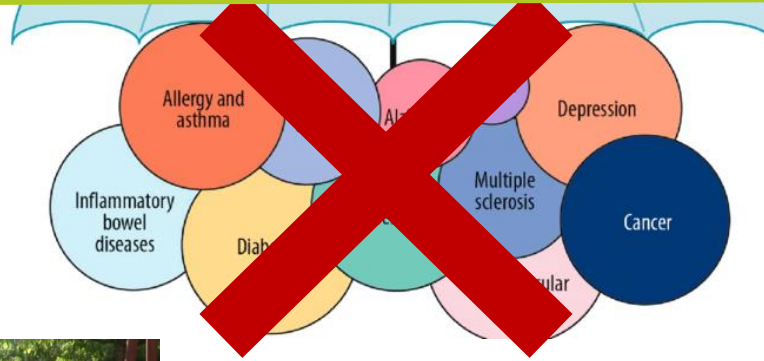


Biodiversity hypothesis of health



 **Low contact with
microbial
biodiversity**





Contact with
microbial
biodiversity

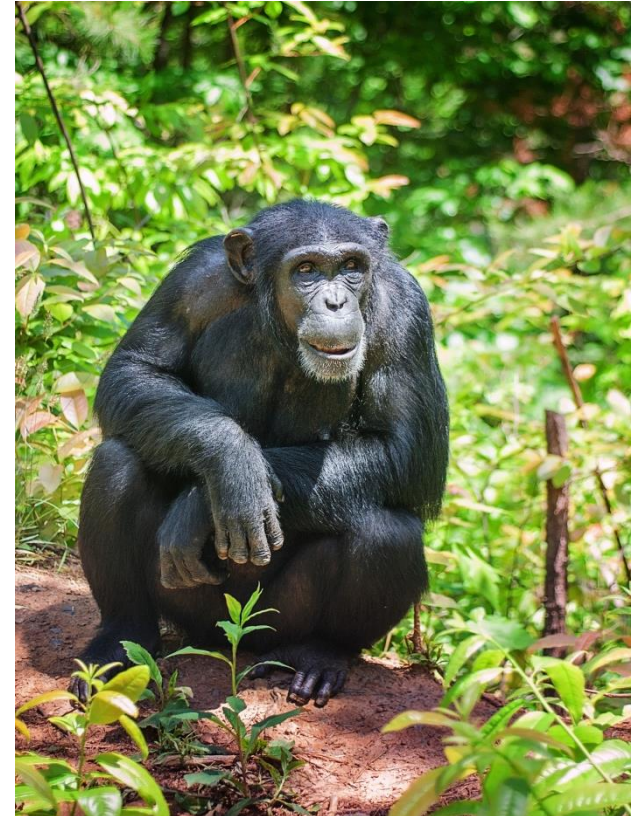
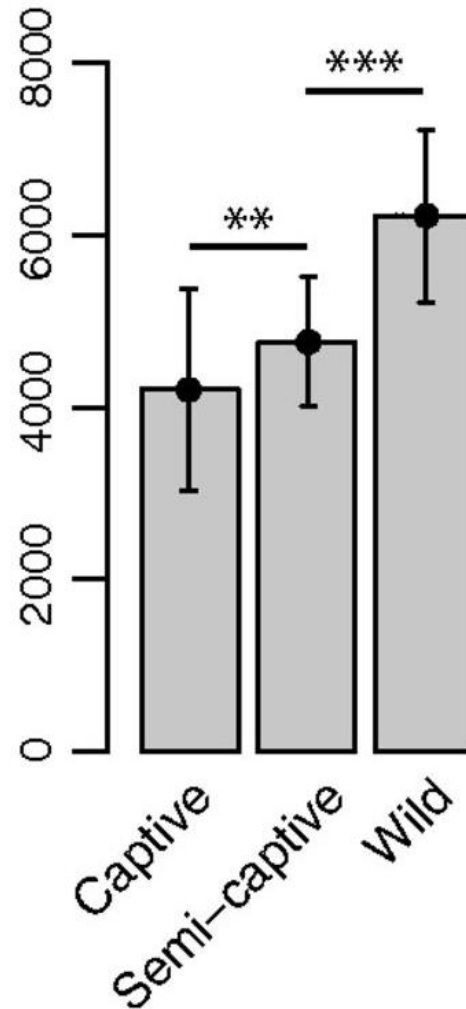


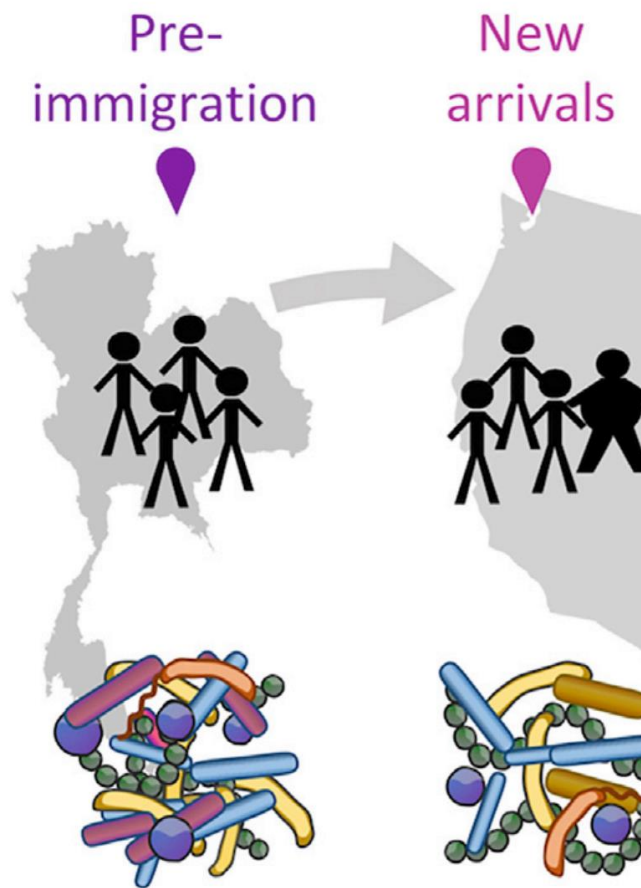
*Eat, Breathe and Touch
green*

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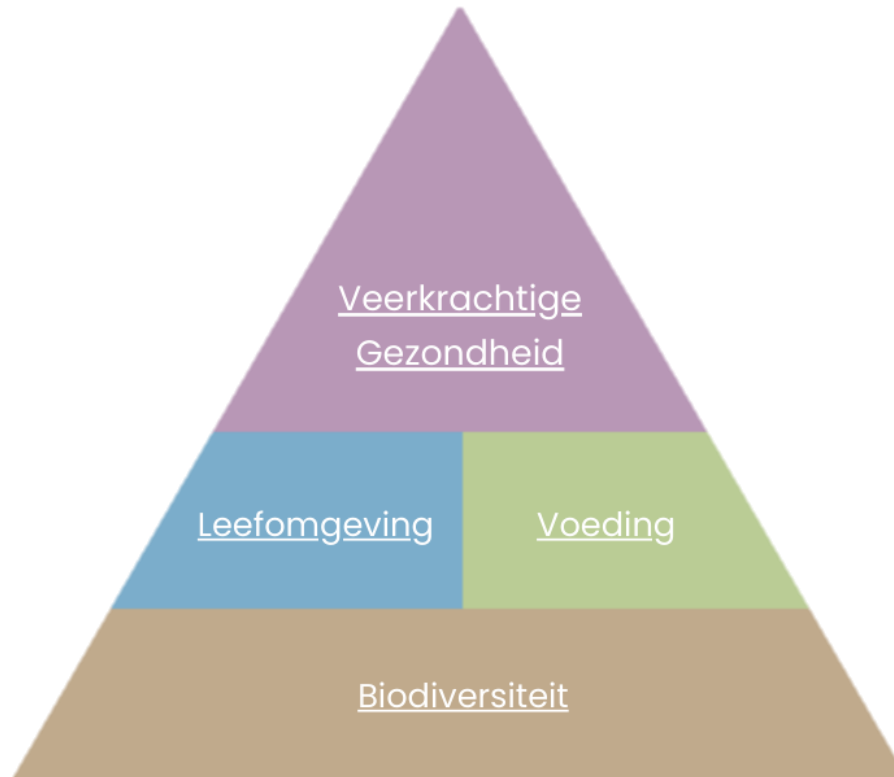


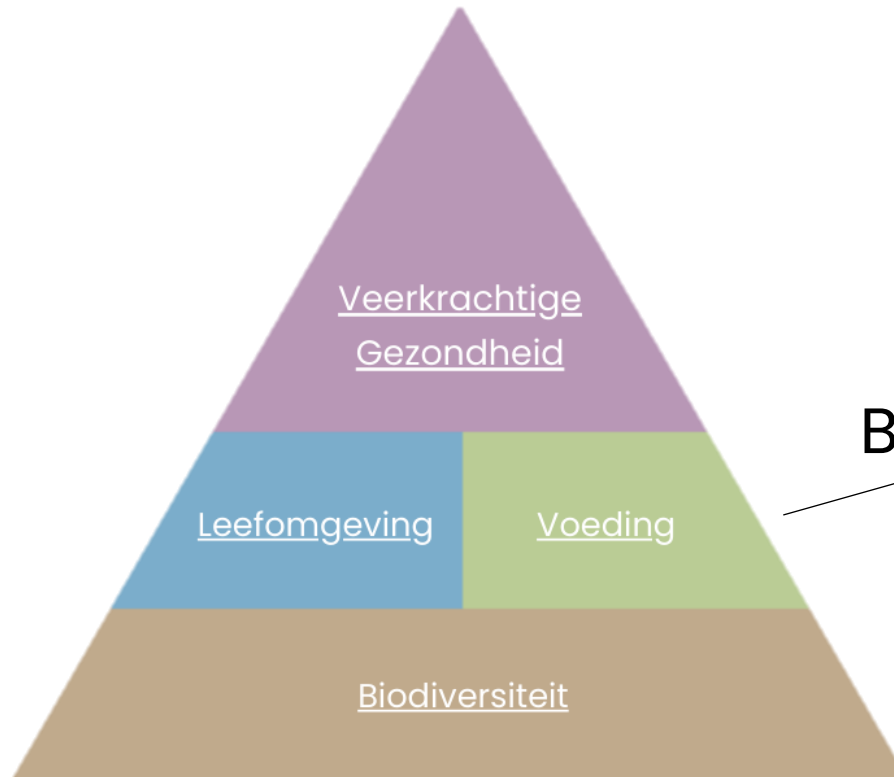




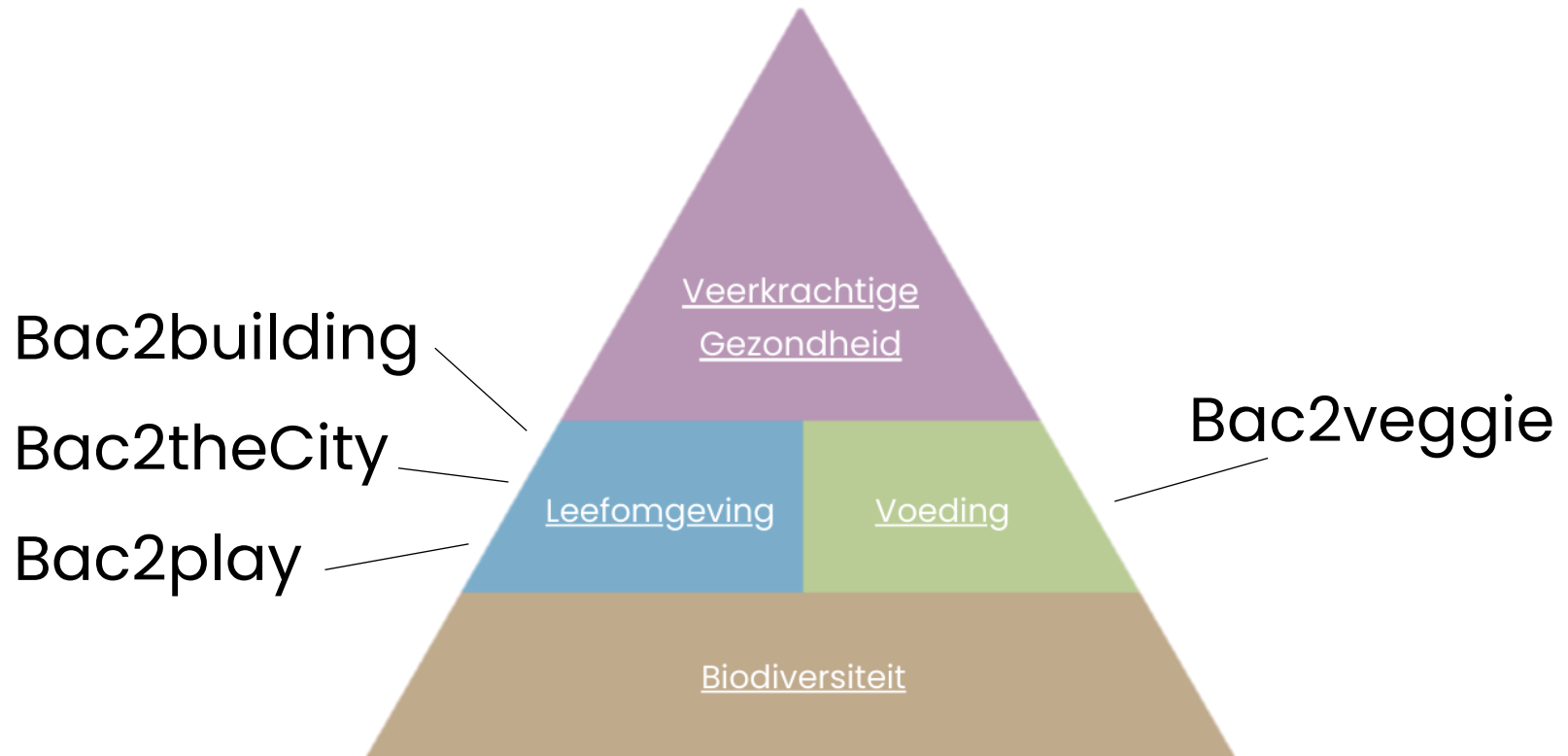
- Live on a farm, or at least have a dog or two
- Eat a diverse diet
- Eat washed raw fruits and vegetables
- Fibers
- Fermented foods
- Probiotics
- Wash hands with soap and water instead of sanitizing
- Avoid unnecessary antibiotics
- Breast feed your baby
- Avoid elective caesarean births

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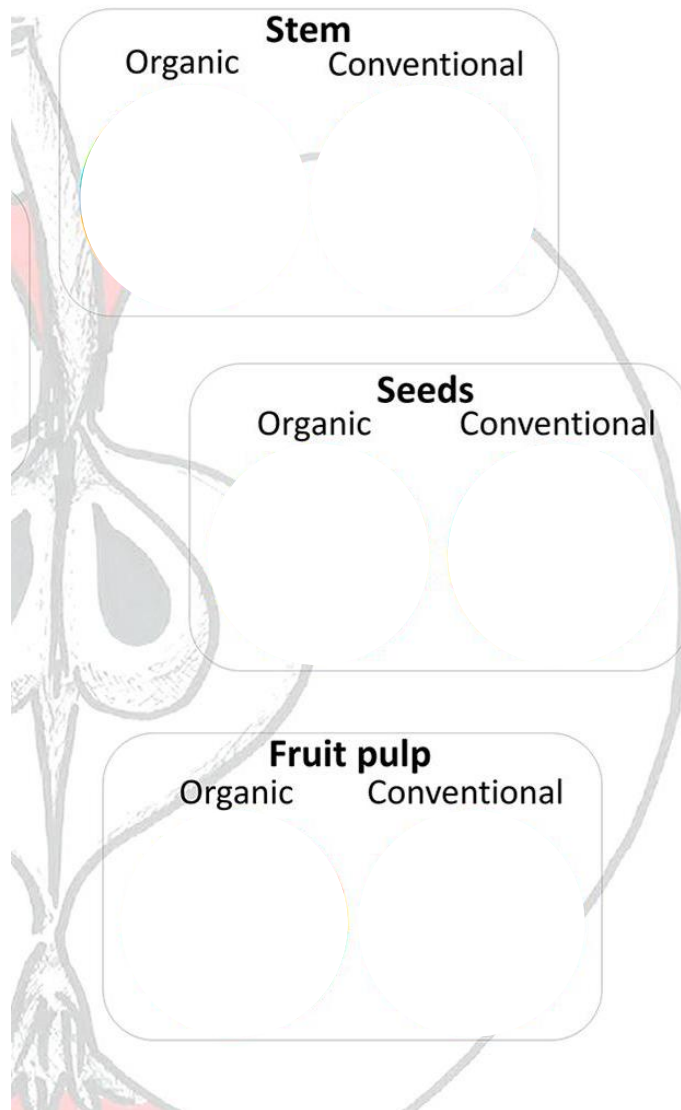




Bac2veggie

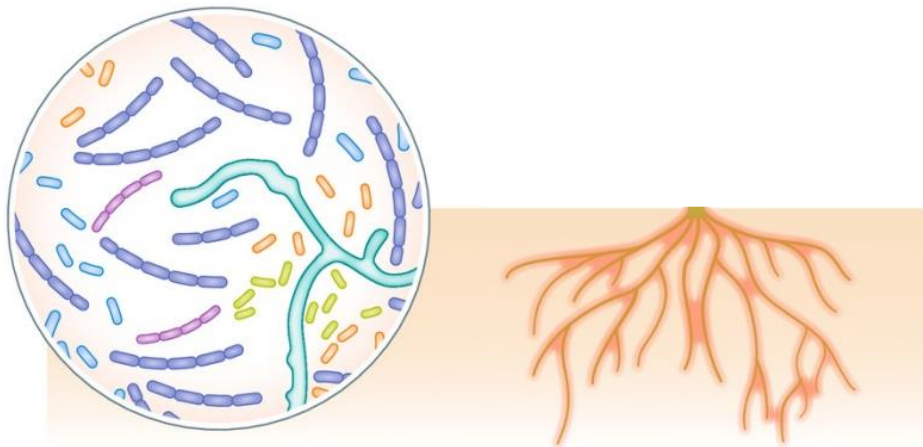




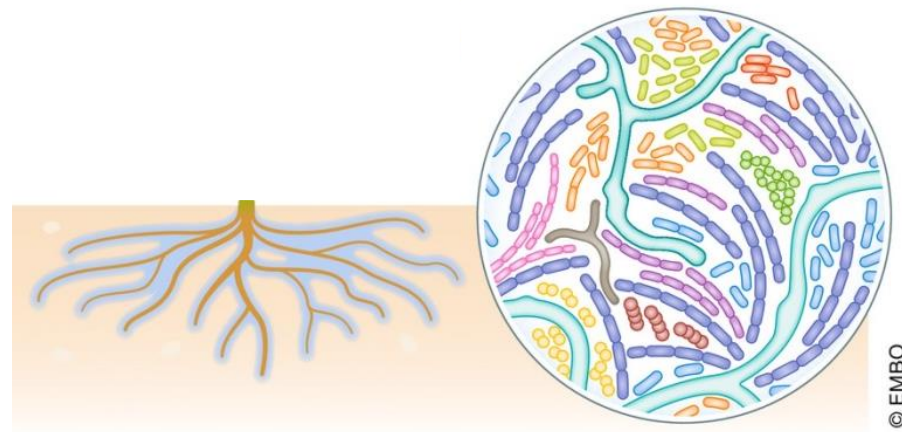


- | | |
|-------------------------|----------------------------------|
| ■ Ralstonia | ■ Sphingomonas |
| ■ Pseudomonas | ■ Massilia |
| ■ Methylobacterium | ■ Pantoea |
| ■ Burkholderia | ■ Rhizobiales sp. |
| ■ Hymenobacter | ■ Bacillus |
| ■ Variovorax | ■ Mucilaginibacter |
| ■ Curtobacterium | ■ Zymomonas |
| ■ Comamonadaceae sp. | ■ Spirosoma |
| ■ Acinetobacter | ■ Frondihabitans |
| ■ Pelomonas | ■ Acidiphilium |
| ■ Bdellovibrio | ■ Novosphingobium |
| ■ Flavobacterium | ■ Acetobacteraceae sp. |
| ■ Kineococcus | ■ Sphingomonadaceae sp. |
| ■ Planctomycetes sp. | ■ Erwinia |
| ■ Myxococcales sp. | ■ Rhizobium |
| ■ Armatimonadetes sp. | ■ Amnibacterium |
| ■ Staphylococcus | ■ Deinococcus |
| ■ Oligoflexales sp. | ■ Caenimonas |
| ■ Oxalobacteraceae sp. | ■ Sphingobium |
| ■ Pedobacter | ■ Sorangium |
| ■ Rathayibacter | ■ Gluconobacter |
| ■ Legionella | ■ Aquabacterium |
| ■ Bradyrhizobium | ■ Corynebacterium |
| ■ Paenibacillus | ■ Acidobacteria sp. |
| ■ Microbacteriaceae sp. | ■ Chryseobacterium |
| ■ Rhizobiales sp. | ■ Terriglobus |
| ■ Pectobacterium | ■ Stenotrophomonas |
| ■ Nitrospira | ■ Soil Crenarchaeotic Group(SCG) |
| ■ Buchnera | ■ Arthrobacter |
| ■ Streptococcus | ■ Reyranela |
| ■ Fructobacillus | |

POOR
soil microbiome



RICH
soil microbiome





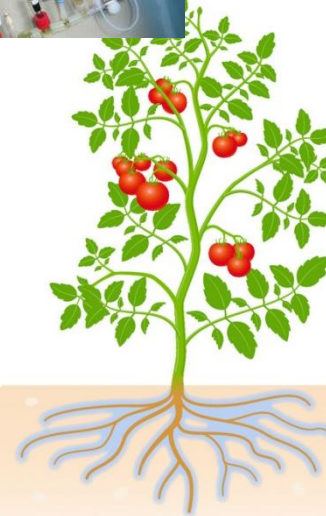
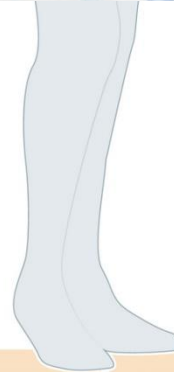
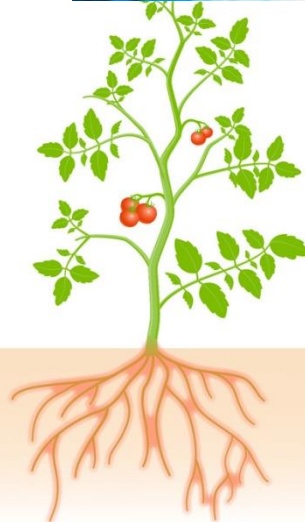
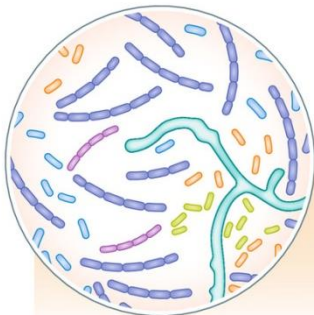
Rob Baan, Koppert Cress

“...Do you realize that this is the first time in 40 years of horticultural experience that I see a measurable difference between Organic and Conventional? If it is measurable instead of a feeling or an emotion, this is a world-class study...”



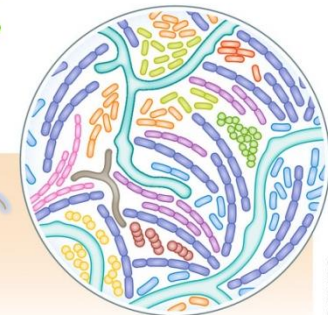
FRAGILE
plant microbiome

POOR
soil microbiome



HEALTHY
plant microbiome

RICH
soil microbiome



2020

2021

2022

2023



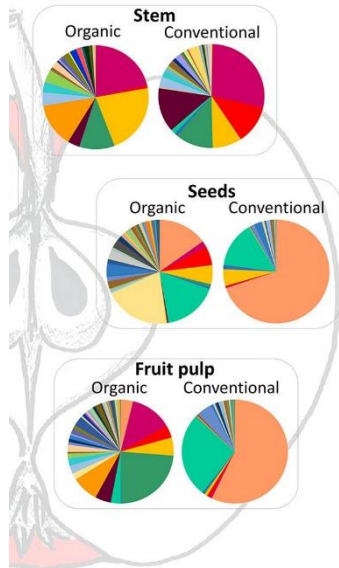
Maastricht University



Sample size too small



VU UNIVERSITY AMSTERDAM



Maastricht University

Louis Bolk Instituut



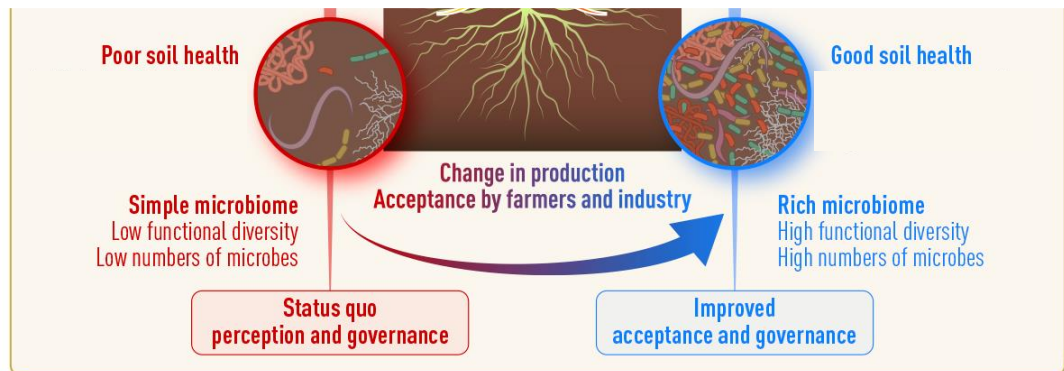
€ 1.8 M Steering soil microbiomes for better crop quality





Steering soil microbiomes

The holy grail to improve human health



2023 -> 2028





Voedingsgeneeskunde

PLATFORM VOOR GEZONDHEIDSPROFESSIONALS

VOEDING

JANET A. KOMDUUR EN MARCO VAN ES (BAC2NATURE)^{1,2}

Microbiële biodiversiteit van de bodem

HOE DRAAGT DEZE BIJ AAN ONZE GEZONDHEID?

tekst: Janet Komduur en Marco van Es | foto: Pexels

VOEDING NU

Bac2Nature

Groente en fruit de vergeten probiotica?

In en op verse groentes en fruit is een enorme variatie aan micro-organismen aanwezig. Zouden we in de toekomst rauw gegeten groenten en fruit als 'probiotica 2.0' kunnen classificeren? Een pleidooi voor nader onderzoek.



 Arts en Leefstijl
Voor de zorg van morgen



Marco van Es

Oprichter stichting Bac2Nature



Natuurvoedingskundigen
Raad & Daad natuurvoeding





Our findings suggest that biodiversity intervention

enhances immunoregulatory pathways and provide an incentive for future prophylactic approaches to

reduce the risk of immune-mediated diseases in urban societies.

Restoring biodiversity of day care playgrounds to kick start children's health

6 MSc Wageningen +
Day care
GGD
RIVM
Landscaping
Soil microbiome
Health care

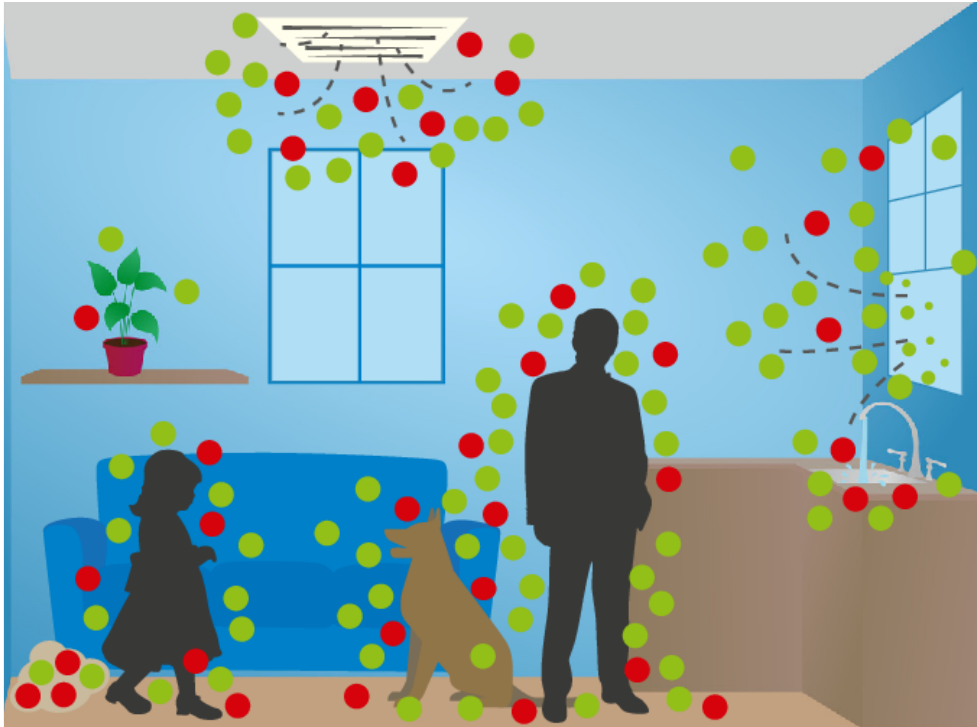




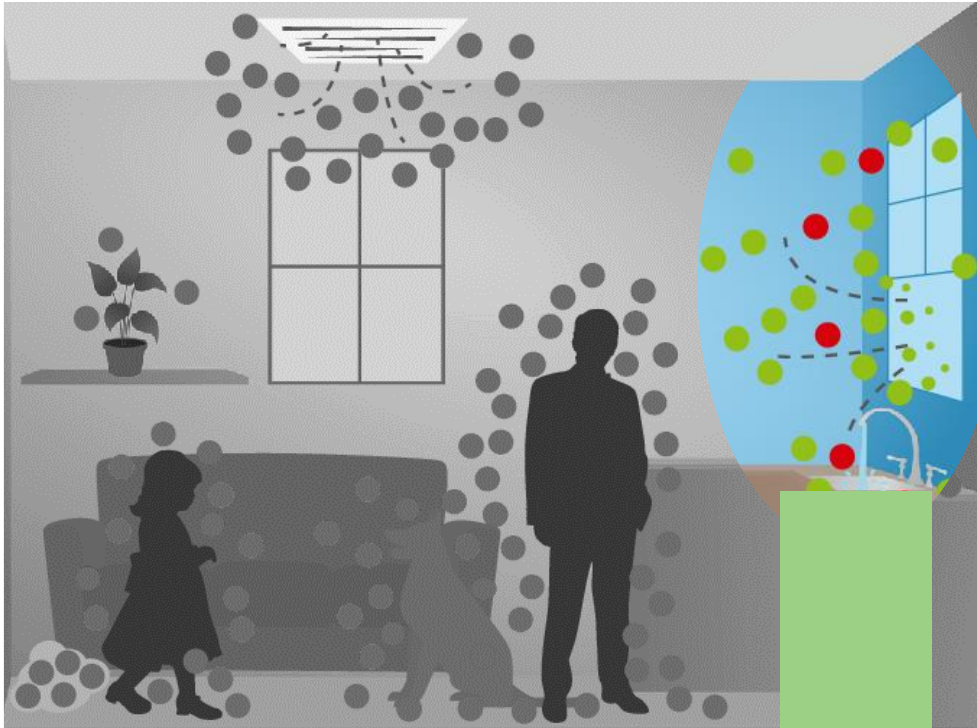
Prof. Dr. Louise Vet

“As a scientist and president of the Deltaplan Biodiversity recovery and grand mother I am very much in favour of the Bac2play initiative to enhance the biodiversity at day-cares. Implement in The Netherlands, ASAP!”





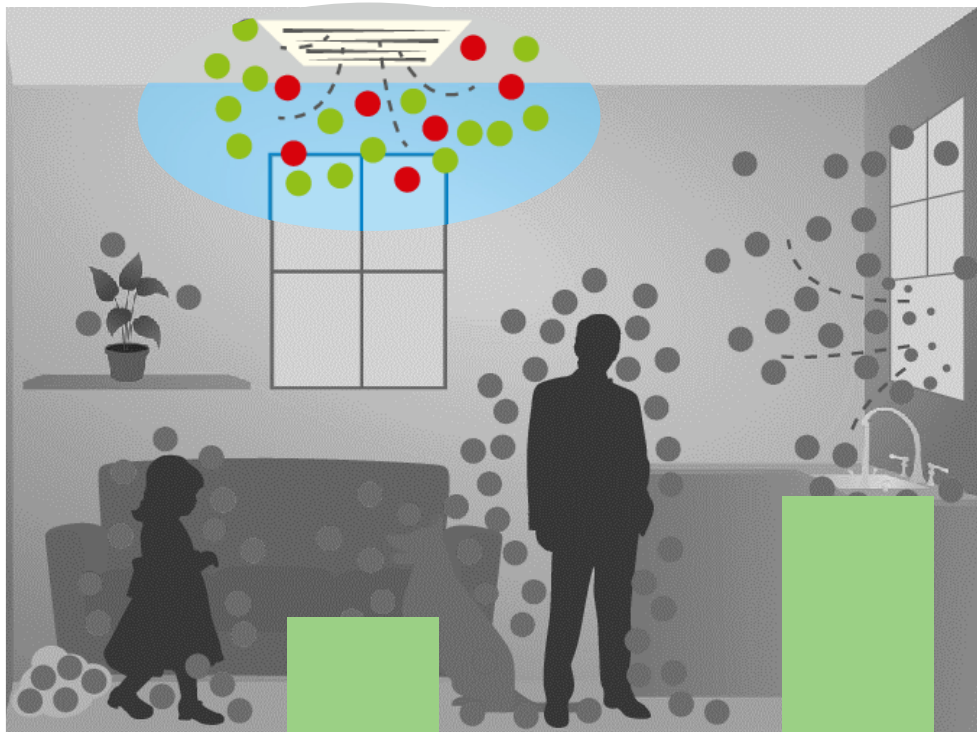
27



22



27



13

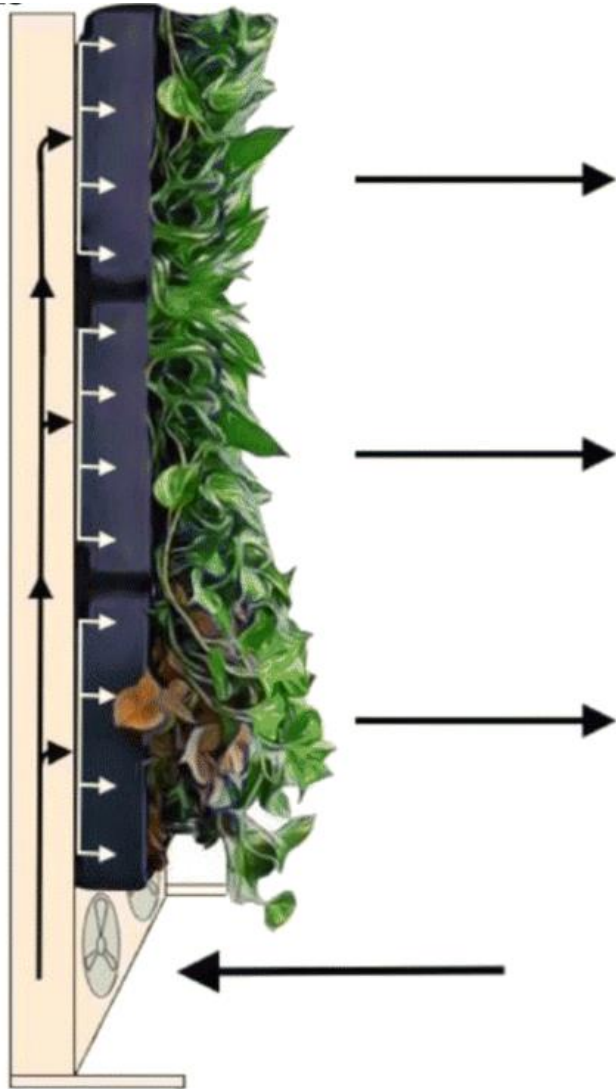


22



27





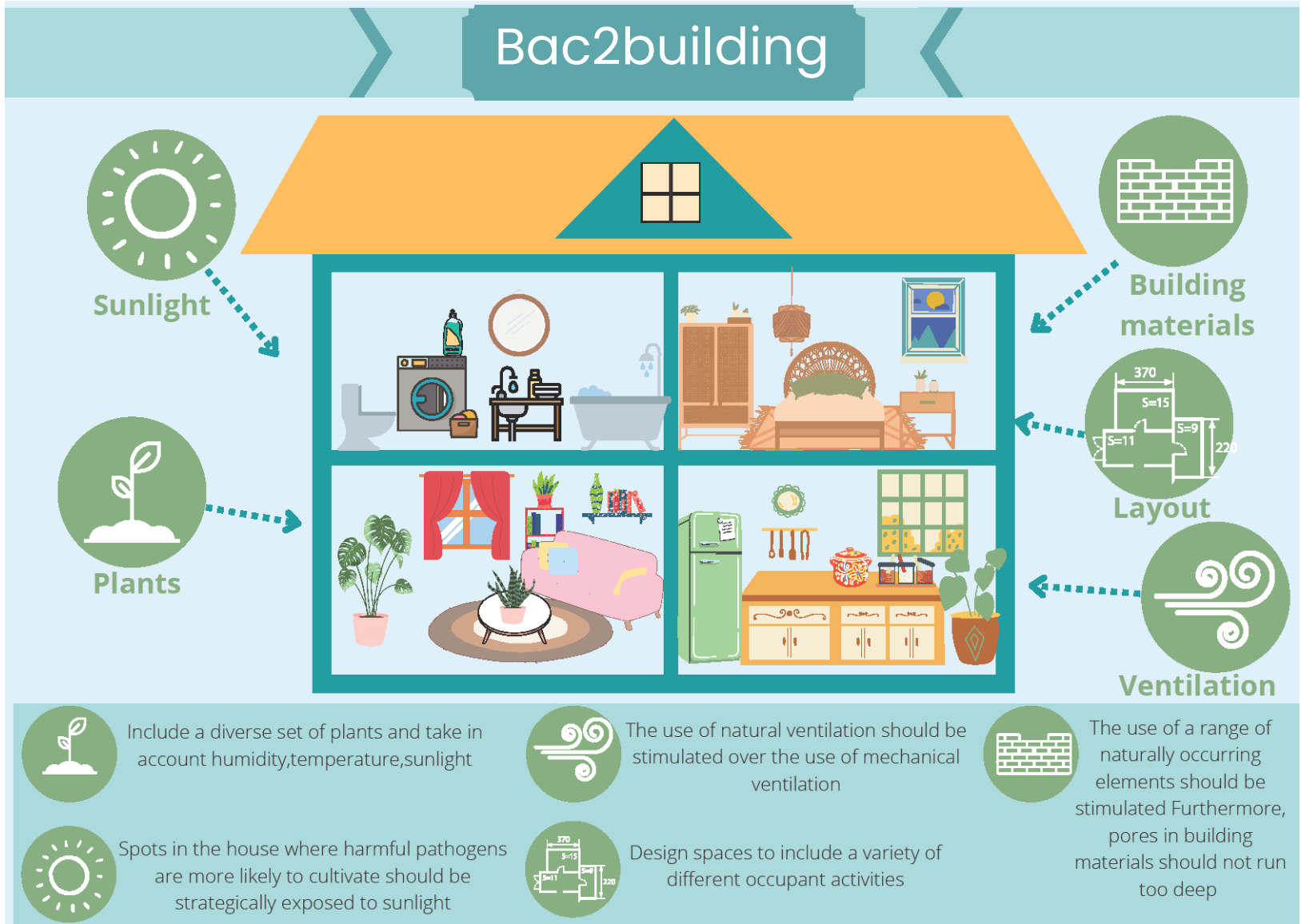
a randomized trial among
urban office workers

air-circulating green walls may
induce beneficial changes in a
human microbiome













Soil dust exposure experiments

-

Biodiverse soil dust modulates gut microbiota
Bacteria from biodiverse soils may have an anxiety reducing effect



0

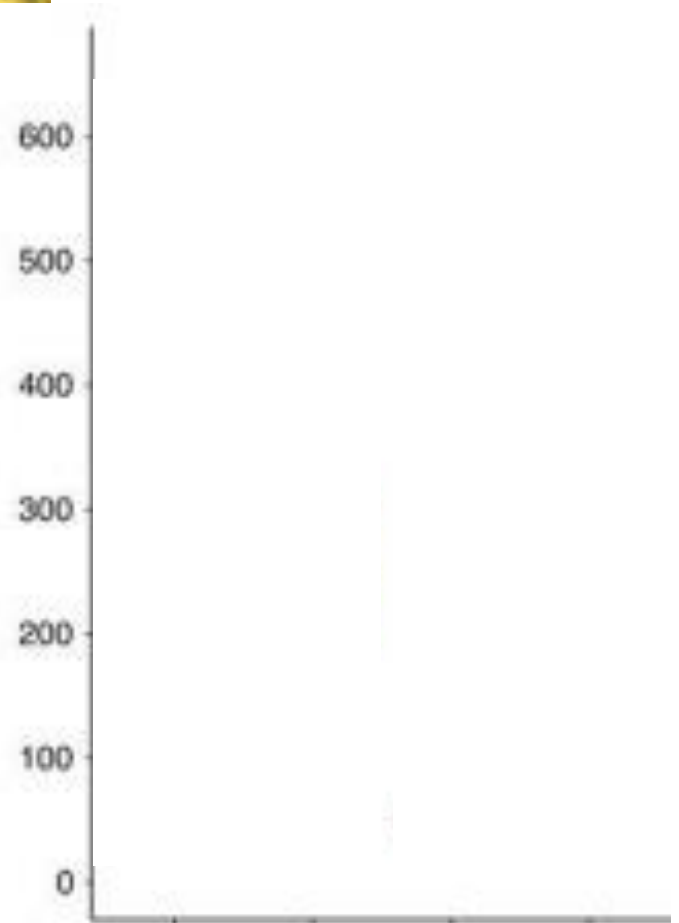
Diversity

8

Rural kids have higher gut microbiome diversity
& lower prevalence of asthma and allergy



Observed Species





Residential green environments are associated with human milk oligosaccharide diversity

Prof. Dr. Stanley Brul

Prof. Dr. Ger Rijkers

Prof. Dr. rer. nat. Gabriele Berg

Prof. Dr. Hauke Smidt

Prof. Dr. Koen Venema

Prof. Dr. Paul Savelkoul

Dr. Freddy Troost

Prof. Dr. Renger Witkamp

Prof. Dr. Ben Witteman

Prof. Dr. Dinand Ekkel

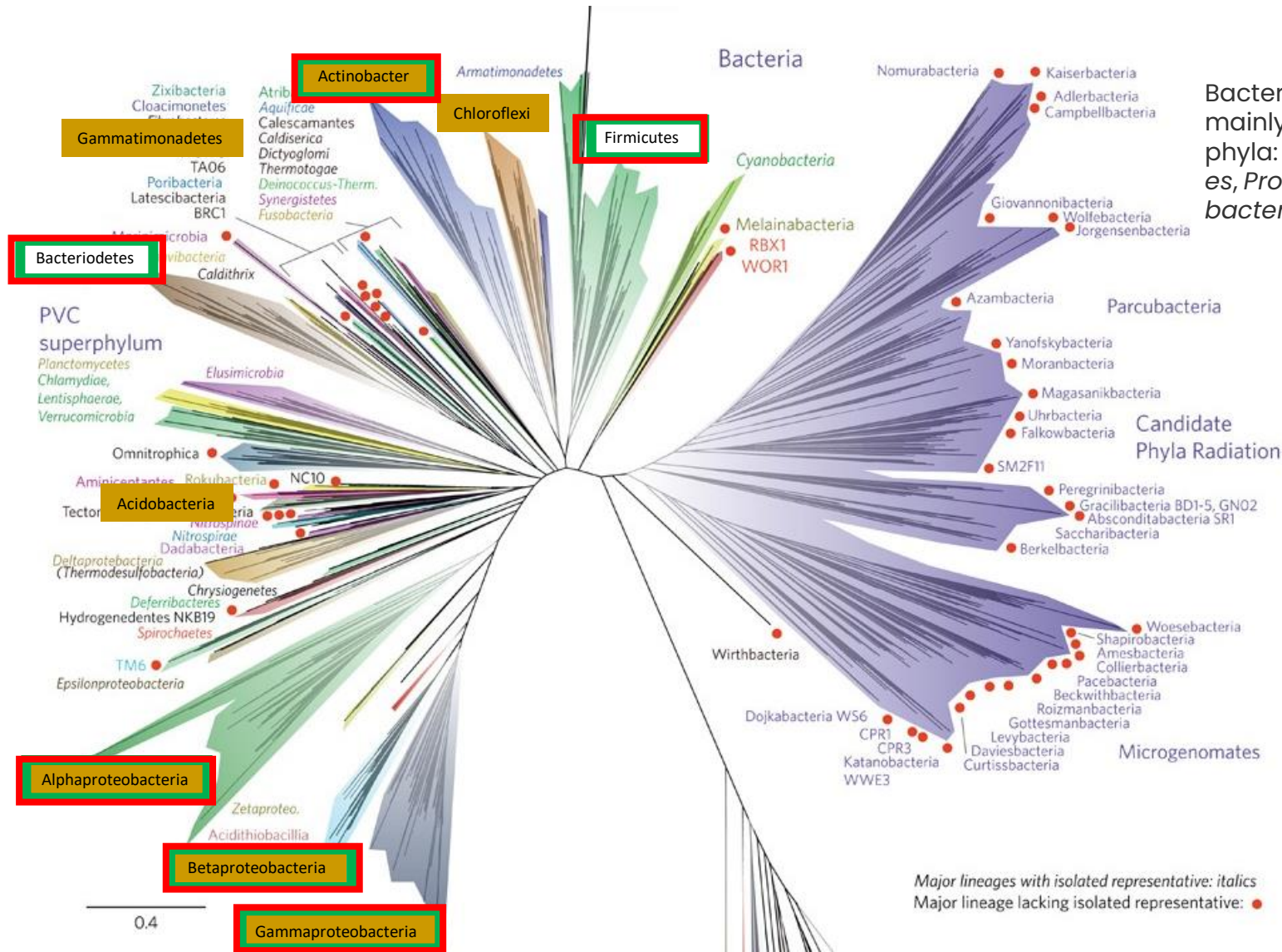
Prof. Dr. Andreas Schwiertz

Dr. Hermie Harmsen

Dr. Erwin Zoetendal



Soil – Plants – Human gut



Bacteria residing on the skin mainly fall into four phyla: *Firmicutes*, *Bacteroidetes*, *Proteobacteria* and *Actinobacteria*. [Source](#)

- Soil
- Plant
- Human

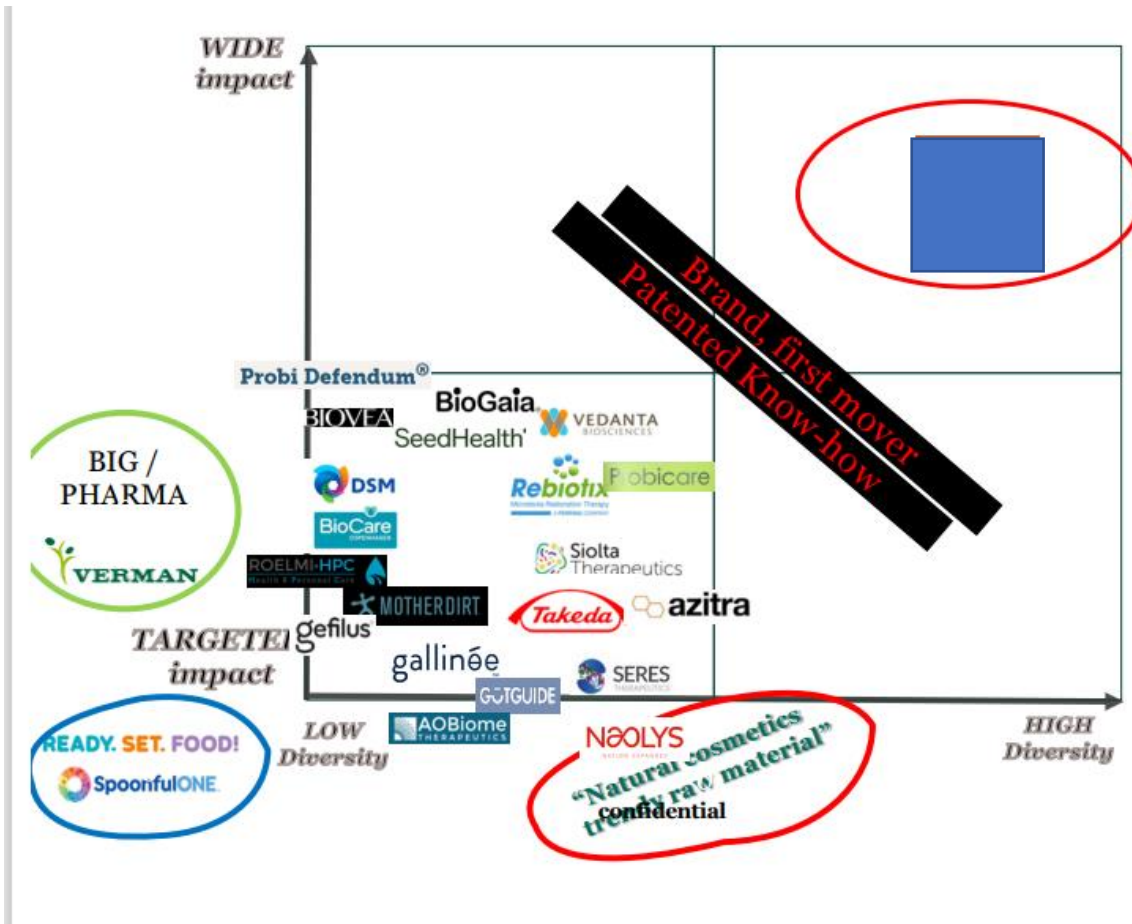
Major lineages with isolated representative: *italics*
 Major lineage lacking isolated representative: ●

Exposure versus Targeted Hygiene



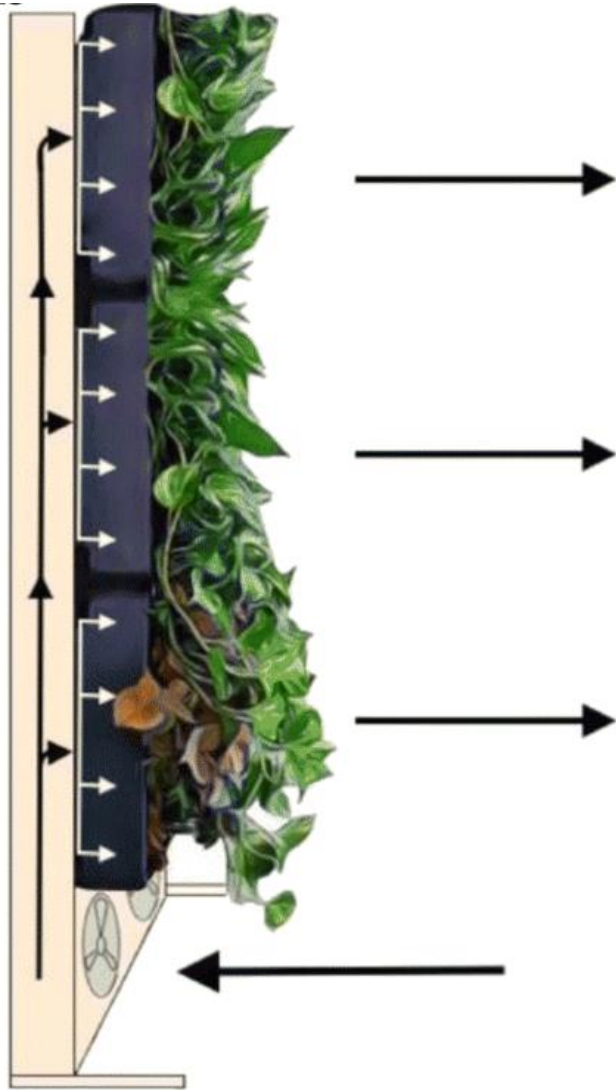
Exposure versus Targeted Hygiene







Product concept



a randomized trial among
urban office workers

air-circulating green walls may
induce beneficial changes in a
human microbiome