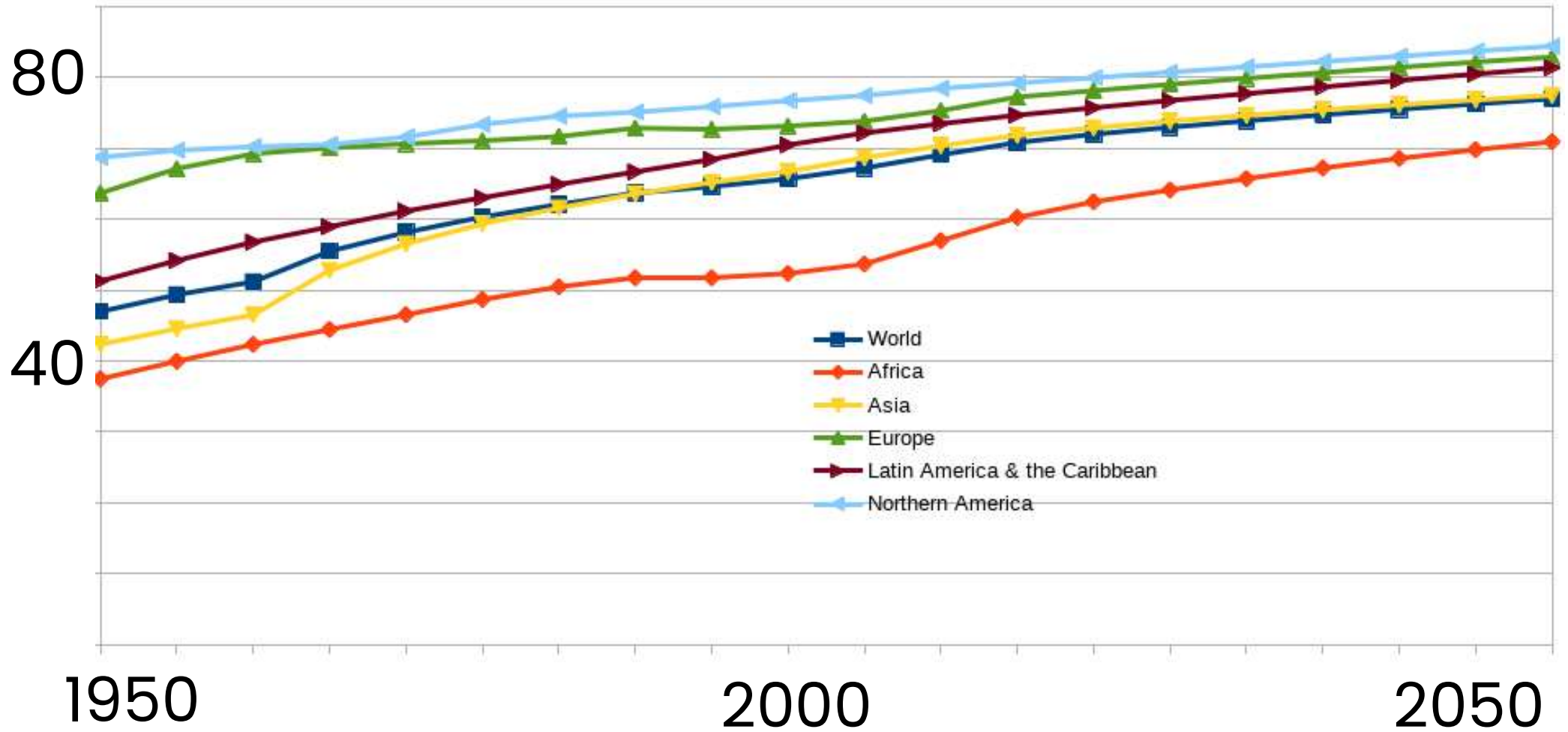






FaceApp

Aging



Chronic diseases of 65+



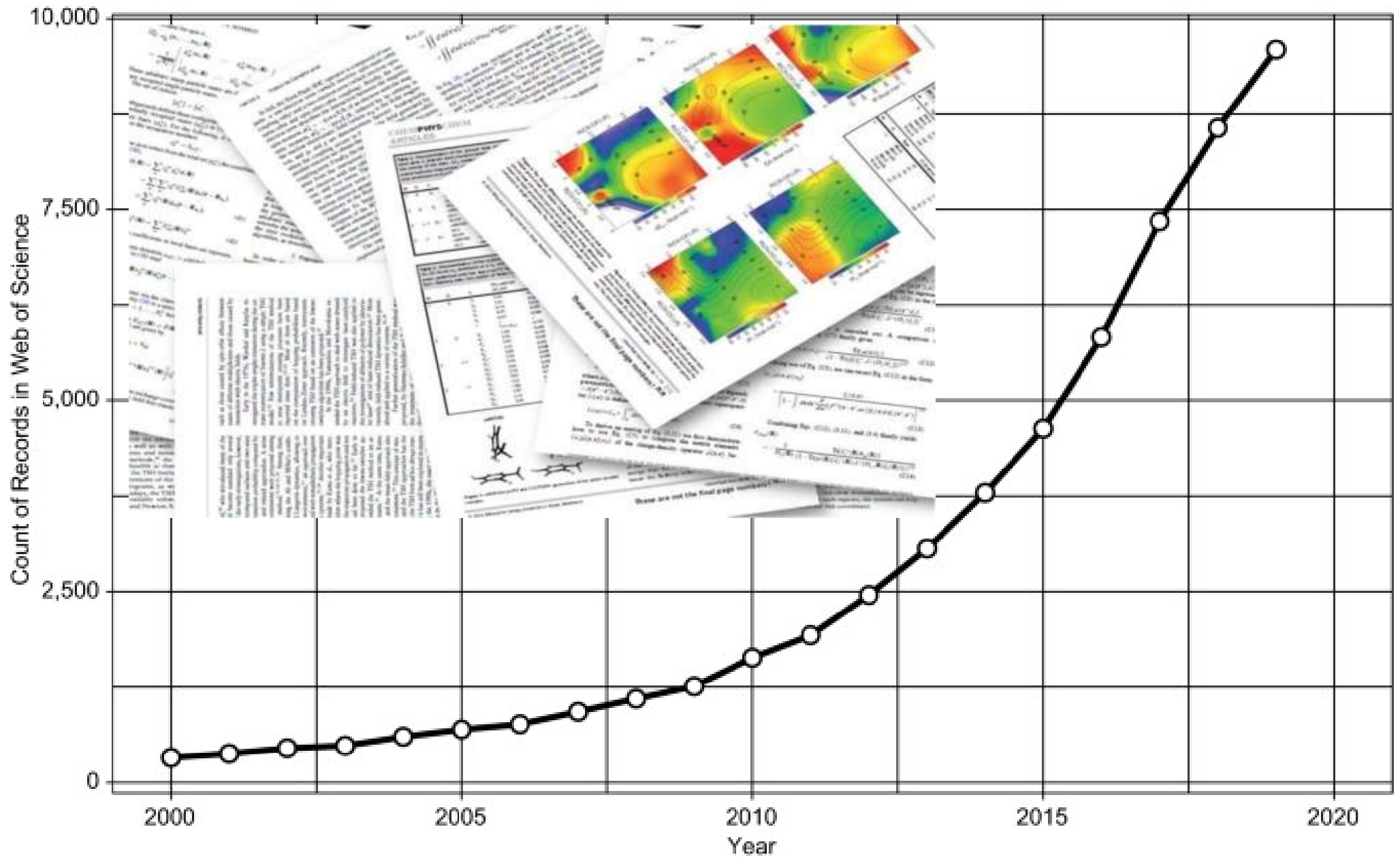
Healthy aging



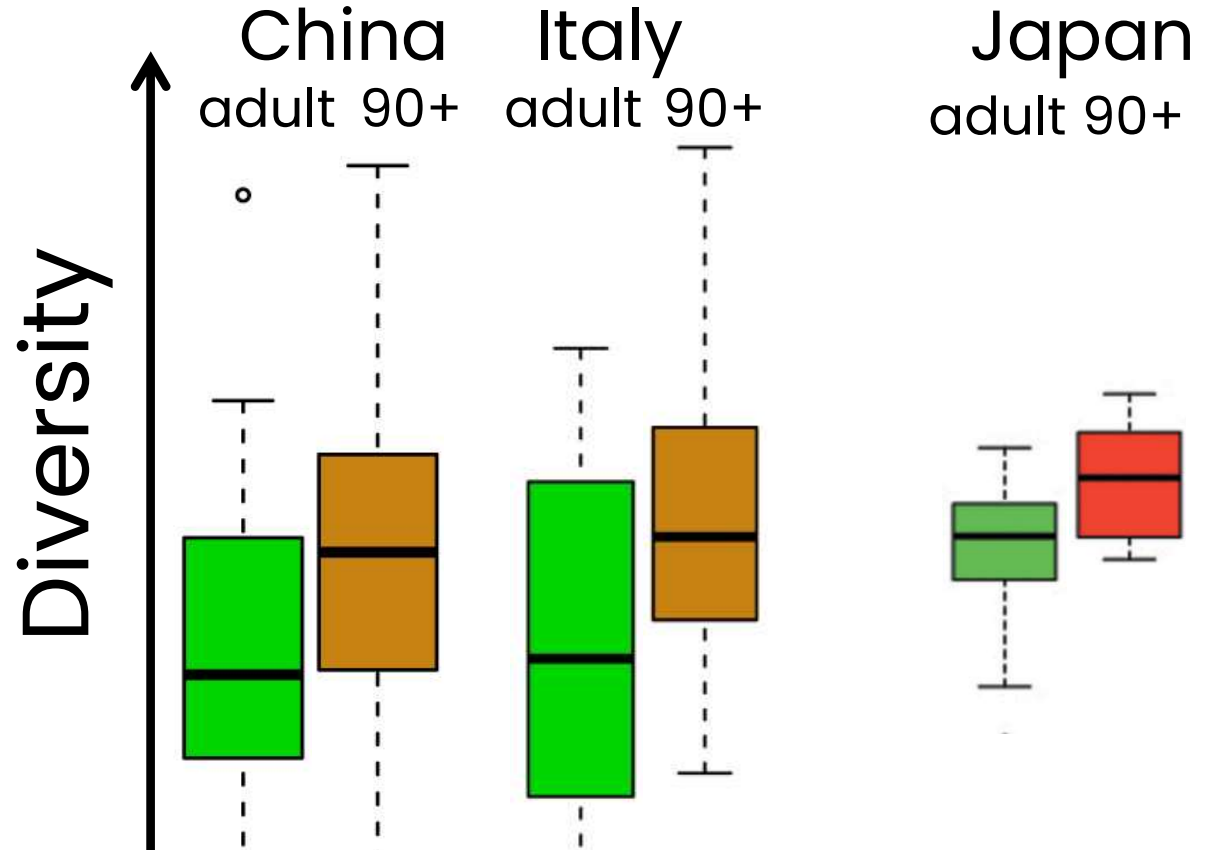
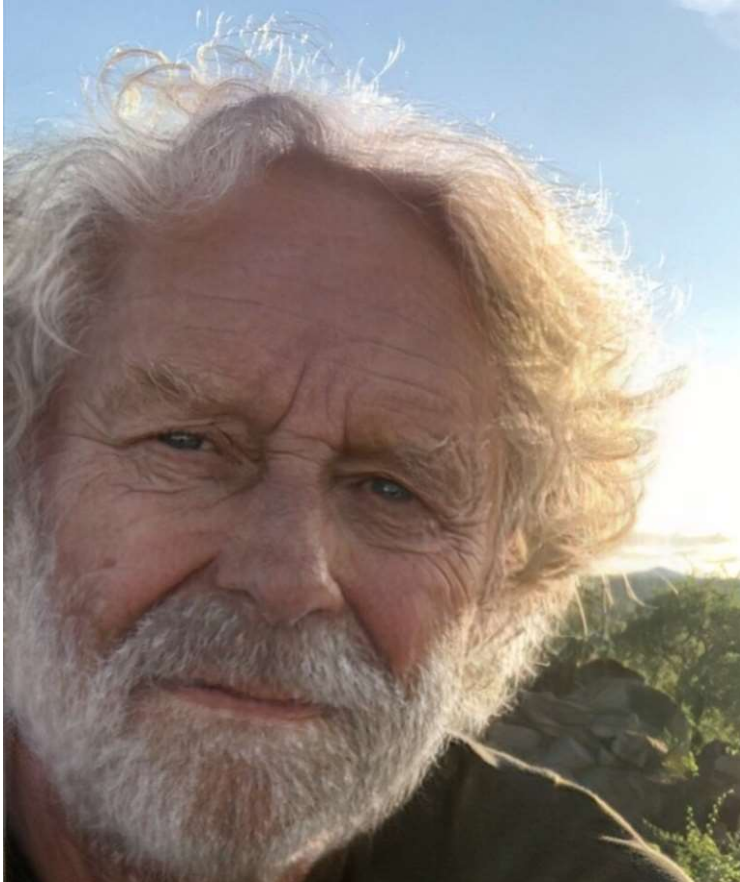
Purpose
Relaxation
Close social ties
Medical care

Physical outdoor activity
Eat local produced food

Bacteria and health



Healthy aging



Diversity

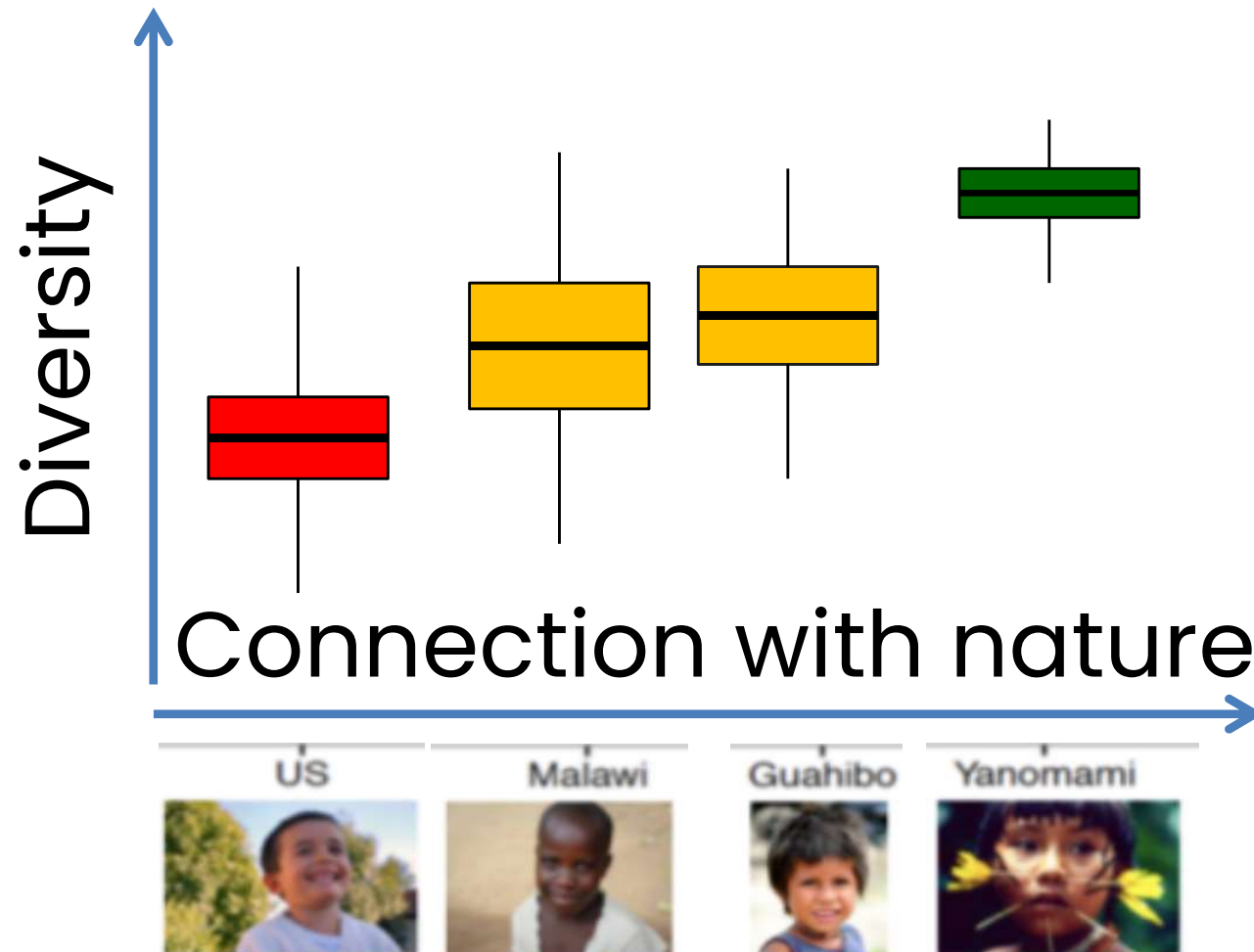

THE FIRST 1,000 DAYS OF LIFE
 From conception until the 2nd year of life
 


ADULTHOOD


ELDERLY



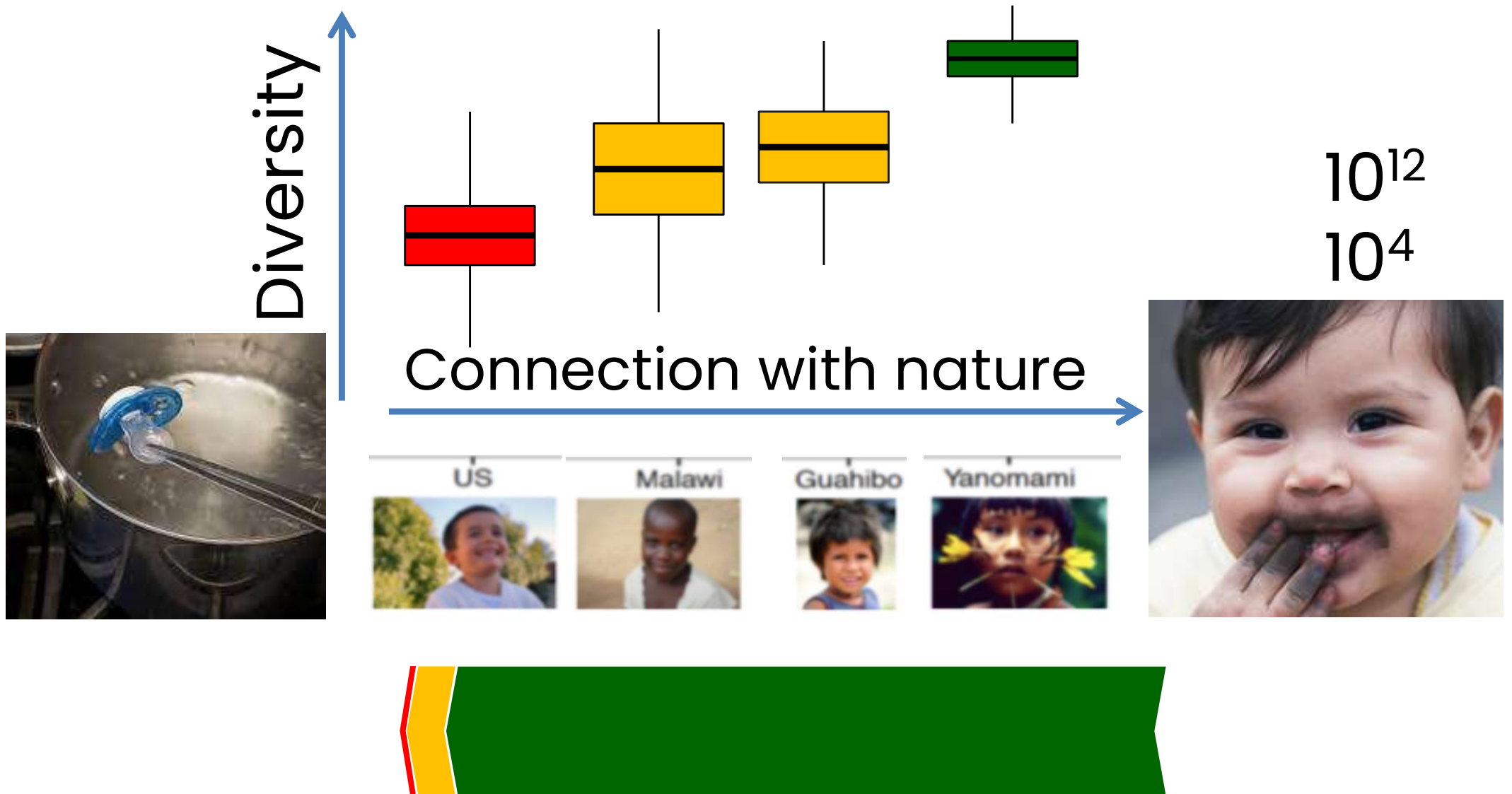
Human evolution



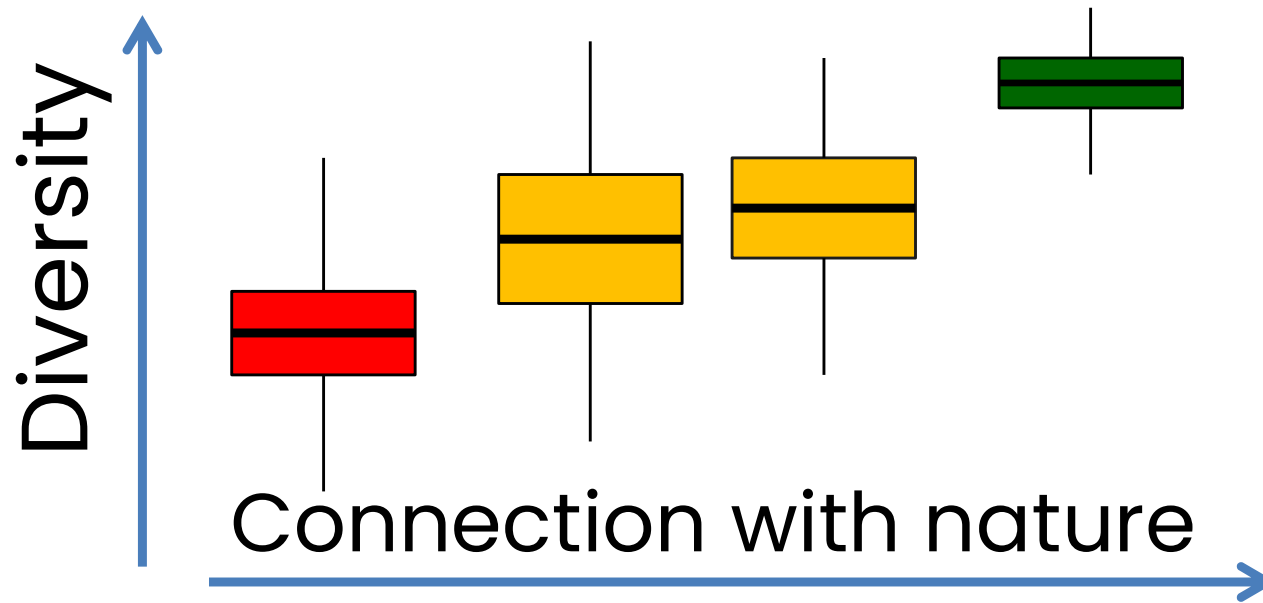




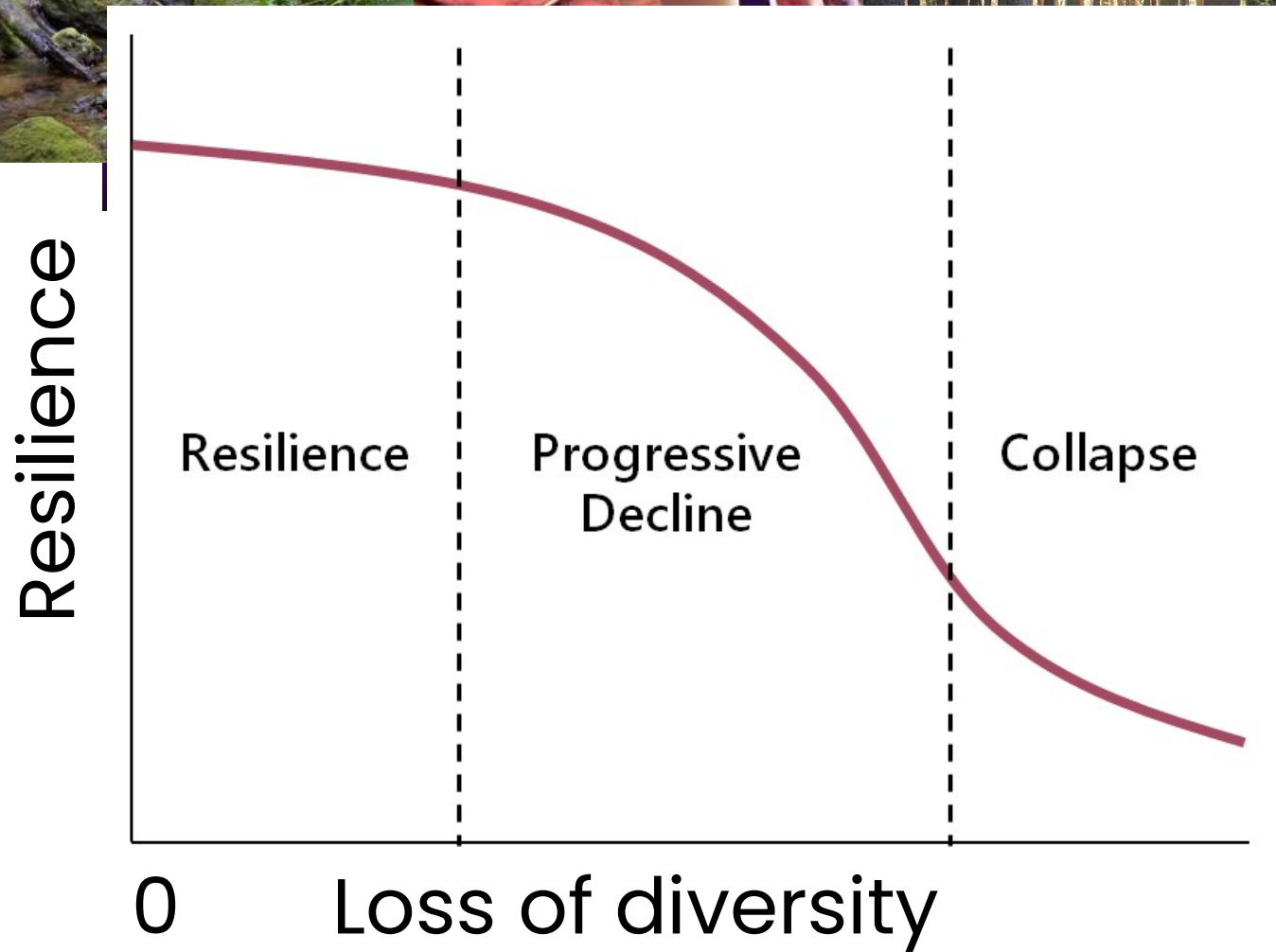
Biodiversity and evolution



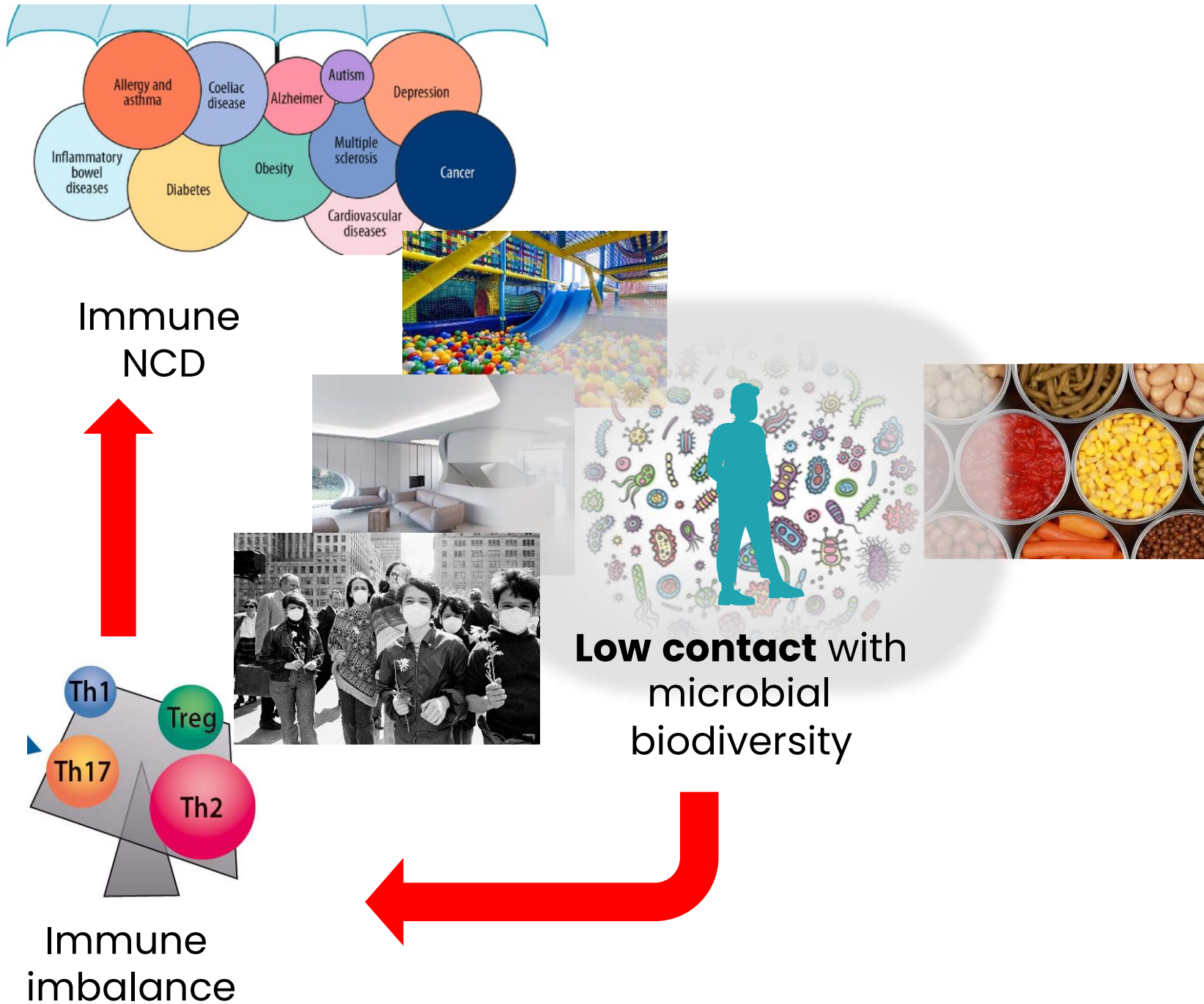
Biodiversity and functionality



Biodiversity and resilience



Biodiversity hypothesis of health

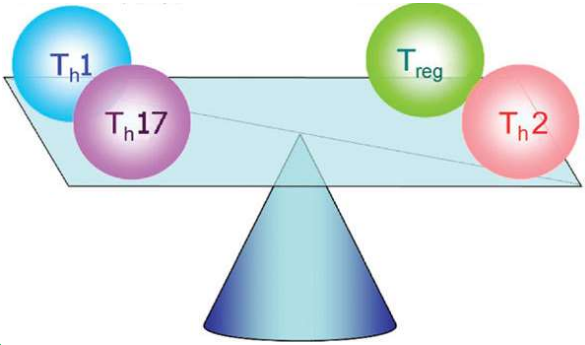




Resilient health



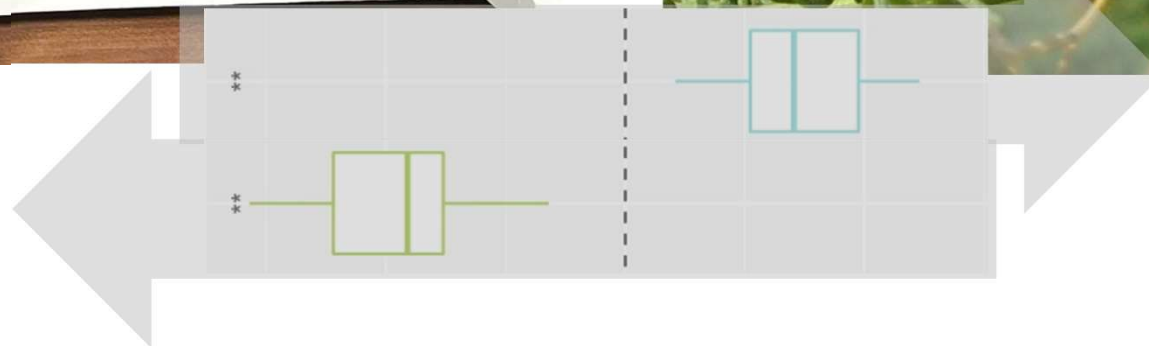
~~Low~~ contact with microbial biodiversity

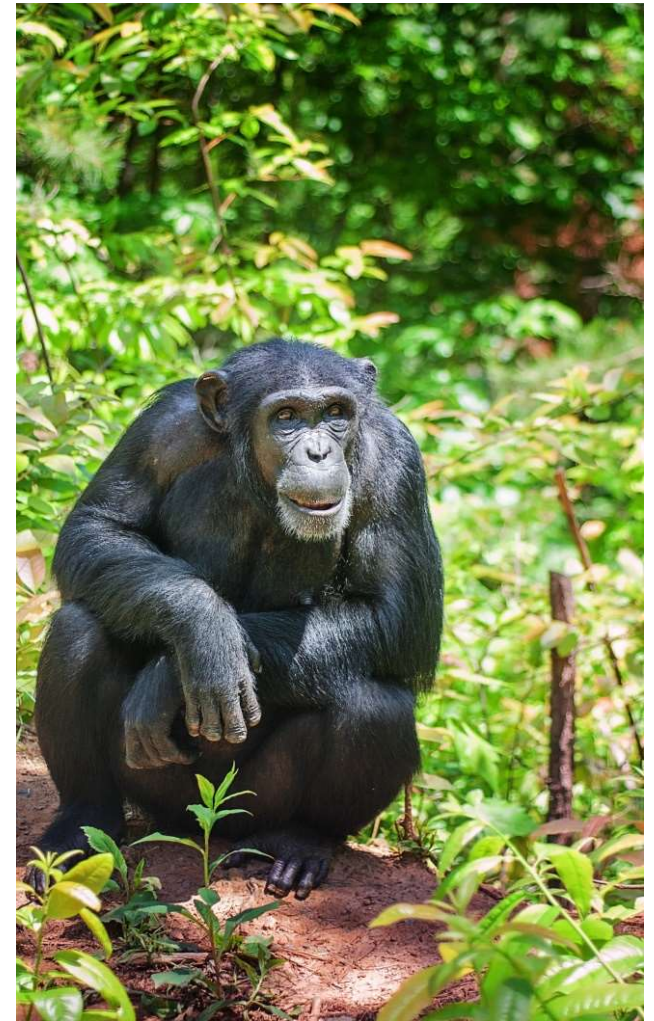
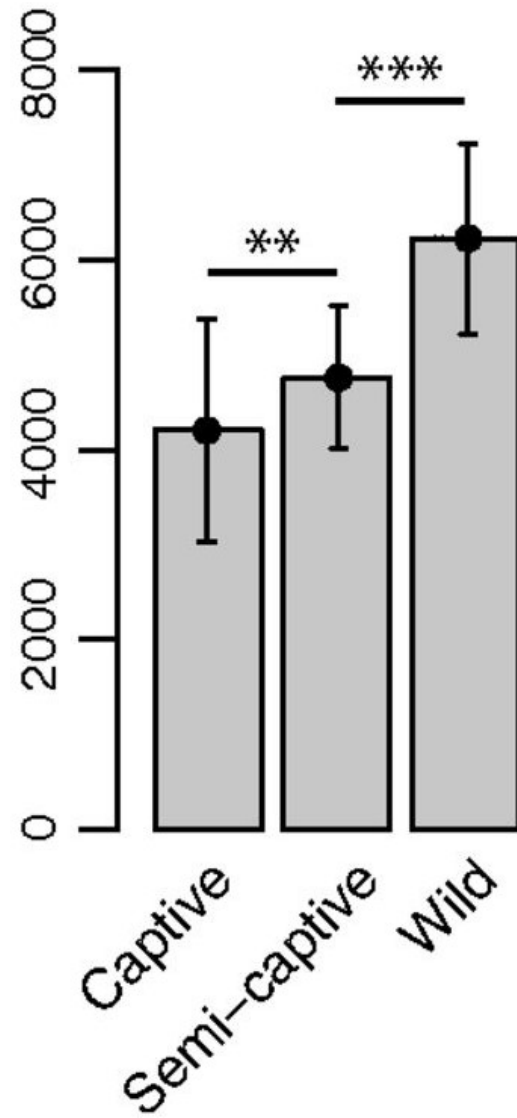


Immune balance



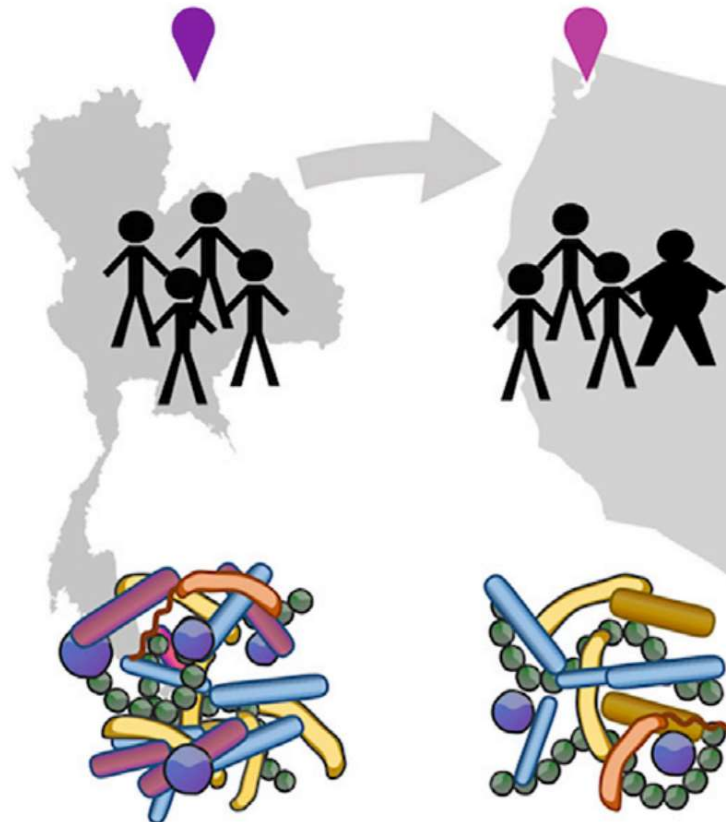






Pre-immigration

New arrivals



Practical Recommendations To Increase Gut Microbial Diversity



- 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

Practical Recommendations To Increase Gut Microbial Diversity



- **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

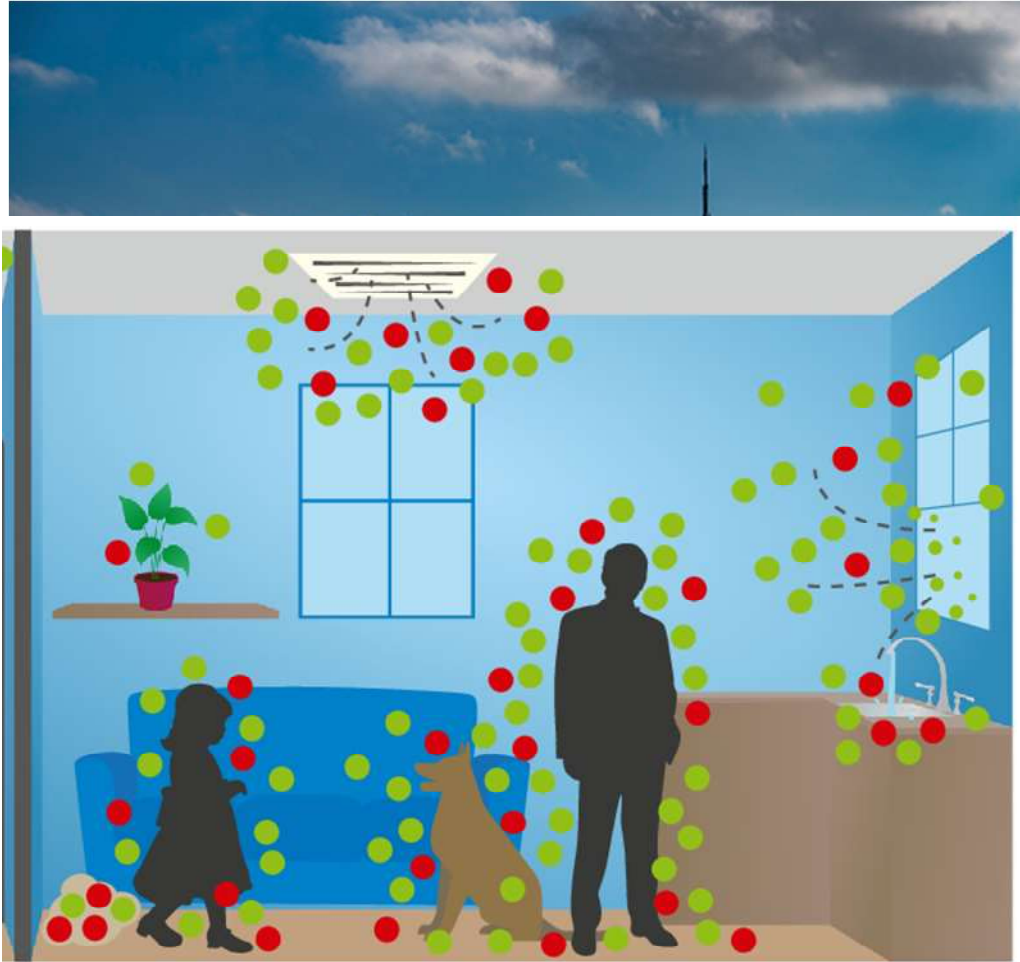


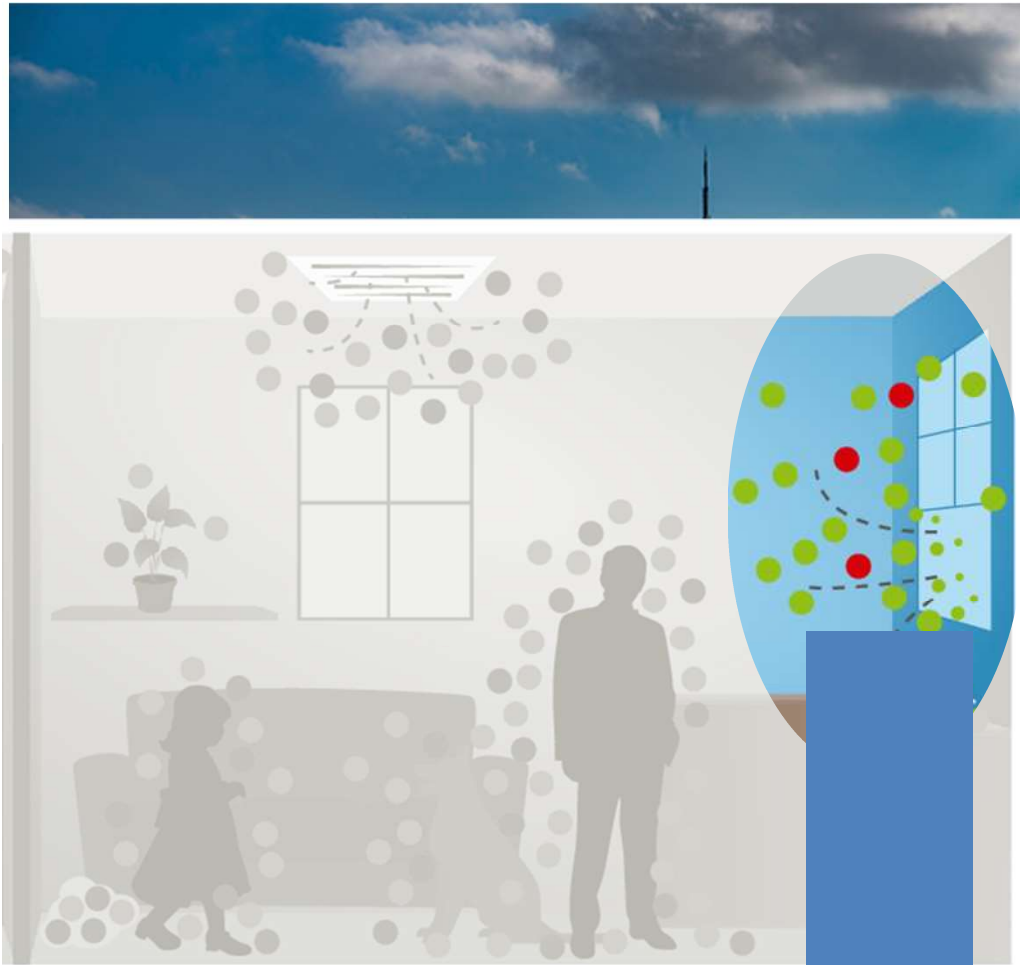
0

Diversity

8

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

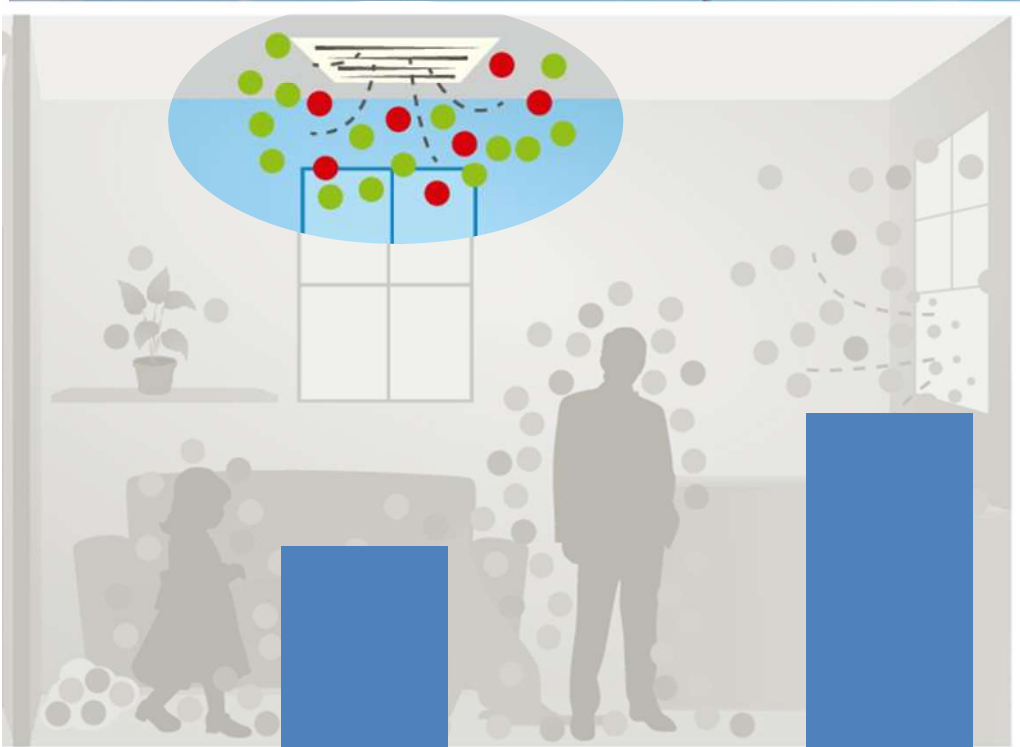




22



27



13

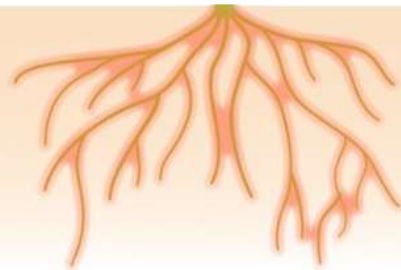
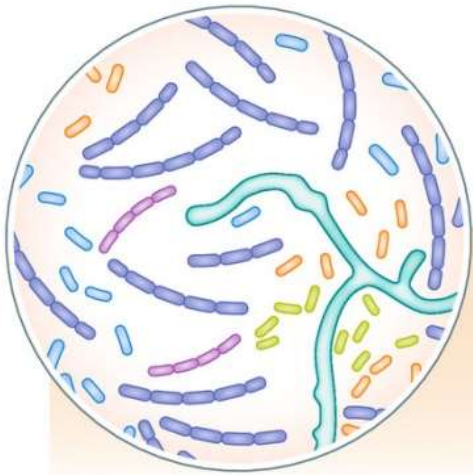
22



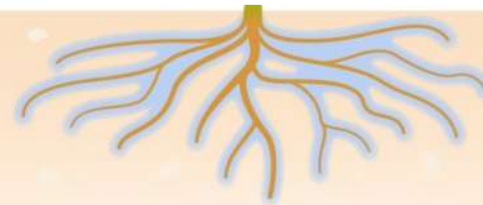
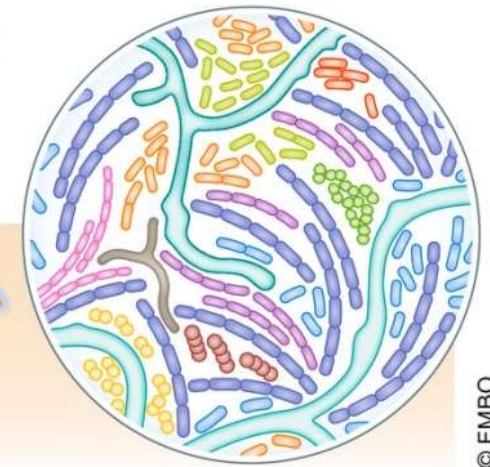
27

Raw fruits and vegetables

POOR
soil microbiome

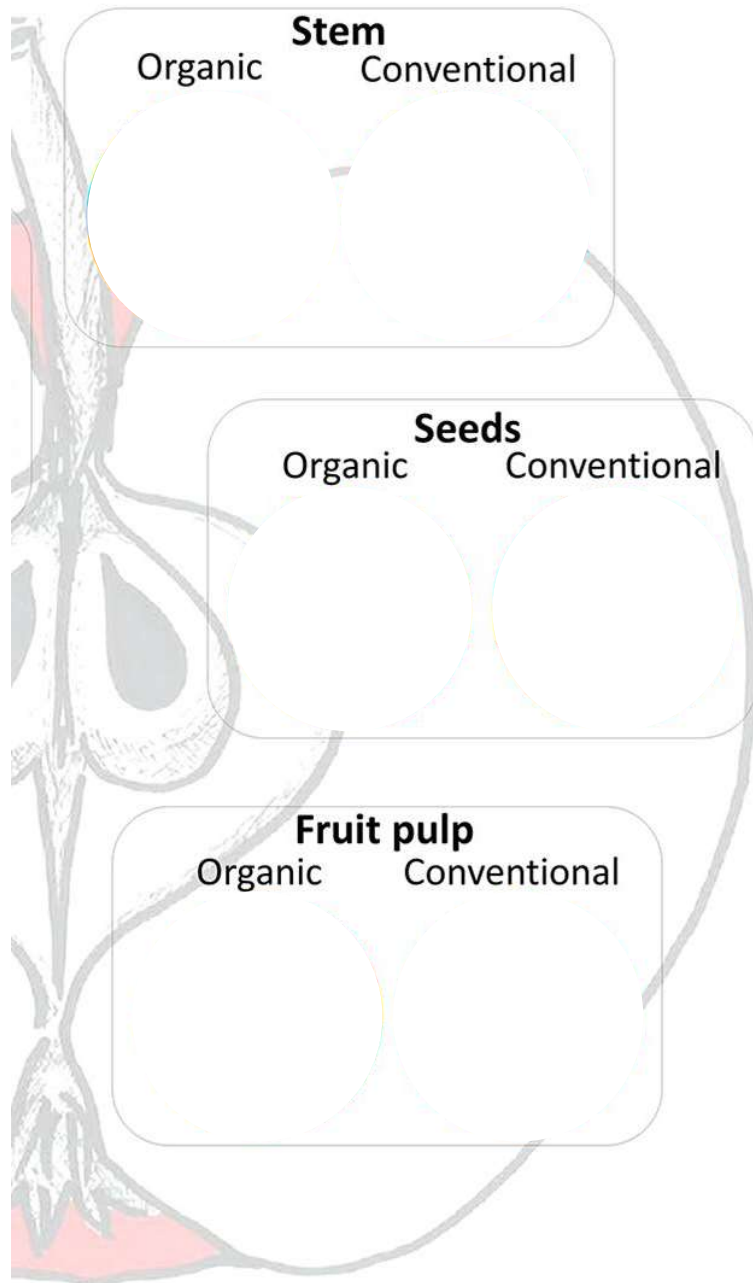


RICH
soil microbiome



© EMBO

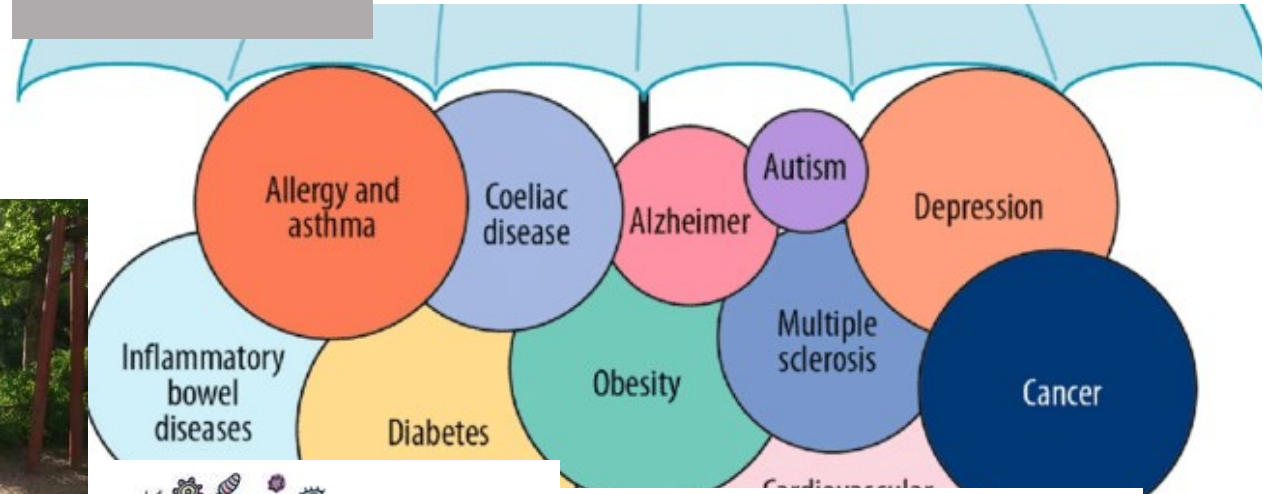
Raw fruits and vegetables



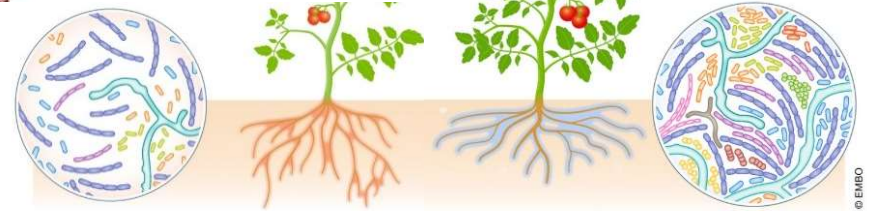
- | | |
|-------------------------|----------------------------------|
| ■ Ralstonia | ■ Sphingomonas |
| ■ Pseudomonas | ■ Massilia |
| ■ Methylobacterium | ■ Pantoea |
| ■ Burkholderia | ■ Rhizobiales sp. |
| ■ Hymenobacter | ■ Bacillus |
| ■ Variovorax | ■ Mucilaginibacter |
| ■ Curtobacterium | ■ 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 | ■ Reyranelia |
| ■ Fructobacillus | |



Resilient health



Contact with microbial biodiversity



A man with long, wavy, light brown hair and a slight smile is looking towards the camera. He is wearing a dark t-shirt. The background is a vast, green, hilly landscape under a blue sky with some clouds. The text "Eat, breath and touch green" is overlaid in a bright green font.

Eat, breath and touch green

Marco.van.es@Bac2nature.org



Rob Baan, Koppert Cress

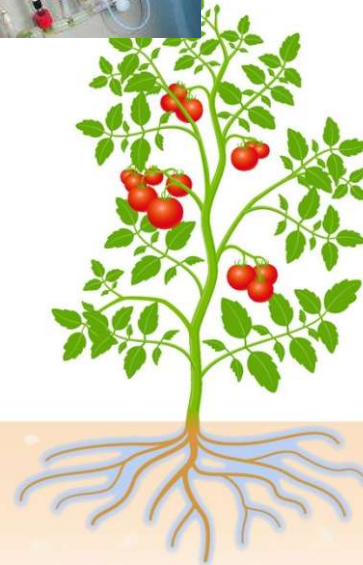
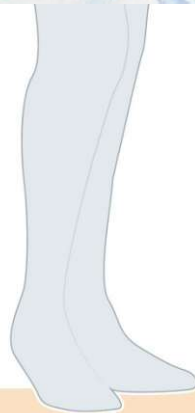
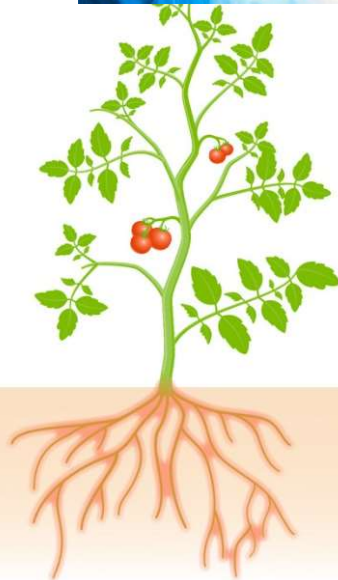
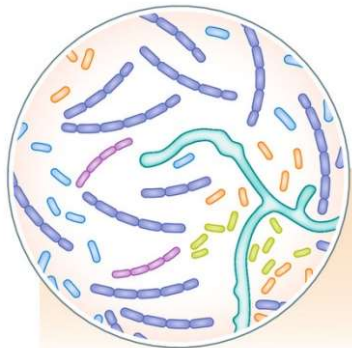
“... Besef je dat dit voor mij de eerste keer in 40 jaar tuinbouwwerfvaring is dat ik een meetbaar verschil zie tussen Bio en Conventioneel? Als het meetbaar is **Do raw vegetables** **grown in a rich microbial diversity,** **have an extra health effect?** een onderzoek van wereldformaat. Alleen ziet niemand dit nog...”

Bac2veggie biodiverse growing



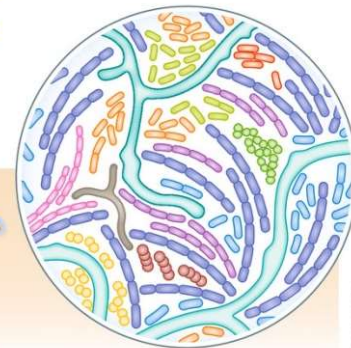
FRAGILE
plant microbiome

POOR
soil microbiome



HEALTHY
plant microbiome

RICH
soil microbiome



© EMBO



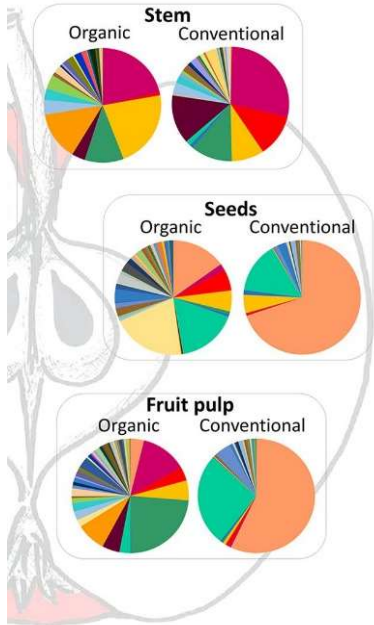
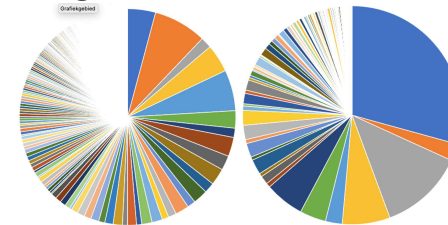
Bac2veggie biodiverse growing



Maastricht University



Organic Conventional



VU UNIVERSITY AMSTERDAM



Maastricht University

Louis Bolk Instituut



[Wassermann et. al. 2019](#)



€ 1.8 M Steering soil microbiomes for better crop quality



Bioglastuinbouw NL



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.

Steering soil microbiomes for better crop quality

The holy grail to improve human health



Universiteit
Leiden
Governance and
Global Affairs



Leids Universitair
Medisch Centrum



Universiteit
Leiden
Instituut Biologie



university of
groningen
faculty of science
and engineering



Universiteit
Leiden
Institute of
Environmental Sciences



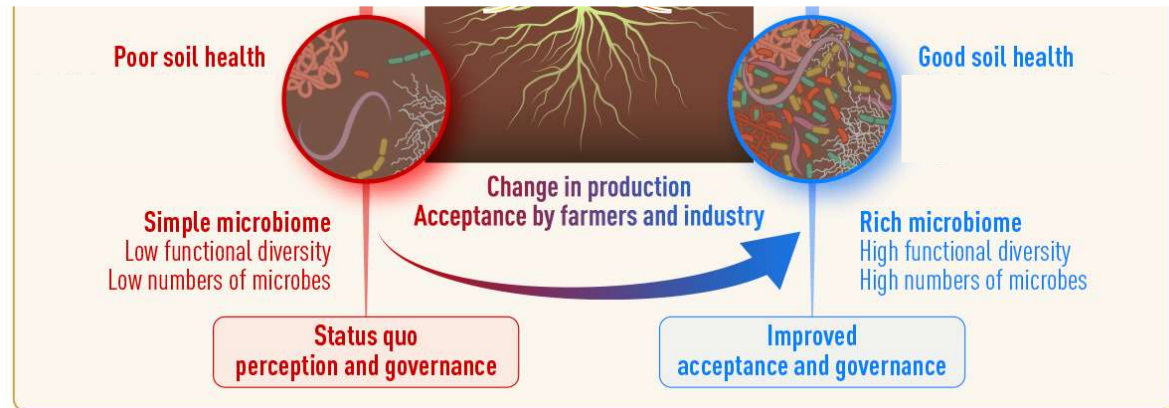
NEDERLANDS
INSTITUUT
VOOR ECOLOGIE
(NIOO-KNAW)



van hall
larenstein
university of applied sciences



Groen Agro Control
LABORATORIUMONDERZOEK & ADVIES 



Bac2play biodiverse playing



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

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

Bac2play
Een **groen** begin
is het halve werk

1U Dagelijks 1 uur spelen
in de natuur...

geeft voldoende contact
met vriendelijke bacteriën...

die het immuunsysteem
trainen en de weerbaarheid
verhoogt tegen o.a.
allergie en astma.

Hoe wilder hoe beter!

Echt contact...

en daarna handjes wassen
met gewone zeep...

**Bac2
nature** www.bac2nature.org

ANTIBACTERIËL
ANTIBACTERIËL

The infographic is a vertical poster with a light green background. It features several illustrations: a child playing in a garden, a child with a shield, children playing under a tree, and hands being washed. The text is in Dutch and describes the benefits of playing in nature for children's health, specifically mentioning the immune system and allergies. It also includes a logo for Bac2nature and a website URL.

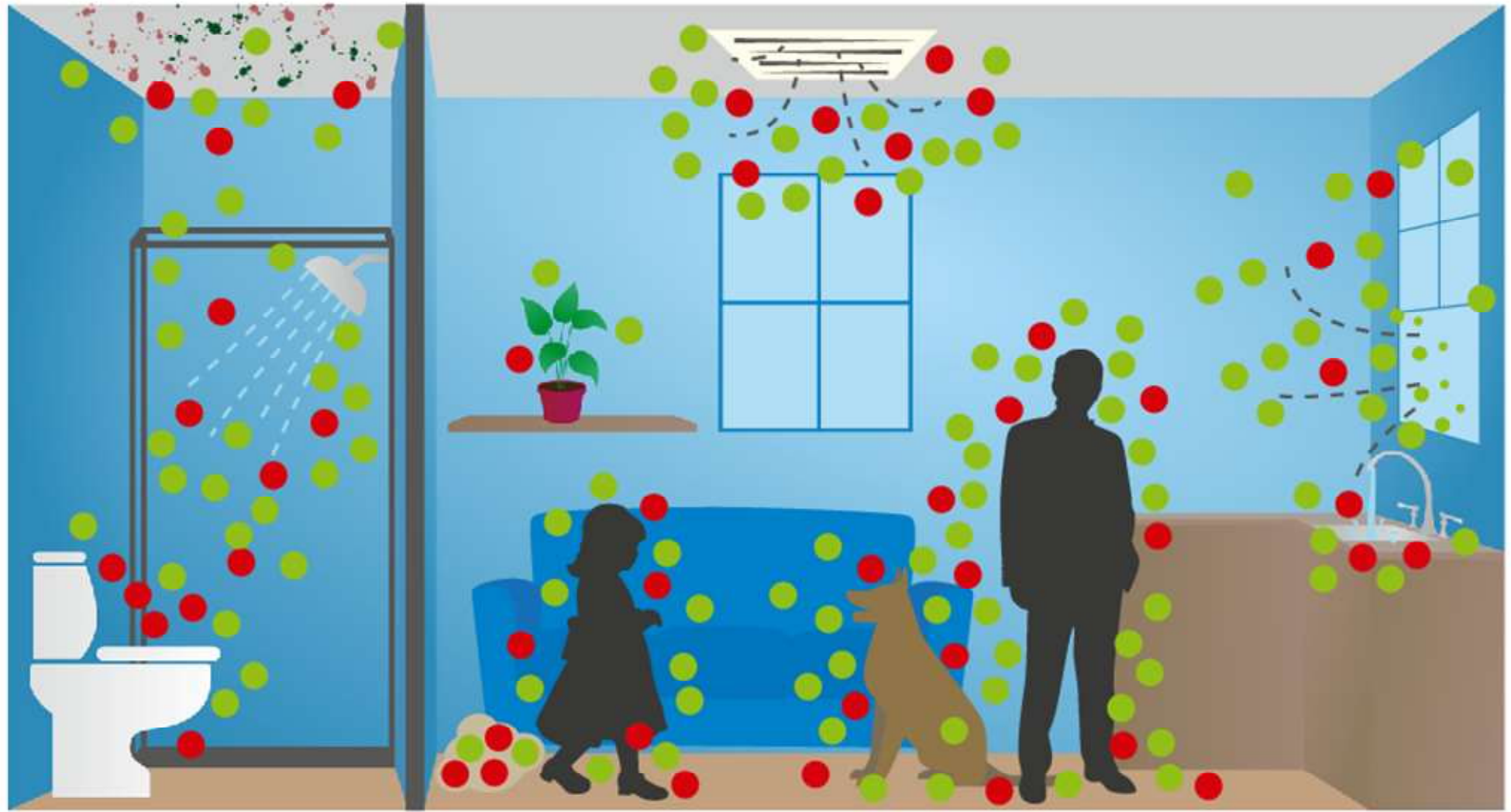
Bac2play biodiverse playing



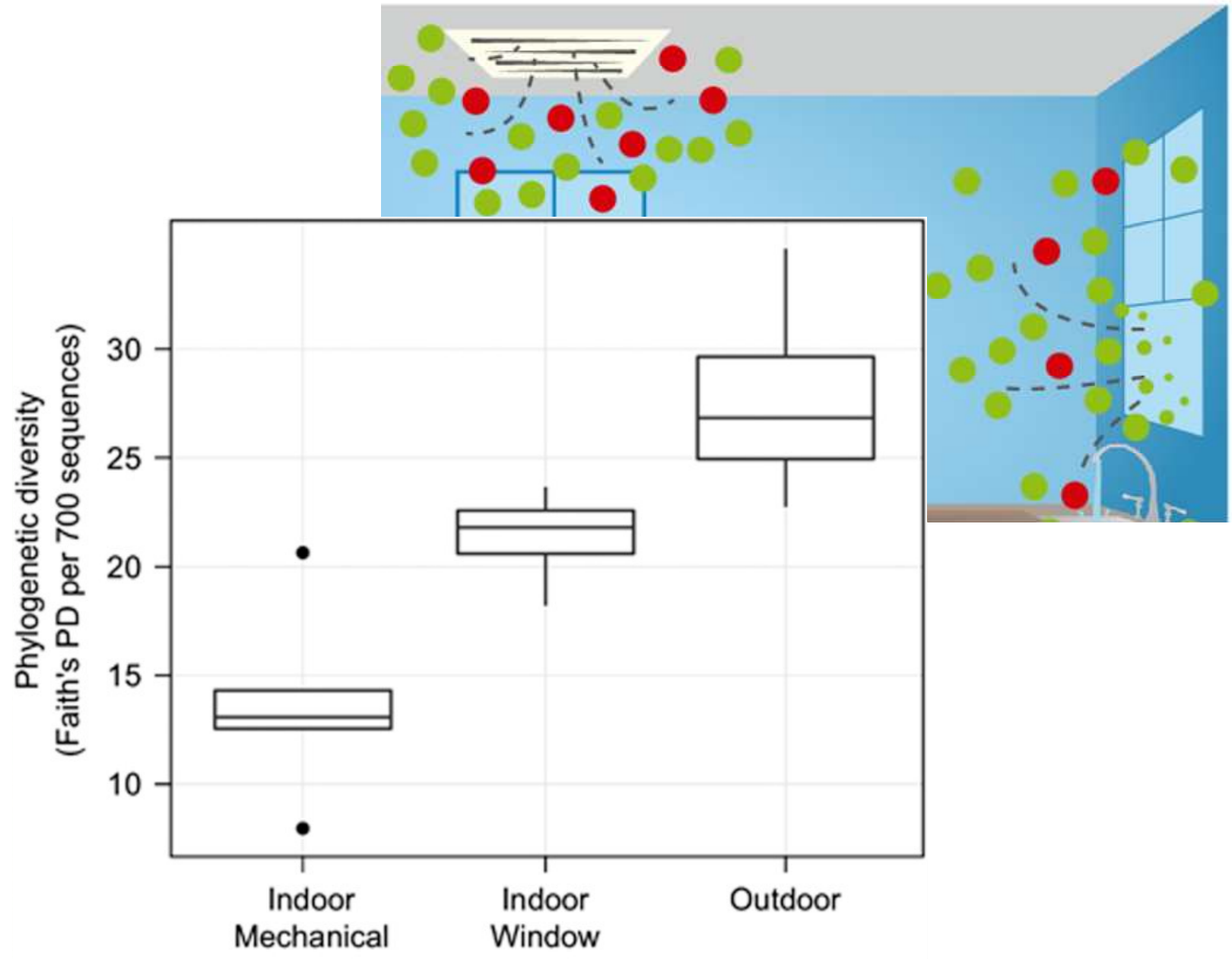
Prof. Dr. Louise Vet

“Ik ben als wetenschapper en **voorzitter van het Deltaplan Biodiversiteitsherstel - én als kersverse grootmoeder -** groot voorstander van dit initiatief van Bac2Nature om de biodiversiteit op kinderdagverblijven te vergroten. Uitrollen in Nederland zou ik zeggen, zo snel mogelijk!”

Bac2building



Bac2building ventilation



Bac2building vegetation



Bac2building daylight

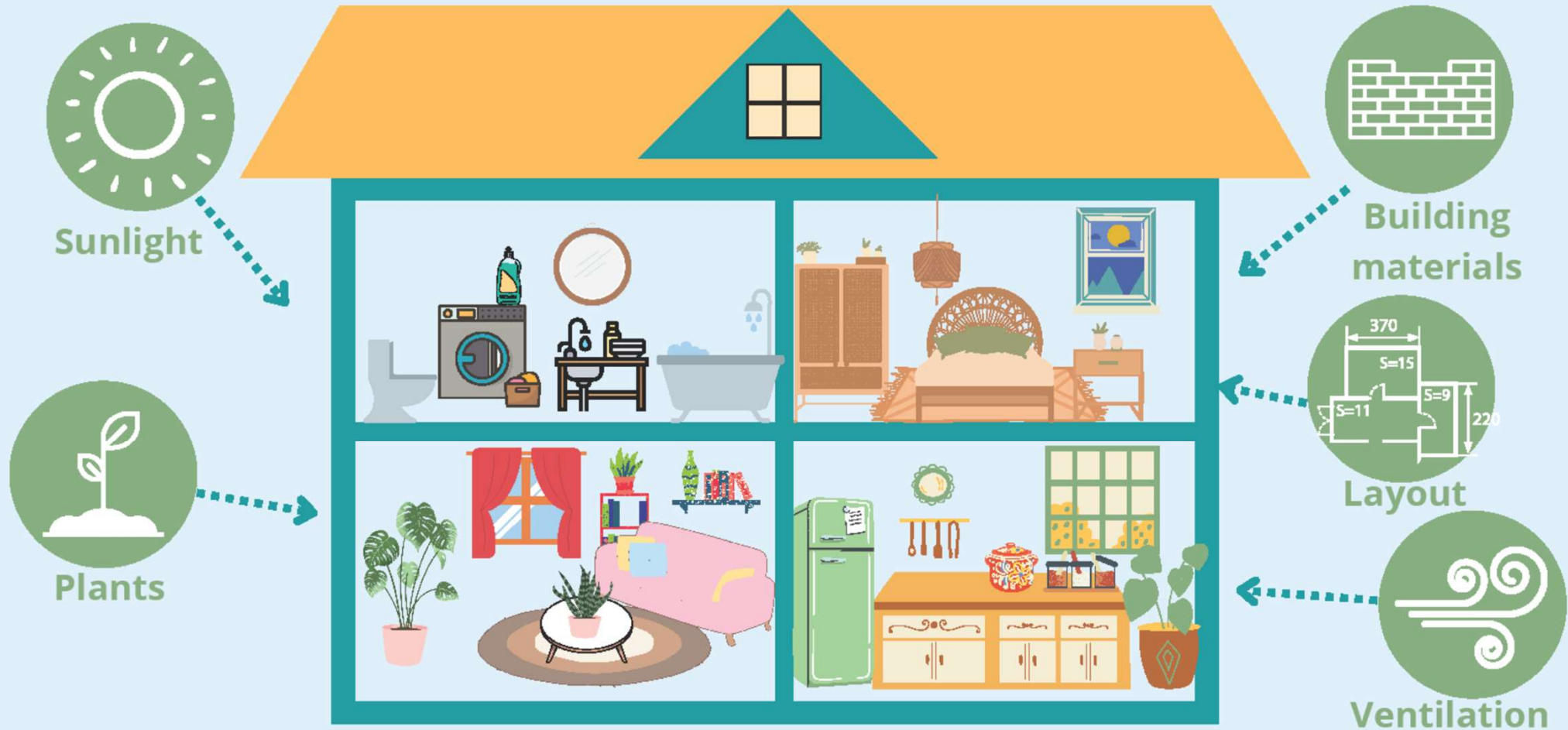


Bac2building materials



Bac2building





Include a diverse set of plants and take in account humidity, temperature, sunlight



Spots in the house where harmful pathogens are more likely to cultivate should be strategically exposed to sunlight



The use of natural ventilation should be stimulated over the use of mechanical ventilation

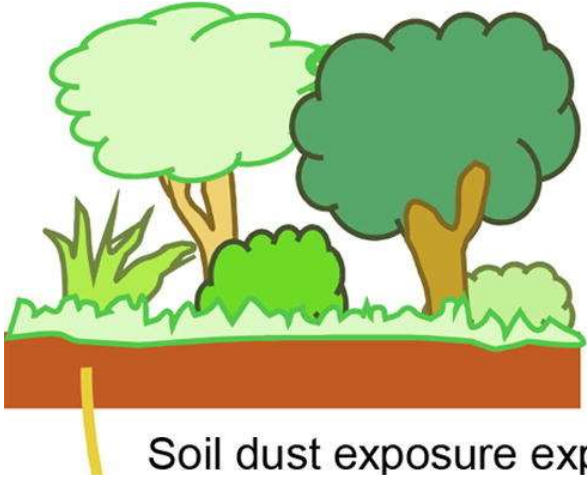


Design spaces to include a variety of different occupant activities



The use of a range of naturally occurring elements should be stimulated. Furthermore, pores in building materials should not run too deep

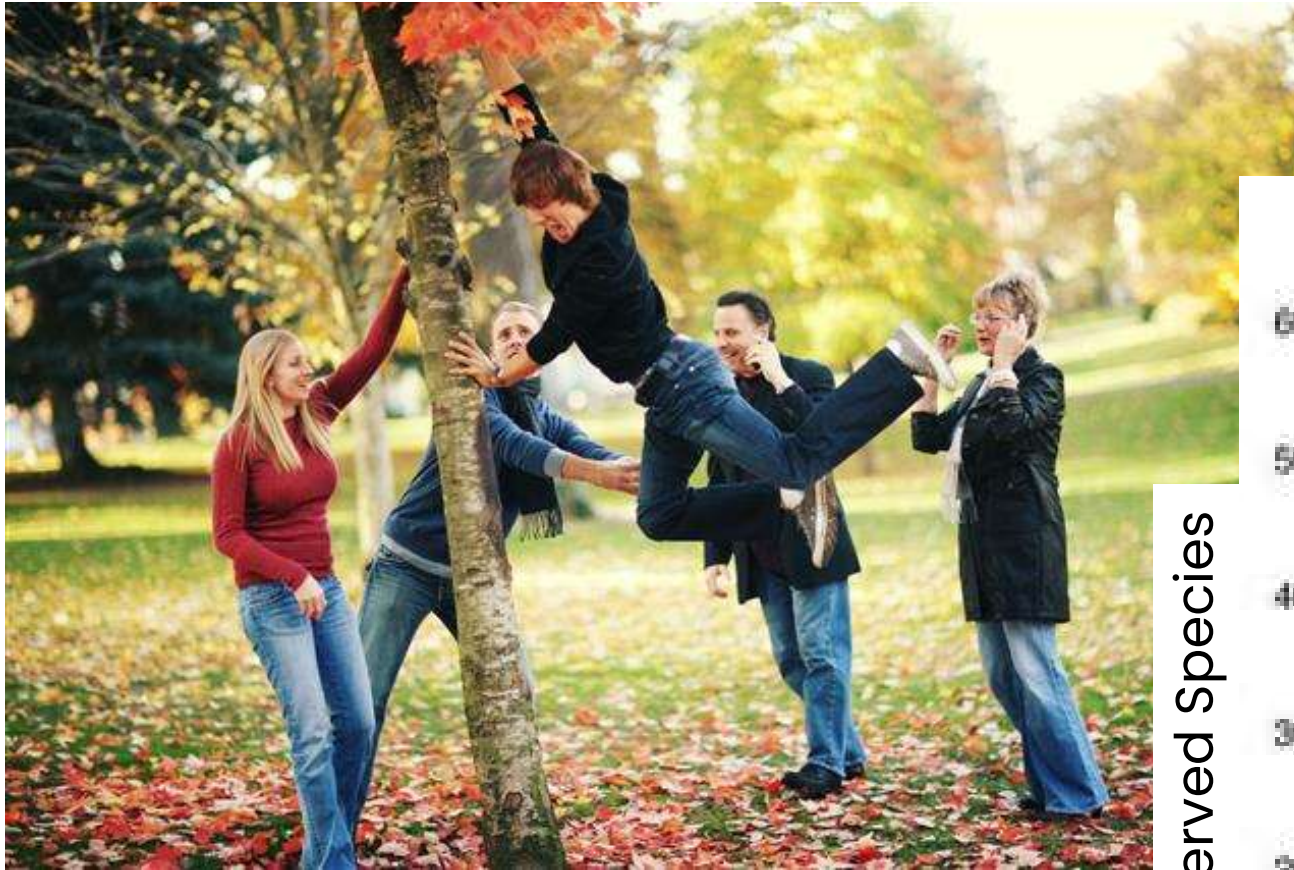
Bac2thecity Urban Greenspace



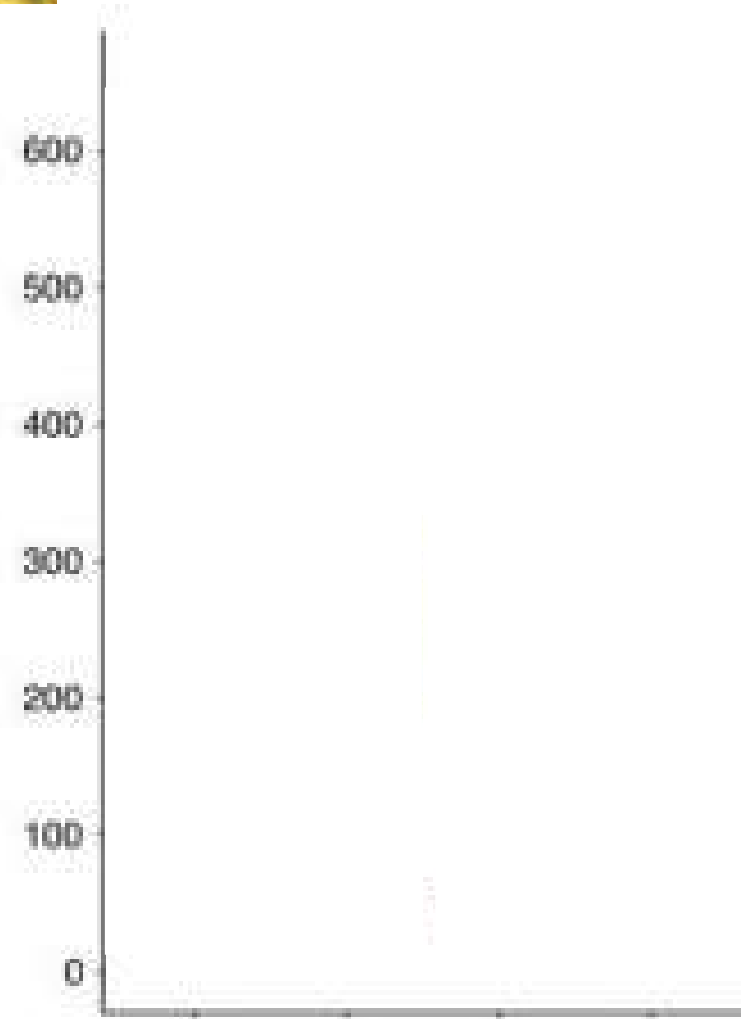
Soil dust exposure experiments

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

Bac2thecity Urban Greenspace



Observed Species





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
Prof. Dr. Renger Witkamp
Prof. Dr. Ben Witteman
Prof. Dr. Dinand Ekkel
Prof. Dr. Andreas Schwiertz
Dr. Hermie Harmsen
Dr. Erwin Zoetendal
Dr. Freddy Troost



KOPPERT CRESS



Bioglastuinbouw NL

Exposure vs targeted hygiene

