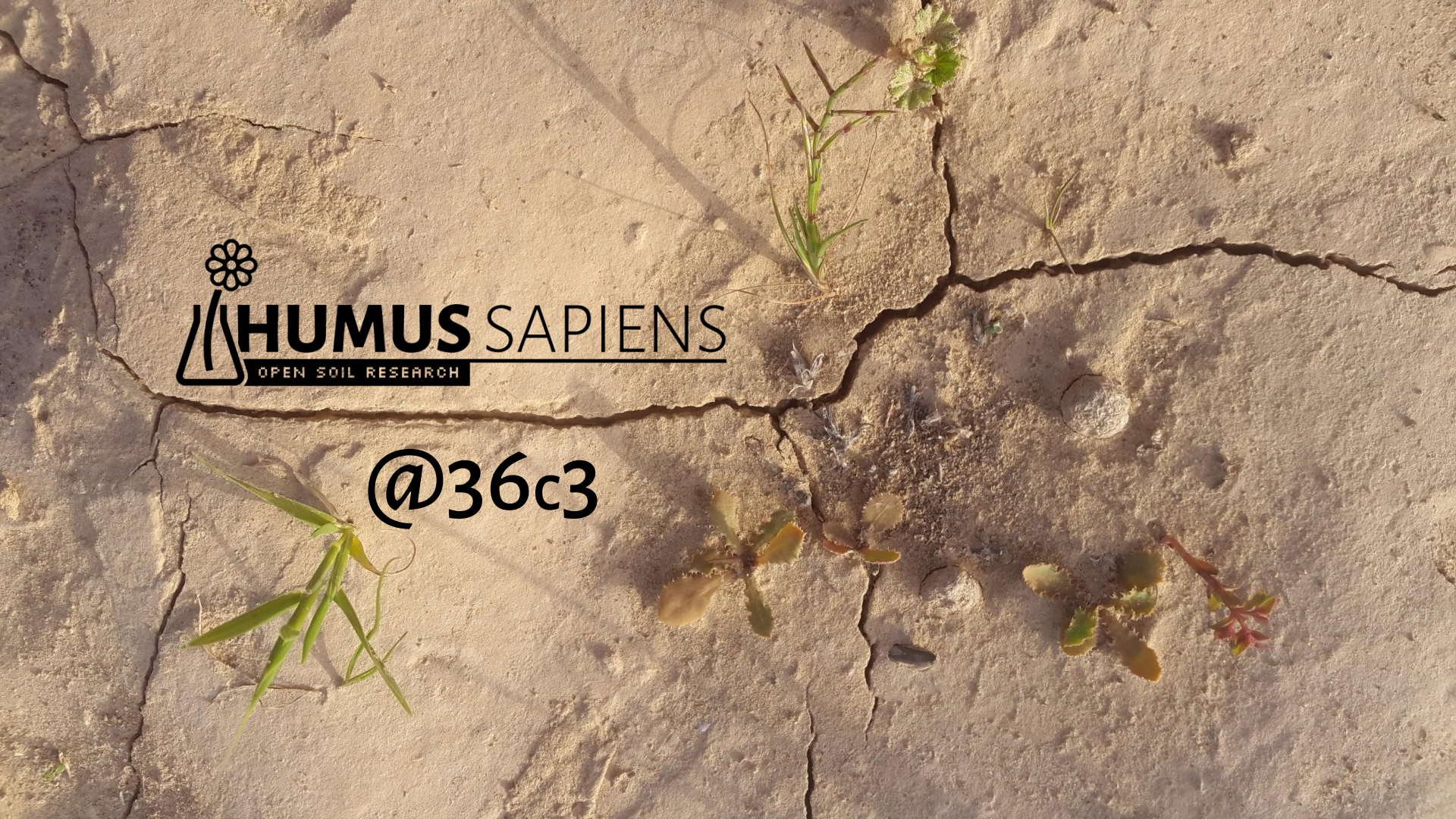

HUMUS SAPIENS
OPEN SOIL RESEARCH
@36c3

content

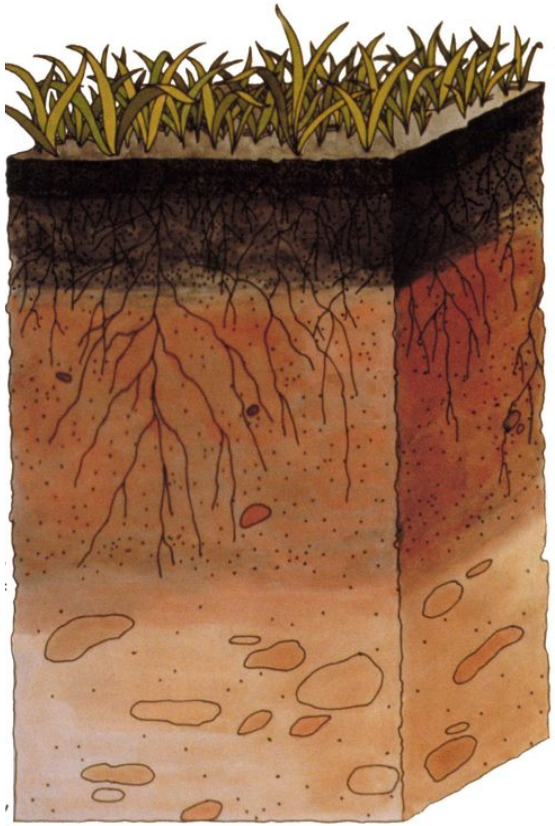
- ➔ intro
- ➔ HUMUS sapiens
- ➔ open science & art
- ➔ open discussion

Humus?

Photo by MAX LIBERTINE on Unsplash

Photo by Gabriel Jimenez on Unsplash

humus

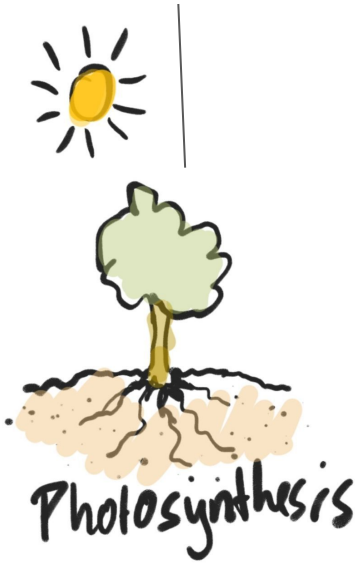


soil

Source: https://www.wikiwand.com/en/Soil (License: Public domain, Credit: US Department of Agriculture)

soil food web - an oversimplification of complex bioreactor

Level 1



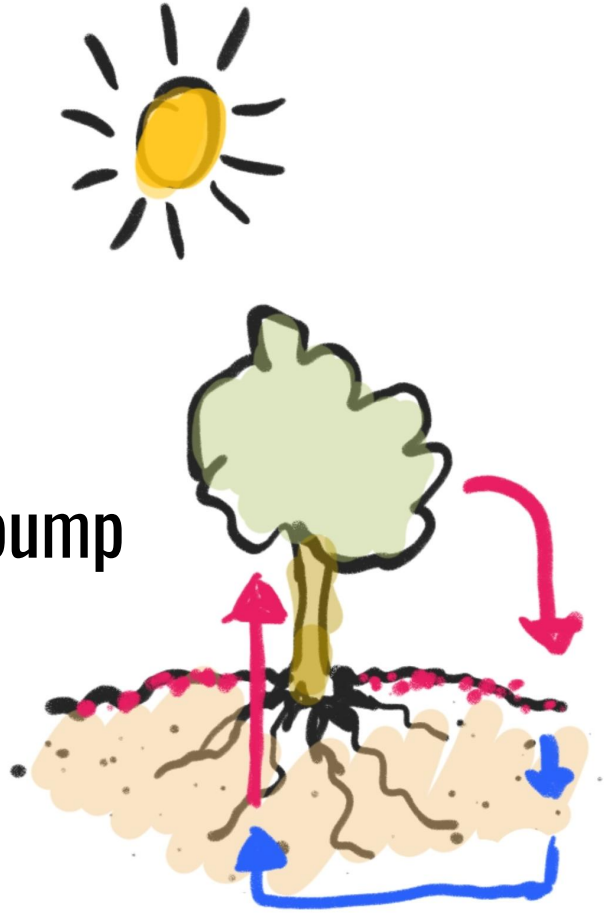
Level 2

Level 3

Level 4

Level 5

Nutrient pump

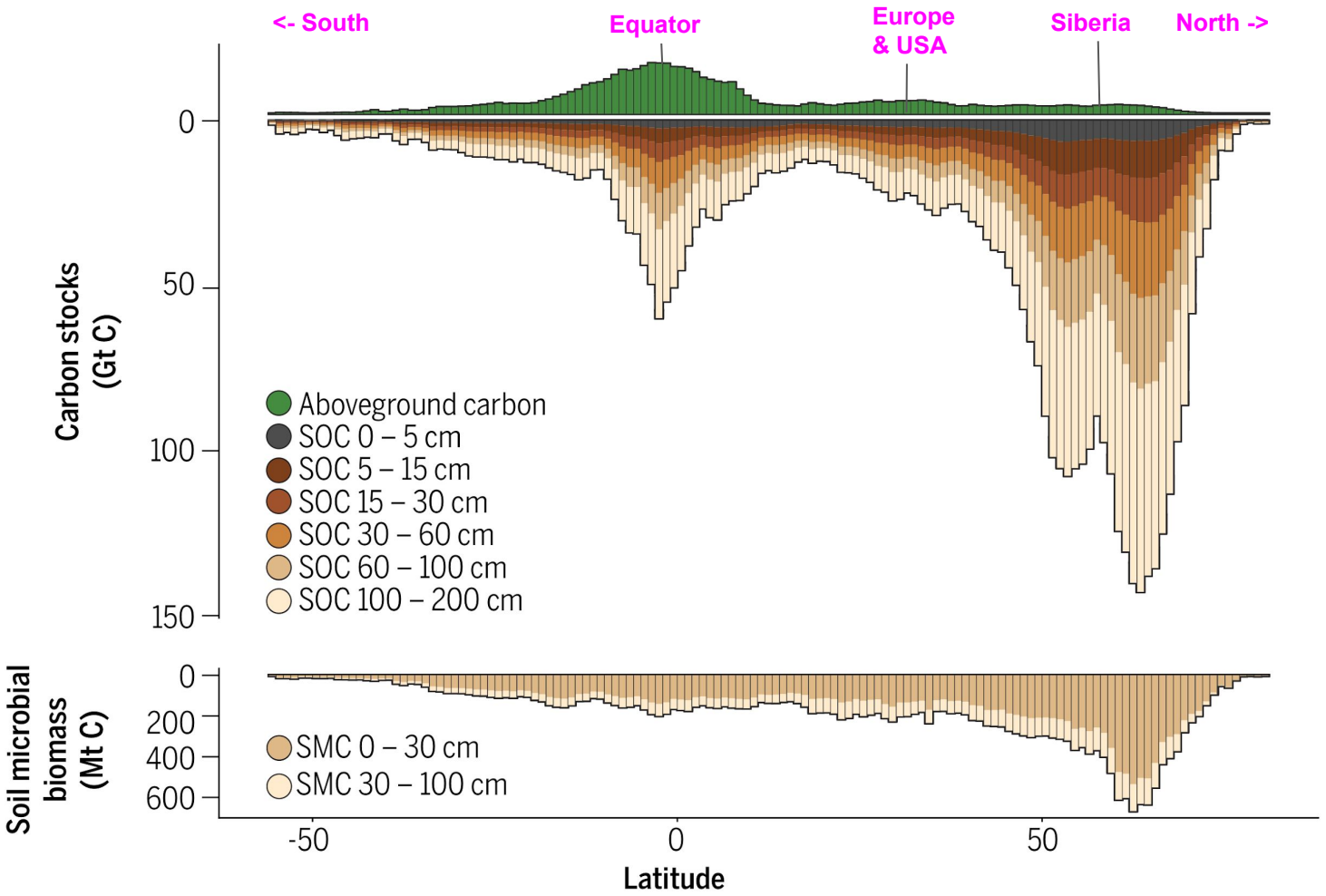


higher temperature

microbial activity

more greenhouse emissions

Carbon puzzle



Crowther et al. (2019), “The global soil community and its influence, on biogeochemistry”

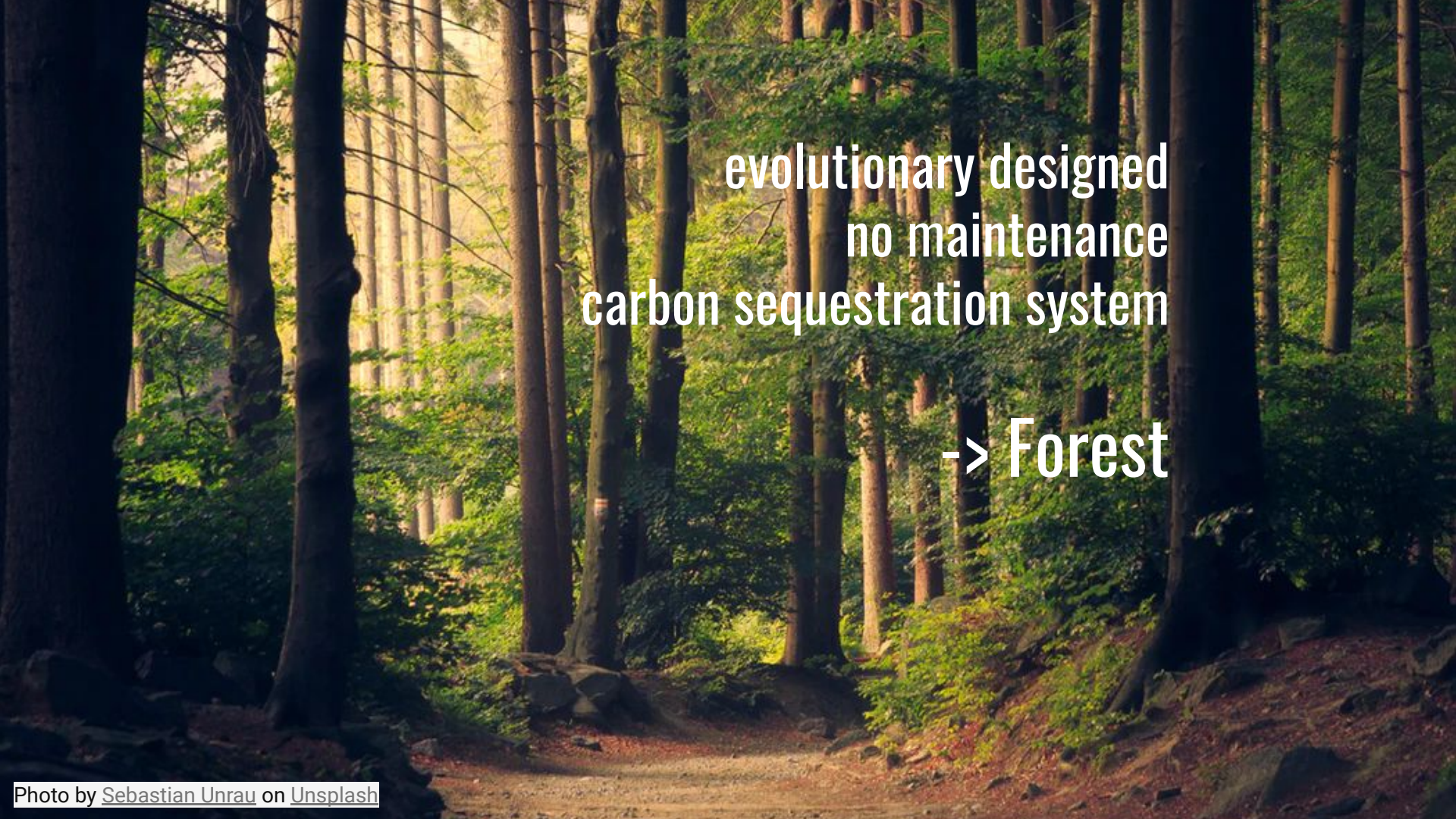


Photo by Sebastian Unrau on Unsplash

inappropriate landmanagement practices

Photo by Sebastian Unrau on Unsplash

Who?

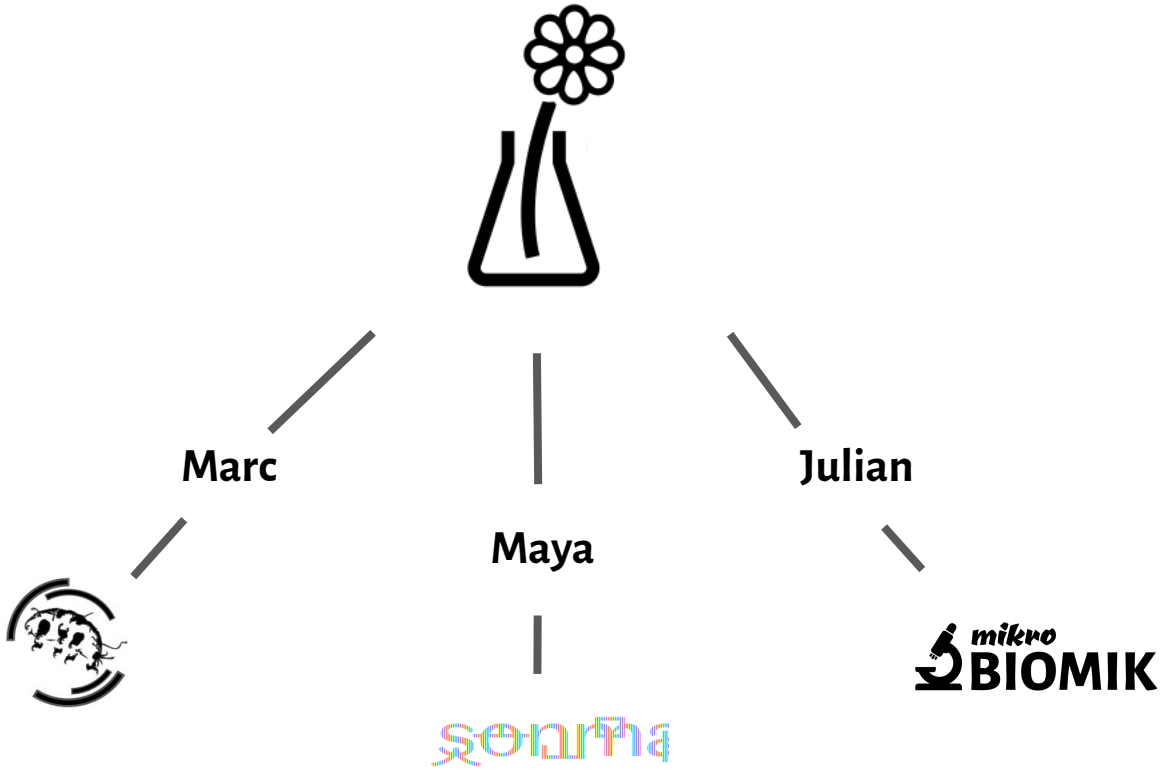
Where?

What?


Klöntal
Biohack
Retreat
2017


Image by
Chris Obrist


HACKTERIA.ORG
Open Source Biological Art


Marc
Maya
Julian
mikro
BIOMIK

NETWORK

organisations

mikro BIOMIK

sonma

Our Sci

GOSH Community

GOAT

SGMK

pif_camp

open source hardware

GaudiLabs

Bauhaus-Universität Weimar

Lucerne University of Applied Sciences and Arts

HOCHSCHULE LUZERN

sci-hub

to open science

spaces & places

/draussen

FABLAB dream it. make it. share it. LUZERN

KUNSTVEREIN WAGENHALLE

LIFEPATCH citizen initiative in art science and technology

ART SCIENCE BLR public laboratory at the srishti institute of art, design & technology

bio kitchen Biology Studio & Science Atelier

133 0 21 0 5

Soil Is Life

We're not talking about hummus, the Arabic chickpea dip – we're talking about HUMUS the stuff that makes the chickpeas grow. With this crowdfundig campaign, you can

Project Status

20'252
of EUR 9'000 pledged

62
backers

225 %
percent reached

we made it!!!

This project ended successfully on 8/4/2018 22:00!

Rewards


HACKTERIA SOIL RETREAT
04.05.2018 - 06.05.2018
NEAR SCHAFFHAUSEN @RANDELAB.CH
MIKROBIOMIK WORKSHOP SOIL AND SUSTAINABILITY
20.07.2018 - 22.07.2018
NEAR MUNICH @PROJEKT-DRAUSSEN.COM
HTTPS://WEMAKEIT.COM/PROJECTS/HUMUS-SAPIENS

HUMUS SAPIENS

OPEN SOIL RESEARCH

Contents [hide]

https://www.hackteria.org/wiki/HUMUS_sapiens

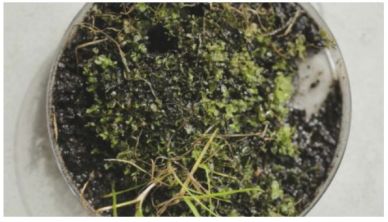
Pictures by Rytis Seskaitis

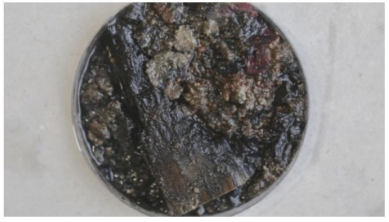





Excursion to Reformatu Square (Pictures: Julian Chollet)





Retreats & open collaboration

Switzerland


Switzerland

Switzerland

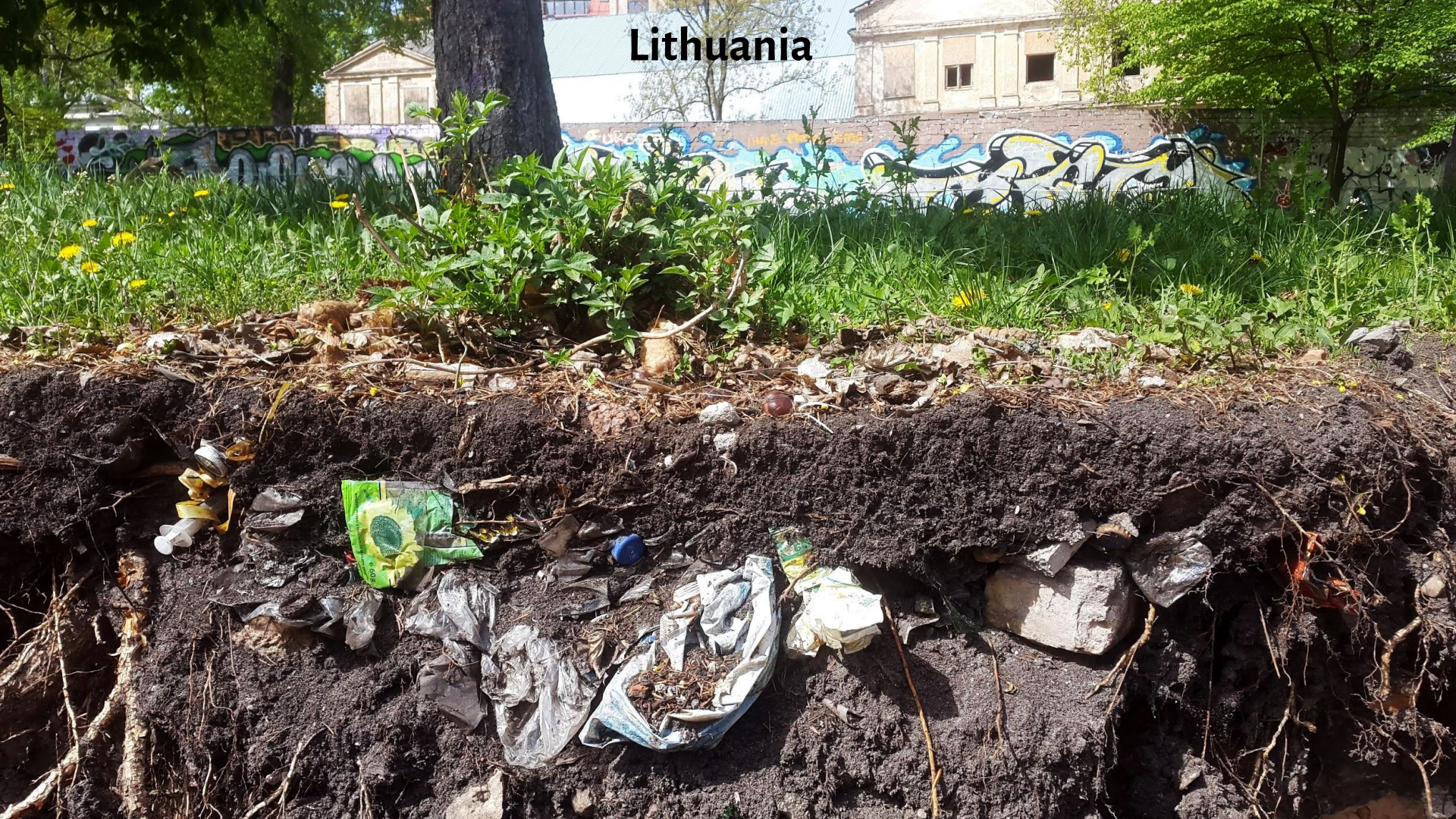
Germany

Image by
Lisa Bindlingmaier

Finnland


Indonesia
Powered by
360player.io

Lithuania



Slovenija

Workshops

Image by
Ewen Chardronnet


Image by
Chris Obrist

Image by
Ewen Chardronnet

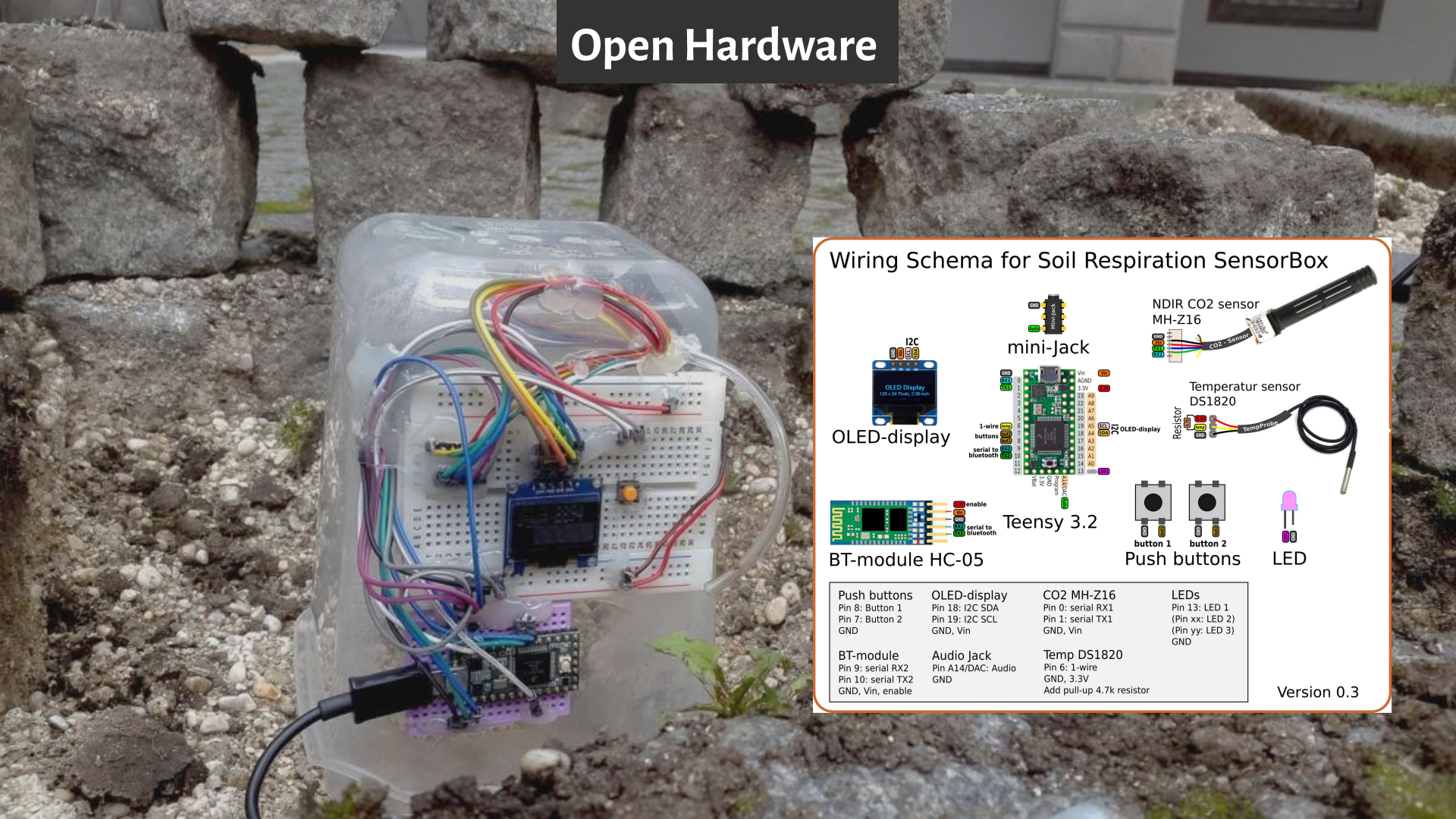
Image by
Chris Obrist

Image by
Juan Pablo Diaz

Image by
Rytis Šeškaitis

Image by
Lisa Bindlingmaier

Open Hardware

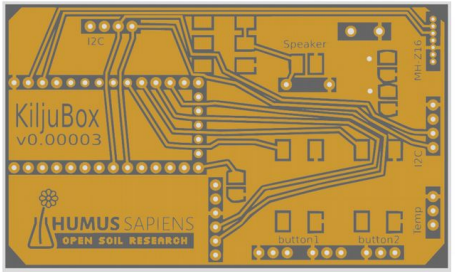


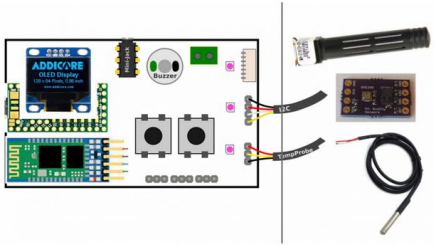
CO2 soil chambers

BambooBox

Further developments during dusjagr's residency at Lifepatch June - August 2018

Failed PCB...





Teensy Code

See RandeLab repo on GitHub

results on our-sci

https://app.our-sci.net/#/survey/by-form-id/build_Randen-Soil-Chamber-Measurement-with-the-Soil-Chamber-built-at-Randelab_1525625829

using this script: https://gitlab.com/our-sci/measurement-scripts/tree/master/mh-z16-randen

PVC pipe Chambers

RandeChamber aka Kilju Chamber

https://www.hackteria.org/wiki/CO2_Soil_Respiration_Chamber


PFLASTER


Open
Wetware?
Get your hands dirty!!
Image by
Chris Obrist

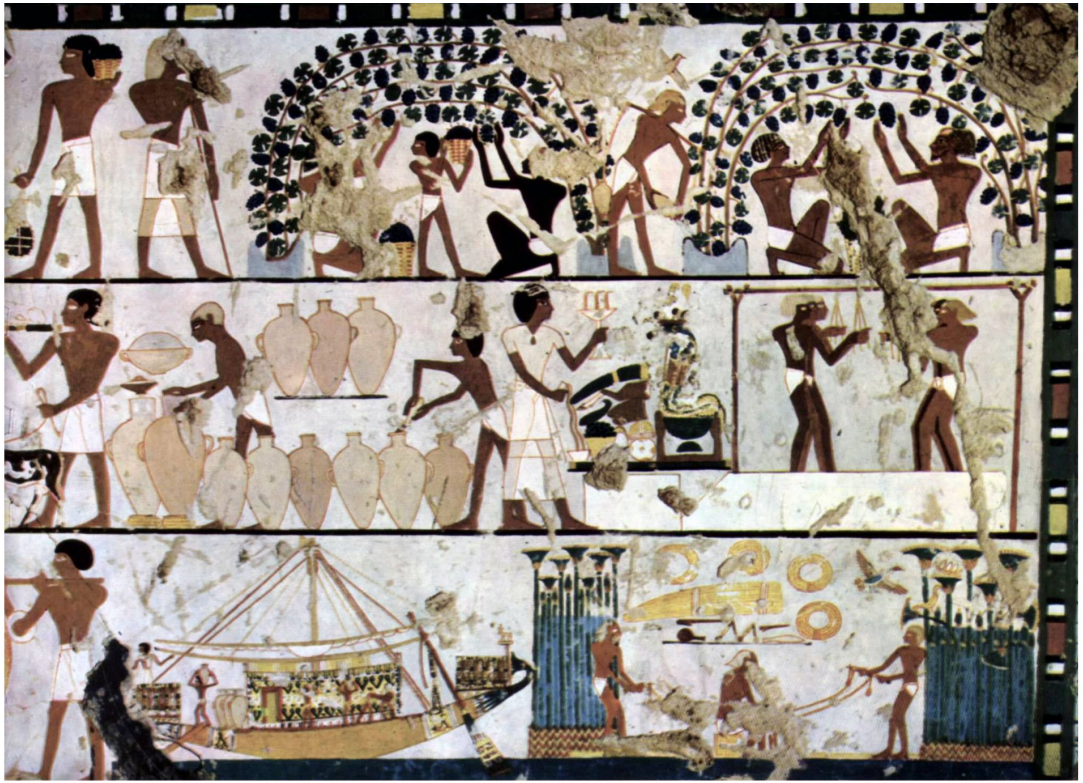
Echter Pilz
HUMUS SAPIENS
OPEN SOIL RESEARCH
Bärtierchen
Springschwänze
Pilze
Wimperntiere
Geißeltiere
Amöben
Algen
Drawing by Mona

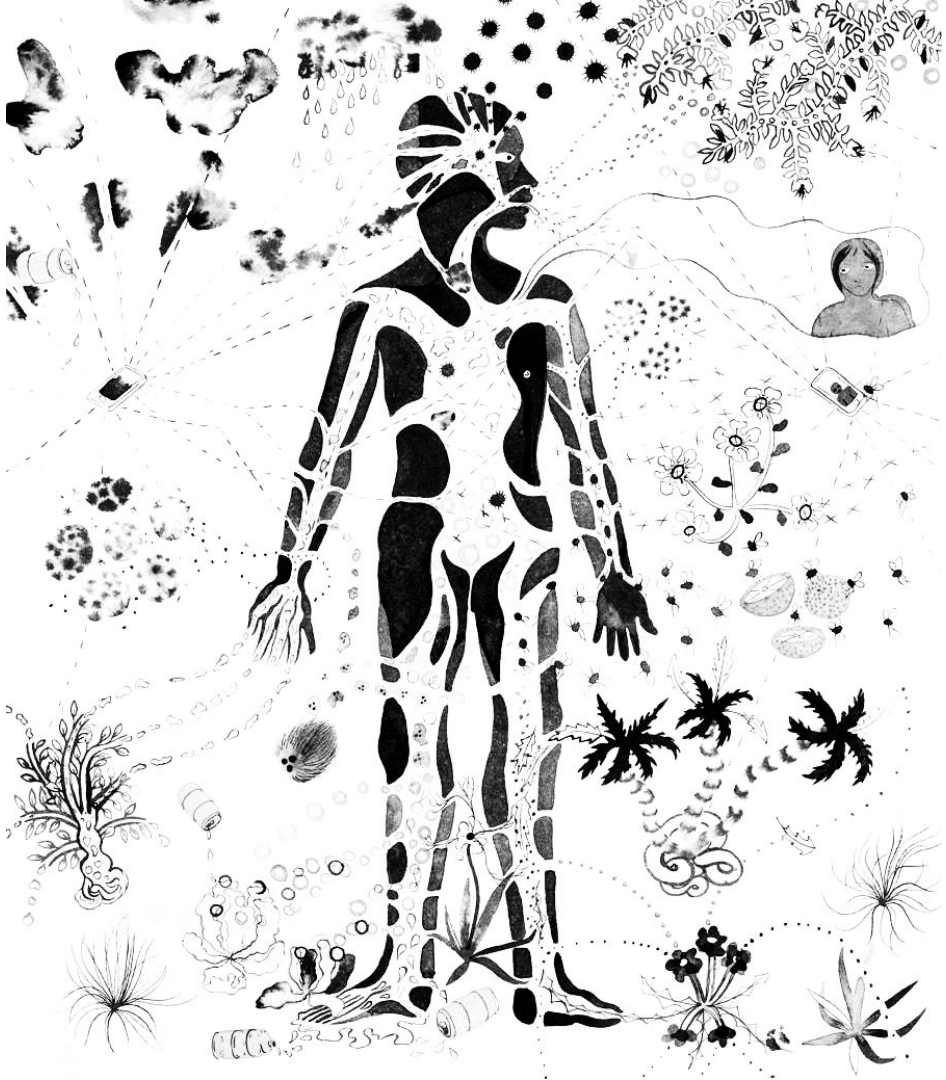
open science & art

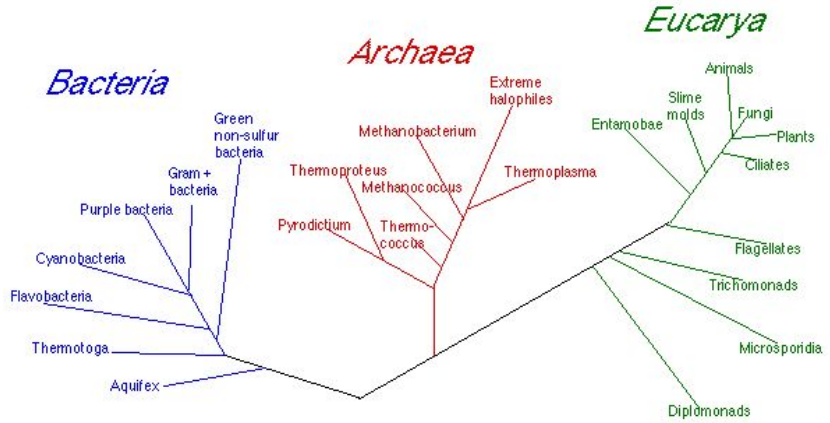
- Fermentation
- Microorganisms
- Symbiosis

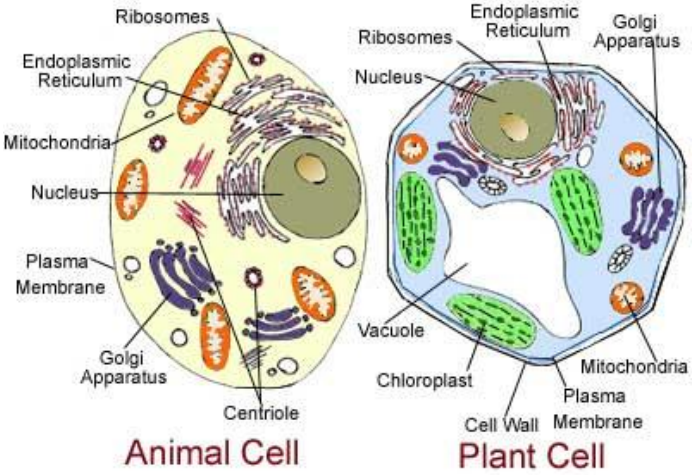

Across Europe
Cheese
(long-aged cheeses)
Cured hams
Anchovies
China
Douchi, Jiang you, Furu
(fermented black beans, soy sauce, soy bean curd)
Poland
Kielbasa (sausage)
Makrela wędzona
(smoked mackerel)
Russia
Selyodka
(salted herring)
Korea
Doenjiang, Ganjiang, Jeotgal
(soy bean paste, soy sauce, fish/shrimp product)
UK
Beef extract
Yeast extract
United States
Tomato ketchup
Bacon
Barbecue sauce
Gravy
Bangladesh
Shutki (dried fish)
Italy
Garum
(fish sauce)
Turkey
Salça (tomato paste)
Japan
Miso, Shoyu, Katsuobushi
(soy bean paste, soy sauce, dried bonito)
West Africa
Dawa dawa, Soumbala
(locust bean product)
Vietnam
Nuoc mam
(fish sauce)
Myanmar
Ngapi
(fish/shrimp paste)
Philippines
Bagoong, Patis
(fish/shrimp paste, fish sauce)
Mexico
Mole
(cooking sauce made
from tomatoes, spices etc.)
Nigeria
Ground crayfish
(shrimp paste)
Thailand
Nam pla
(fish sauce)
Peru
Charqui
(dried alpaca meat)
Malaysia
Belacan
(shrimp paste)
Brazil
Bacalhau
(dried cod)
Ghana
Shito
(shrimp paste)
Cambodia
Prahok, Tuk trey
(fish paste, fish sauce)
South America
Origin of the tomato
Australia
Yeast extract
Indonesia
Tempe, Terasi
(soy bean product, shrimp paste)
UMAMI
INFORMATION CENTER

WE HAVE ALWAYS BEEN BIO-HACKERS






Bacteria
Archaea
Eucarya
Green non-sulfur bacteria
Gram + bacteria
Purple bacteria
Cyanobacteria
Flavobacteria
Thermotoga
Aquifex
Extreme halophiles
Methanobacterium
Thermoproteus
Methanococcus
Thermoplasma
Pyrodictium
Thermo-coccus
Animals
Slime molds
Fungi
Entamoebae
Plants
Ciliates
Flagellates
Trichomonads
Microsporidia
Diplomonads


Ribosomes
Endoplasmic Reticulum
Mitochondria
Nucleus
Plasma Membrane
Golgi Apparatus
Centriole
Animal Cell
Ribosomes
Endoplasmic Reticulum
Golgi Apparatus
Nucleus
Vacuole
Chloroplast
Mitochondria
Plasma Membrane
Cell Wall
Plant Cell

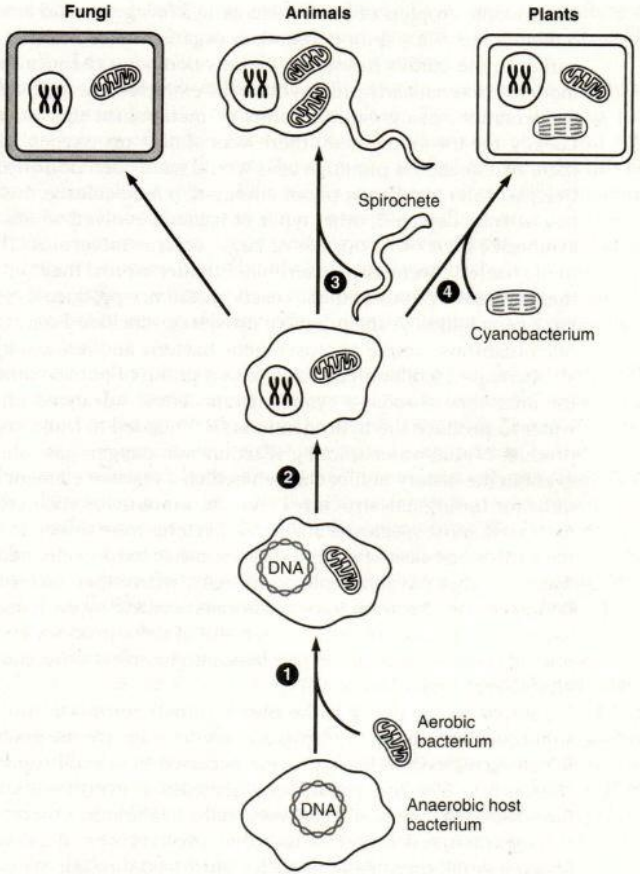
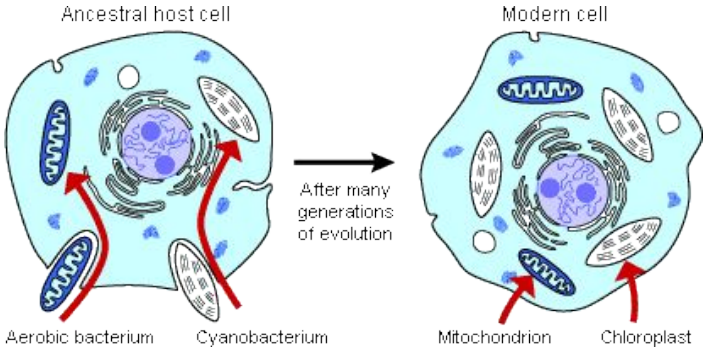


FIGURE 3.3 Evolution of eukaryotic cells by a series of endosymbiotic events: (1) mitochondria evolve from small, free-living, respiring bacteria; (2) the nucleus evolves from the simpler prokaryotic DNA molecule; (3) flagella (undulipodia) evolve from symbiotic spirochetes; (4) chloroplasts arise from free-living cyanobacteria. Cell walls in plants and fungi, which are structurally quite different, evolve independently.

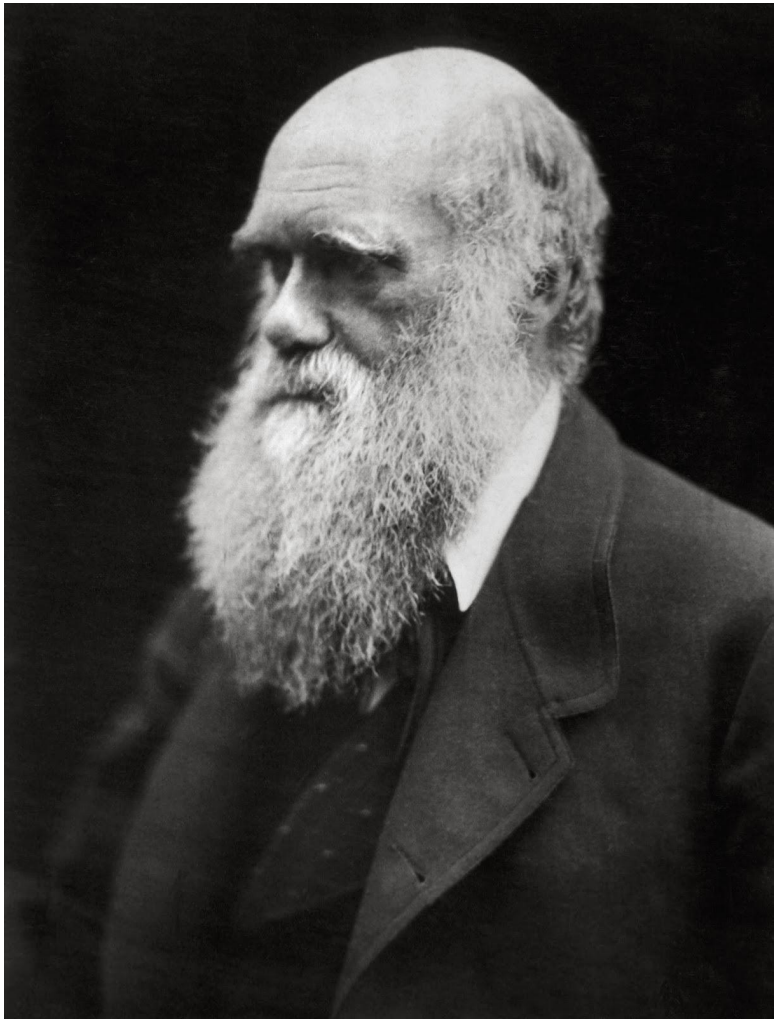


And a woman:

Lynn Margulies

1983 - Theory of Eukaryotic Cell

Symbiosis is a key to evolution!



Science has always been a male dominated field.

Two elderly men honorable to mention.

Louis Pasteur
(1832 -1895)

Charles Darwin
(1809 - 1882)

MICROBIAL DARK MATTER

THE UNCULTURED MAJORITY

Wendy Russell *is a chemist specializing in molecular nutrition at the Rowett Institute of Nutrition and Health, University of Aberdeen. She is researching the complex interplay of food and health and in particular the function of the gut microbiota in the prevention of diet-related disease.*

Despite the best of efforts of our finest microbiologists, many of the microbial species that inhabit our bodies remain unclassified or poorly understood.

These are not just a few species living in the shadows of our knowledge. It could be as much as 99.9 percent of the human microbiota, although it is obviously difficult to accurately estimate the unknown.

So how do we know, what we don't know?
The so-called 'Great Plate Count Anomaly' has consistently demonstrated that we can see things under the microscope that can't be grown under laboratory conditions. We have been aware of this constraint for at least a century and a half, but the science only moved forward with the advent of culture-independent techniques in the 1980s. Using these sequencing technologies, we can identify the genome of uncultivated bacteria.

Why should we care, if we can sequence?
All you need is a high quality draft genome and

Extract of the publication
Food Phreaking, Issue 3
on gut gardening.

Center for Genomic Gastronomy

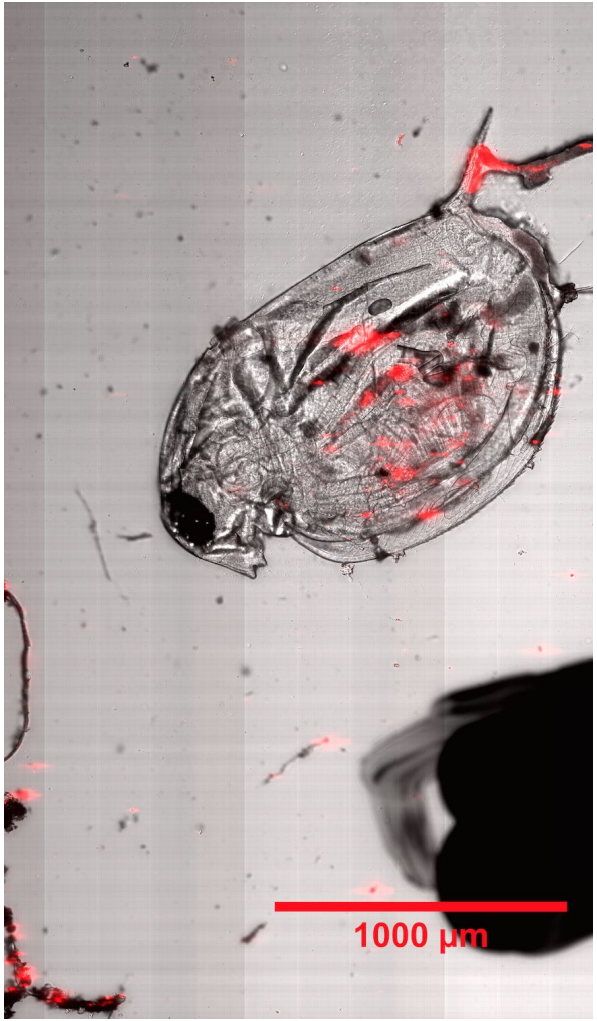
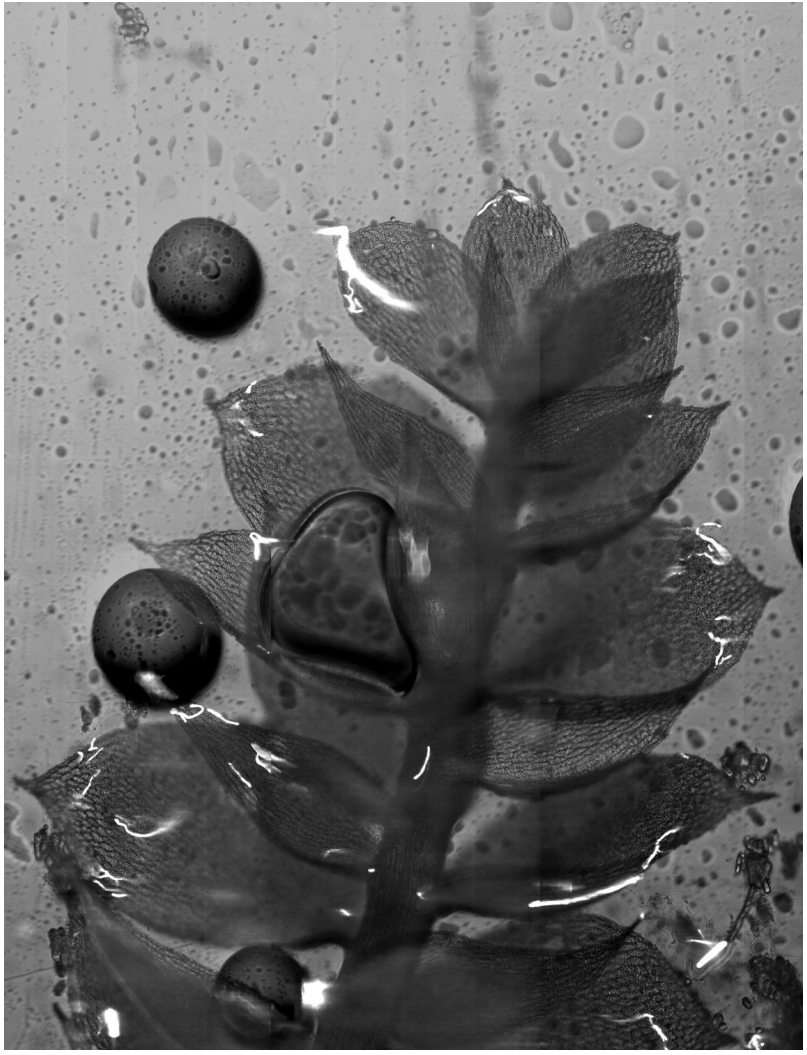


Photo: showing a water flea swallowing microplastic
by Julian Chollet and Urs Gaudenz
made by **Hiseq2000**

Photo: showing a tardigrade made with an binoculare and smartphone.

https://forum.hackteria.org/



Photos by Urs Gaudenz und Maya Minder made by Hiseq2000

Entry for the Science Photo Marathon, 2019

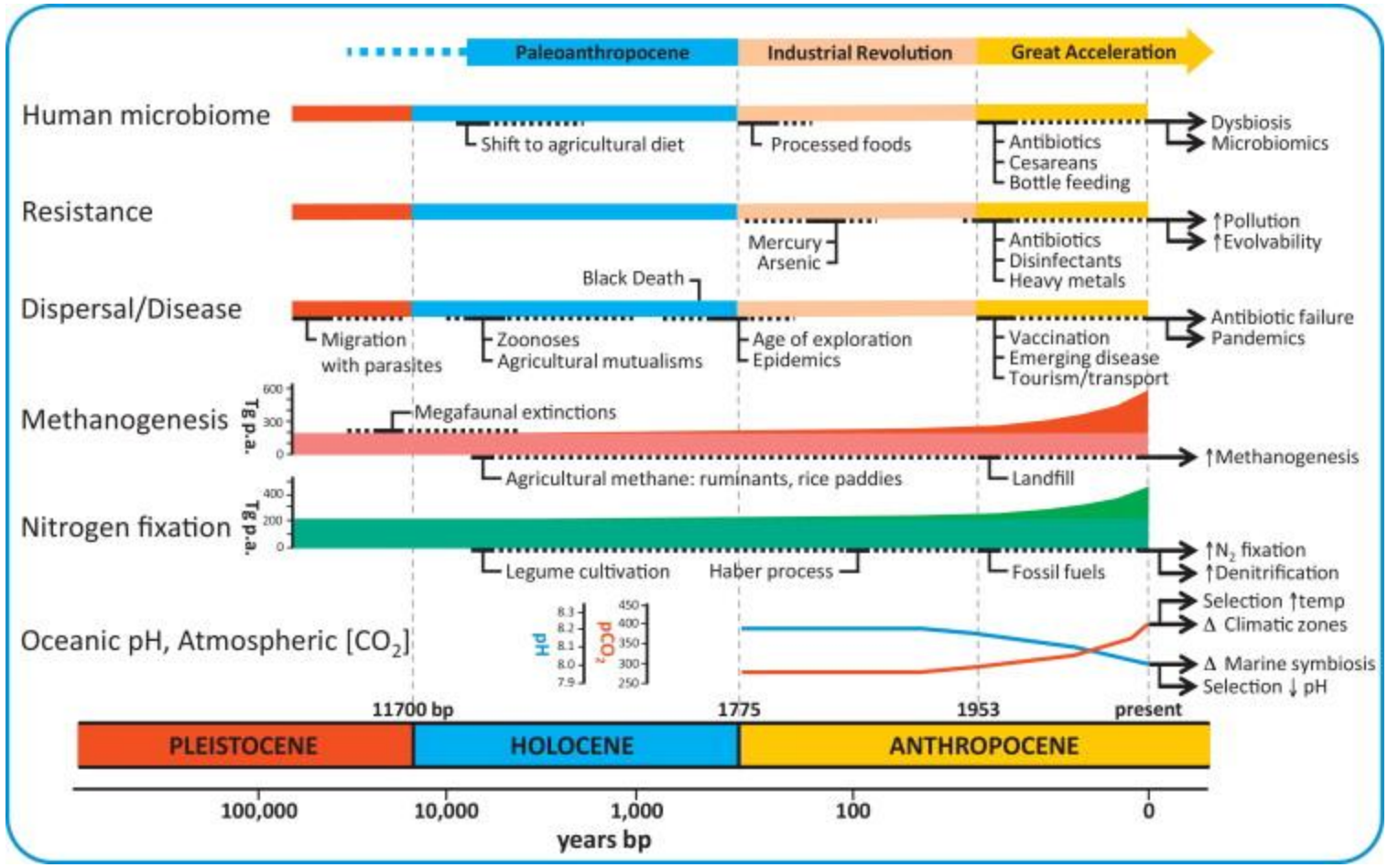
https://forum.hackteria.org/

ANTHROPOCENE

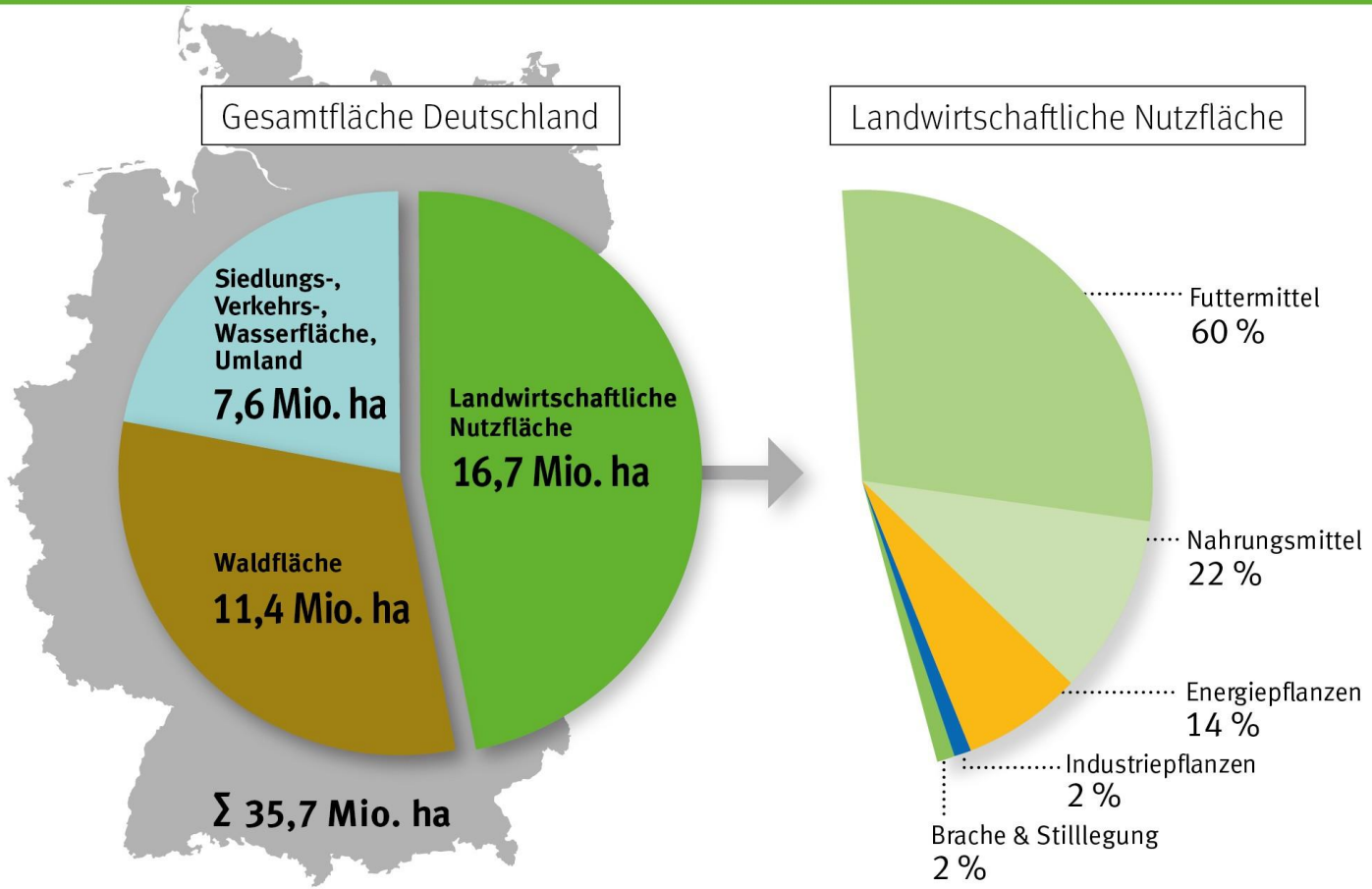
approx. 1945 A.D. - present

A new geologic era with no precise start date. Marked by significant human impact on climate and ecosystems. Coined by Paul Crutzen. Rise of agriculture. Deforestation. Cement. Combustion of fossil fuels. Coal, oil and gas roused from the earth. Extraction and emission. Operation Crossroads vaporizes 70 acres of Bikini Atoll. Deep geologic repositories. Pacific Trash Vortex, a swirling gyre of marine litter and plastic. 6.7 billion humans + growing. Palo Verde Nuclear Power Plant. Hull-Rust-Mahoning open pit mine. Three Gorges Dam. Fresh Kills Landfill. Las Vegas. Dubai.

PMCARRENO / Shutterstock

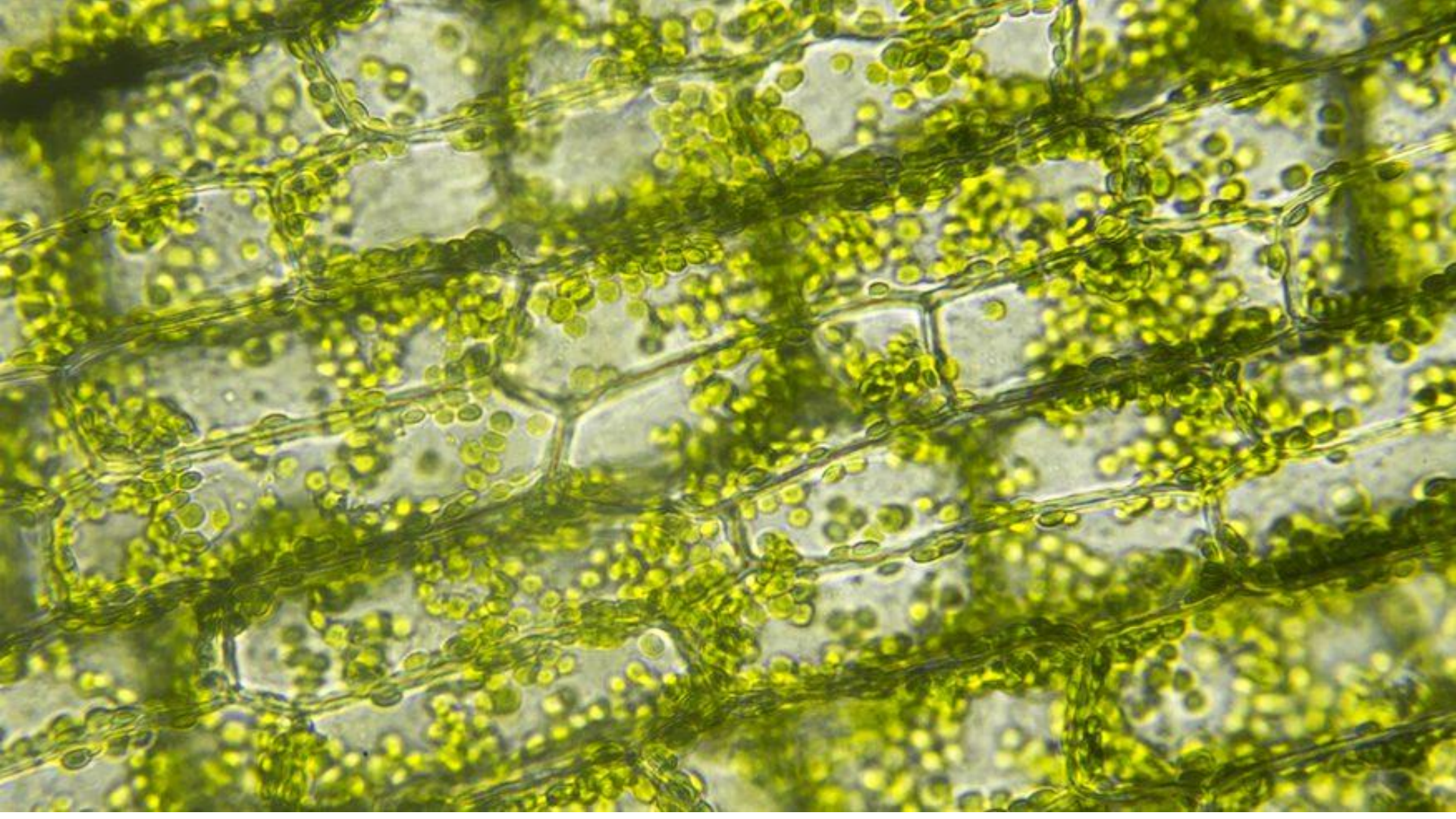

Paleoanthropocene
Industrial Revolution
Great Acceleration
Human microbiome
Shift to agricultural diet
Processed foods
Antibiotics
Cesareans
Bottle feeding
Dysbiosis
Microbiomics
Resistance
Mercury
Arsenic
Antibiotics
Disinfectants
Heavy metals
↑Pollution
↑Evolvability
Black Death
Dispersal/Disease
Migration with parasites
Zoonoses
Agricultural mutualisms
Age of exploration
Epidemics
Vaccination
Emerging disease
Tourism/transport
Antibiotic failure
Pandemics
Methanogenesis
Tg p.a.
600
300
0
Megafaunal extinctions
Agricultural methane: ruminants, rice paddies
Landfill
↑Methanogenesis
Nitrogen fixation
Tg p.a.
400
200
0
Legume cultivation
Haber process
Fossil fuels
↑N2 fixation
↑Denitrification
Oceanic pH, Atmospheric [CO2]
pH
8.3
8.2
8.1
8.0
7.9
pCO2
450
400
350
300
250
Selection ↑temp
Δ Climatic zones
Δ Marine symbiosis
Selection ↓ pH
11700 bp
1775
1953
present
PLEISTOCENE
HOLOCENE
ANTHROPOCENE
100,000
10,000
1,000
100
0
years bp

FLÄCHENNUTZUNG IN DEUTSCHLAND 2017



Quelle: FNR nach Statistischem Bundesamt, BMEL (2017)

Bauernszene aus dem Film: “Denn ich sah eine neue Erde”, DDR, 1970



citizen science, grassroot, DIY and immersive art

Lifepatch - Jogja River Project, Indonesia
Maurice Maggie - Flowergraffiti, Switzerland
Spela Petric, Flower Sex
Sasa Spacal, Earthlink, 2019

CIRCULAR CHROMATOGRAPH
WORKSHOP
with Emanuela Ascari

Image by
Lisa Biedlingmaier

Flowergraffiti
by Maurice Maggie

Image by
Maurice Maggie

Inspiration, 2018
Saša Spačal

Photo © Miha Godec

Inspiration, 2018
Saša Spačal

JOGJA RIVER PROJECT
with LIFEPATCH

Image by
Hackterialab 2014

open discussion

Let’s talk about YOUR ideas!

stay in contact

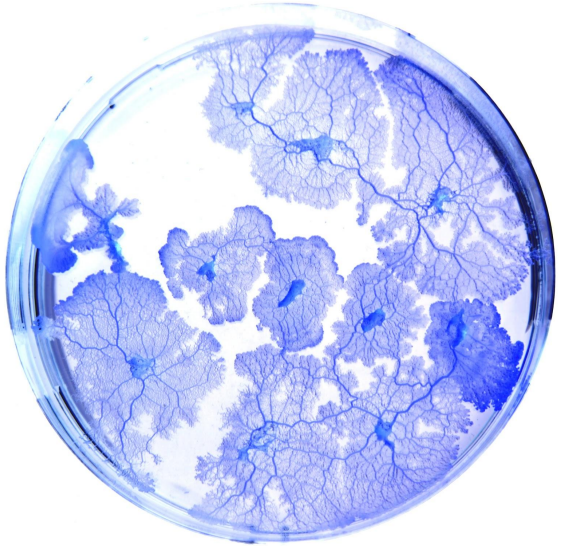
Website: https://mikrobiomik.org/humussapiens
there's also a newsletter....
proudly without wordpress, mailchimp, etc.

Wiki: https://hackteria.org/wiki/HUMUS_sapiens

Forum: https://forum.hackteria.org

Twitter: @mikroBIOMIKorg
@mayaminder

Email: humus@mikrobiomik.org
maya@sonmas.ch



HUMUS SAPIENS IS A COLLABORATIVE PROJECT OF:

mikro BIOMIK

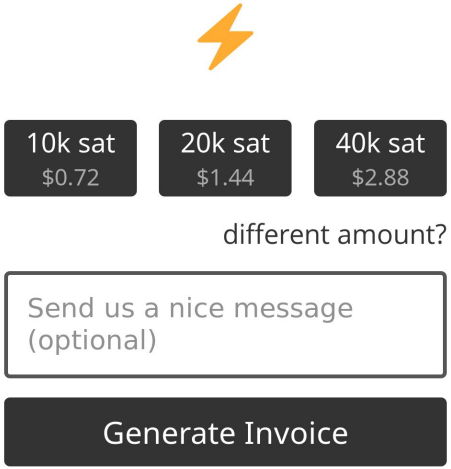
HACKTERIA.ORG

GASTHAUS
FERMENTATION AND BACTERIA

support HUMUS sapiens

https://mikrobiomik.org/en/support-us

Website:



Wallet:

3PhS2GYC5mKJjXp2ALskNrCvmgA48pqfxG

HUMUS SAPIENS IS A COLLABORATIVE PROJECT OF:

mikro BIOMIK

GASTHAUS
FERMENTATION AND BACTERIA

open discussion leading questions

- ➔ Deep adaptation agenda for soils?
- ➔ Revive/rebuild degraded soils?
- ➔ How to design future agriculture systems?
- ➔ Soil for carbon sequestration?

Soil

Humus

Base

Drawing by
Mona Schreiber