Invisible landscape

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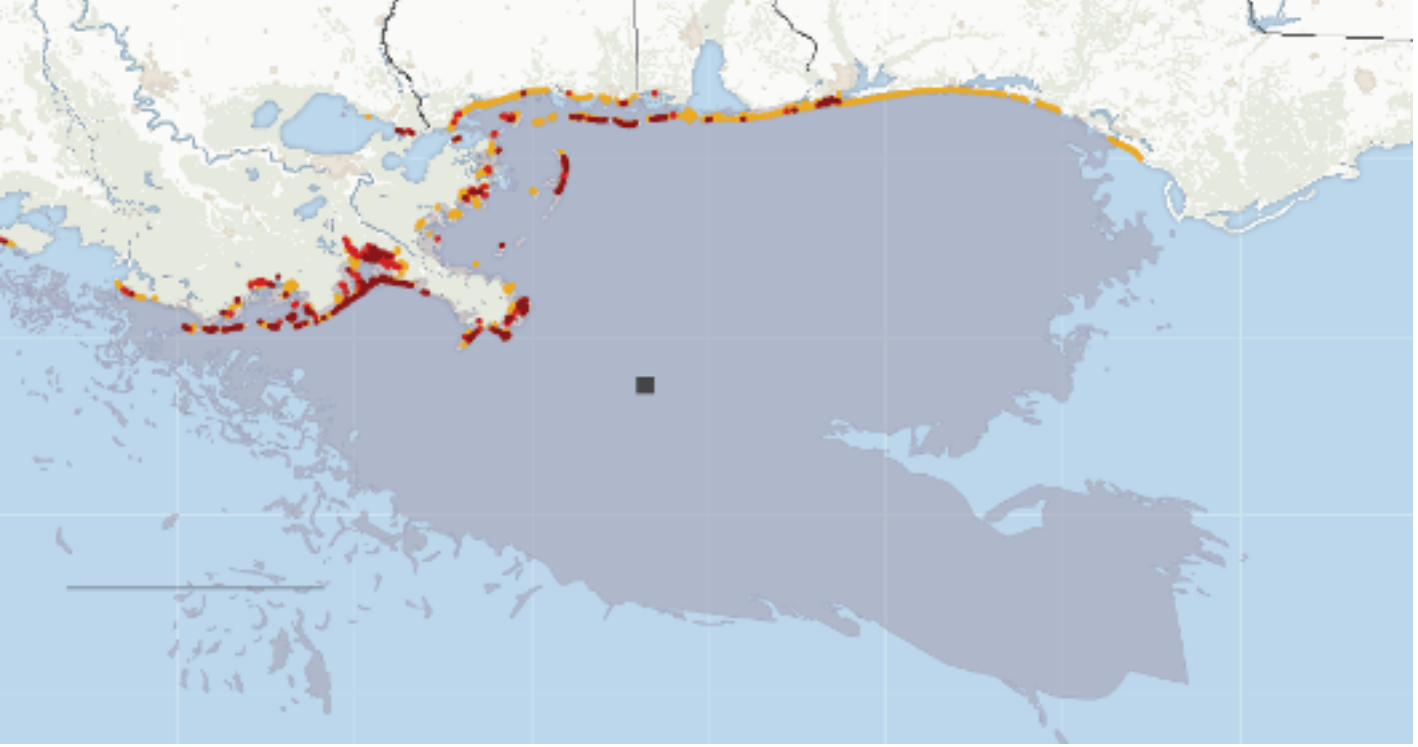
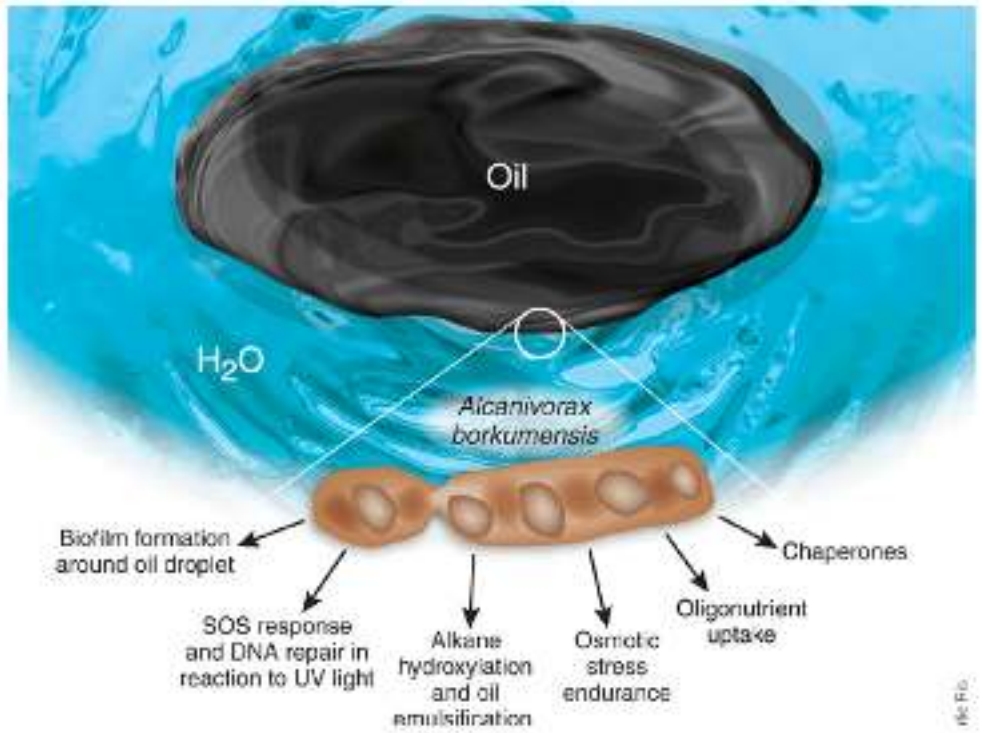
NLA_URU Oslo, 21.04.23

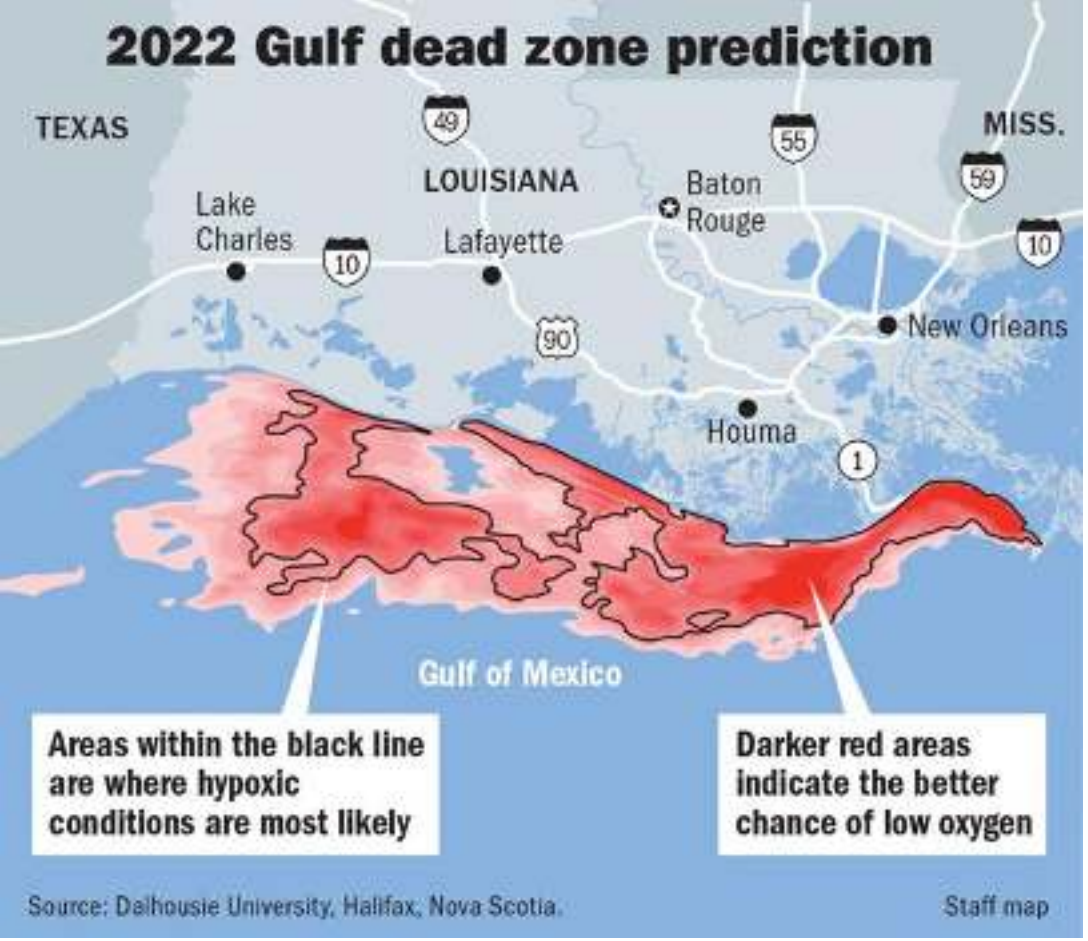


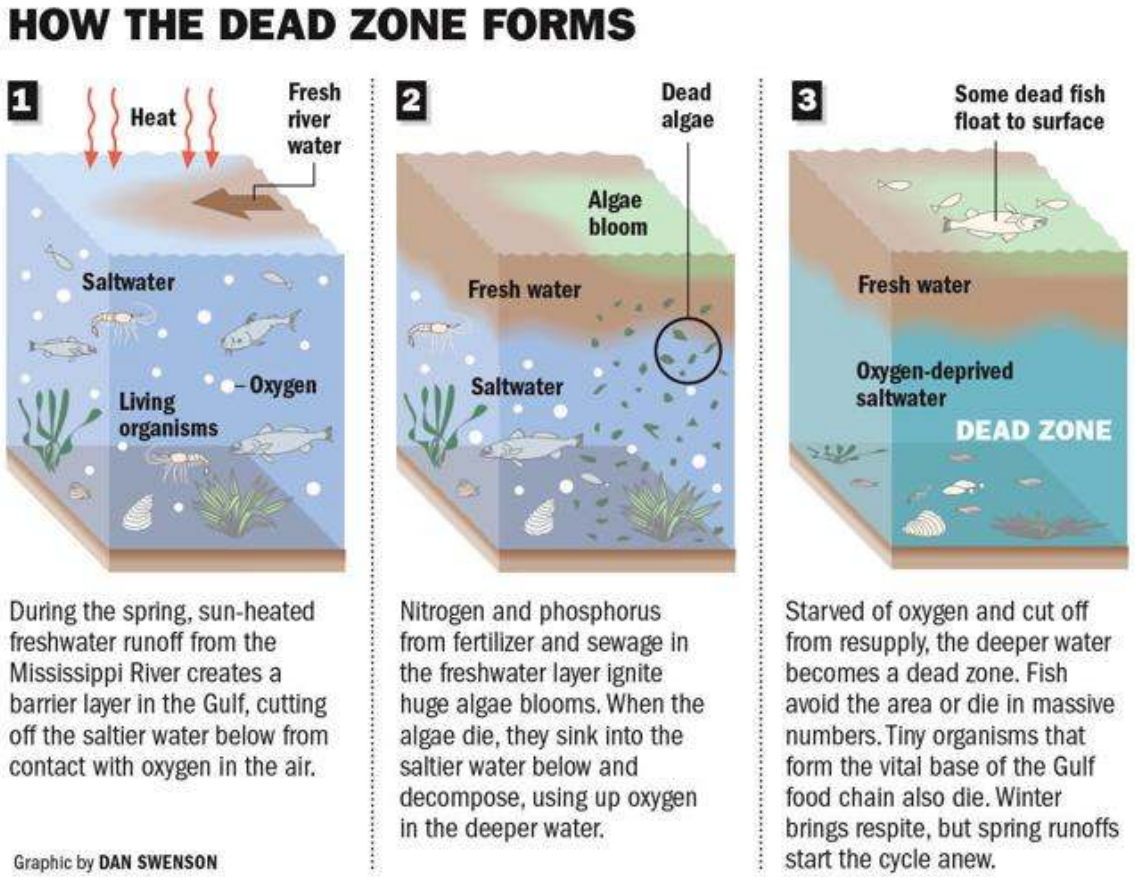
Deep Water Horizon, 2010
est. 143 -203 Million gallons crude oil



Naturally occurring oil-eating marine bacterium called
Alcanivorax Borkumensis consumed about half of the oil spiled.
producing a wide variety of very efficient oil-degrading enzymes.

What does the largest oil spill and
the largest hypoxia zone in history have in common?





Hypoxia: oxygen depleted areas in the sea.

Causes marine life to die or flea.

> Eutrophication from watershed

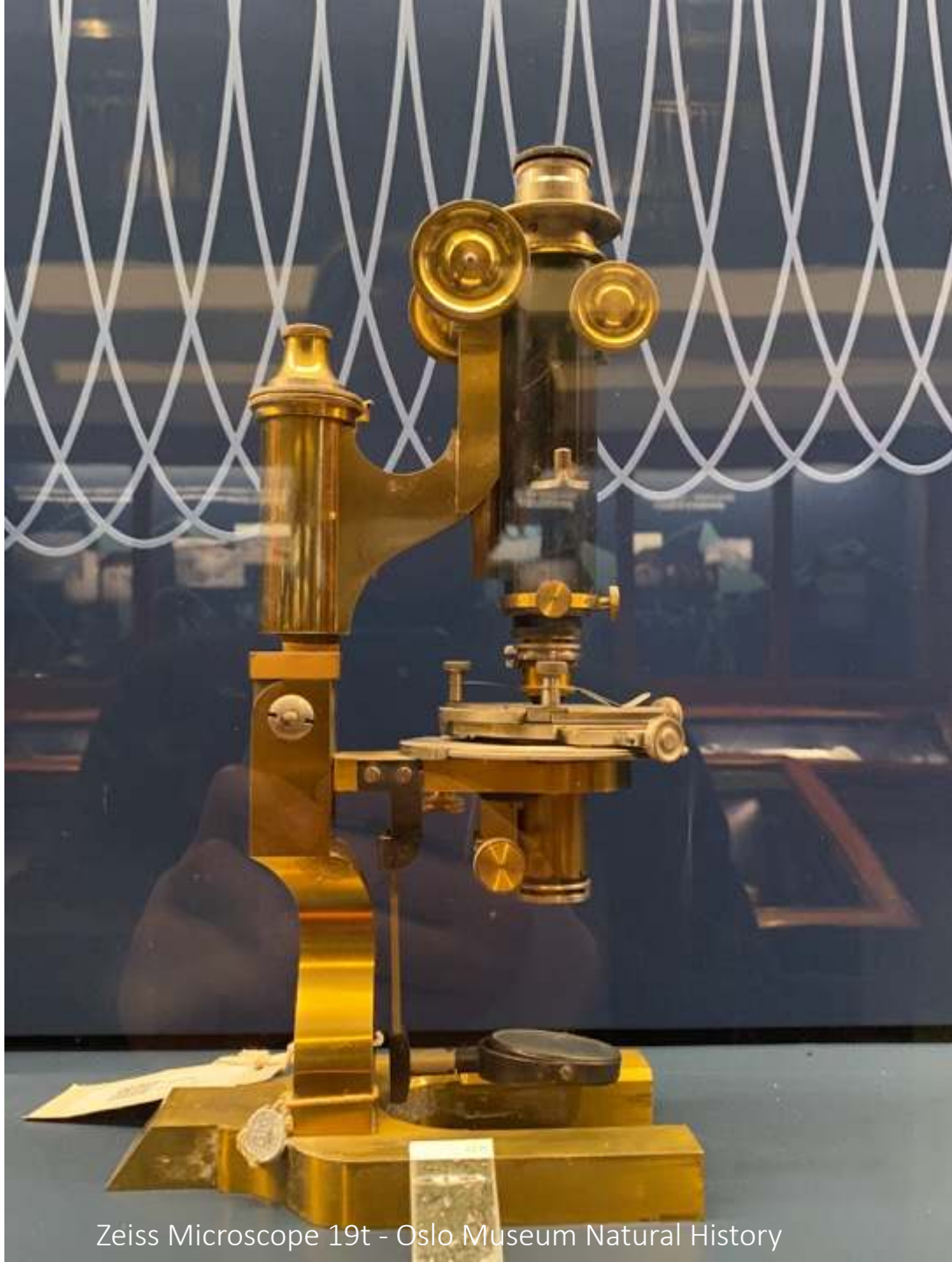
> Excess algae and plankton growth

> Bacterial decomposition consumes oxygen

Invisible landscape - an oxymoron?

Why does Landscape architecture

rarely address microbiology?

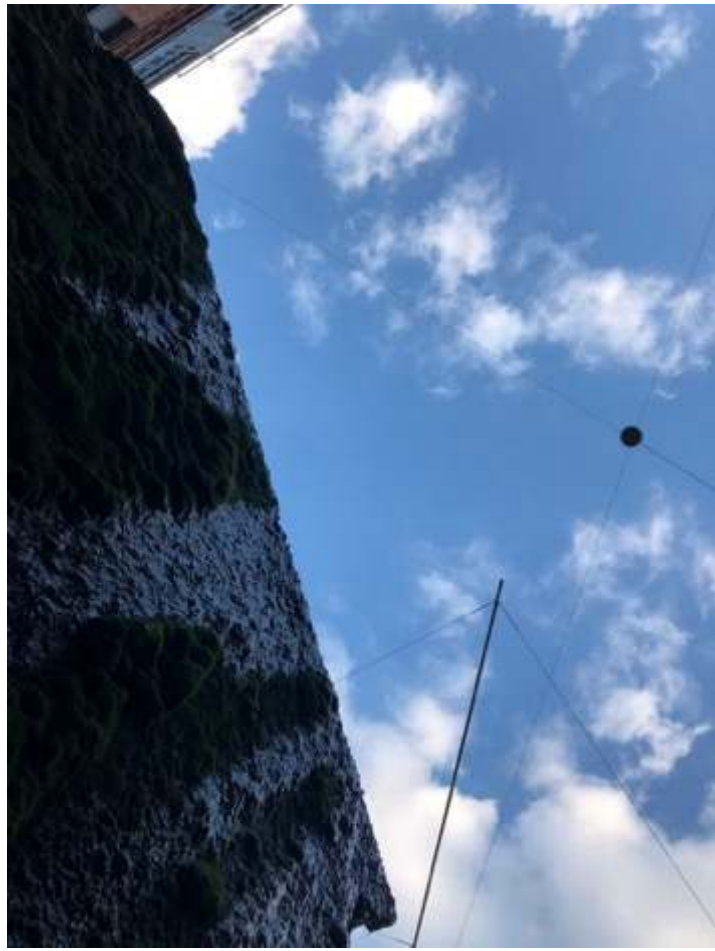


Zeiss Microscope 19t - Oslo Museum Natural History

Fountain sculpture inducing erosion and nurturing microbial growth

Narva Höfe: Berlin Oberbaum-City,

Prof. Gustaf Lange



Photos: Jorg Sieweke, 2021

Germ theory

Science photo library Streptococcus bacteria. Computer artwork

Thomas Murner (1512)

Sick from lack of germs

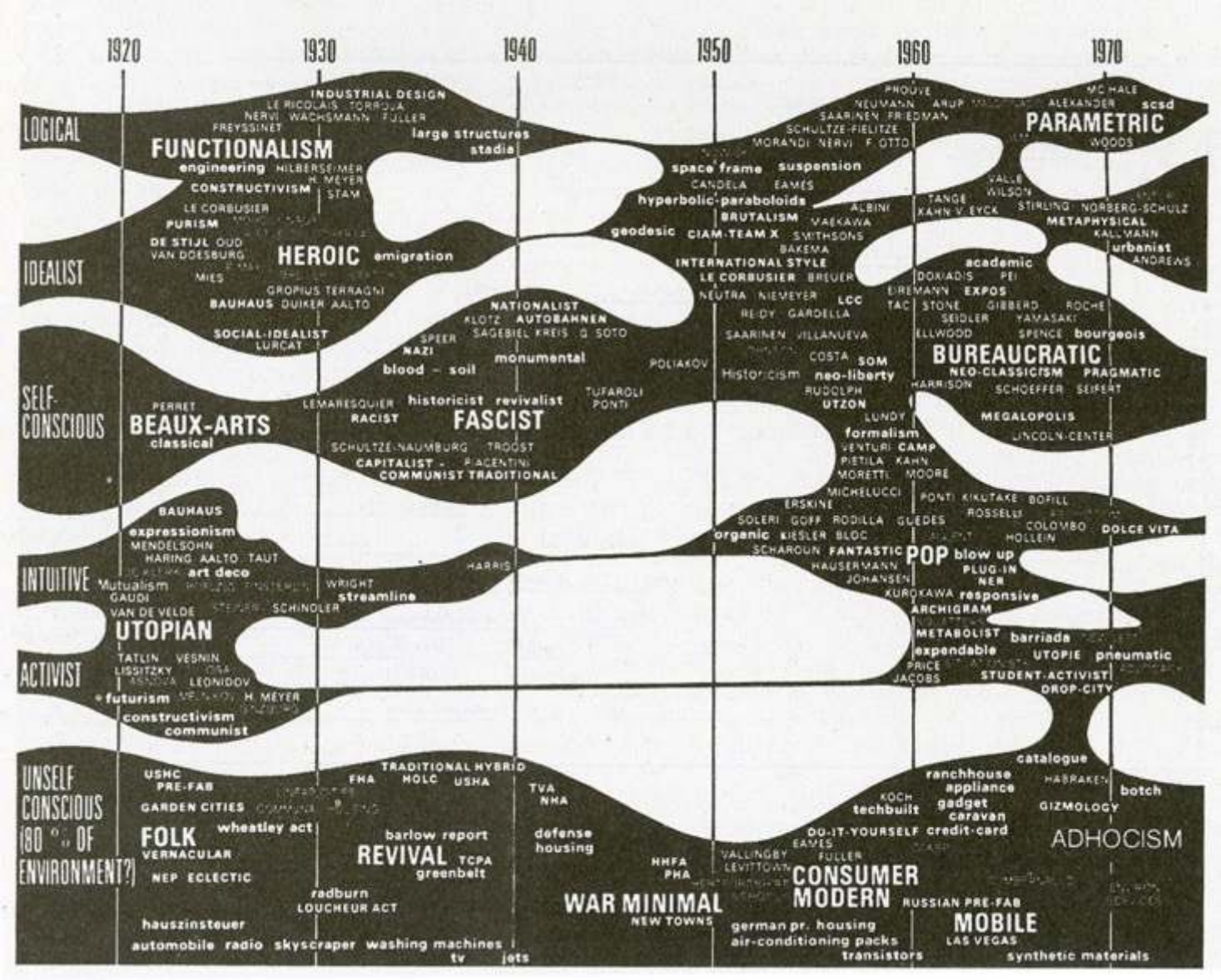
Robert Koch (1876) showed connection between specific microorganisms and the occurrence of particular diseases: e.g. cholera

Hygiene Hypothesis
Todays increase in sanitization is directly linked to growing rates of health problems
Allergies, Asthma, Cancer, etc.

Early modern
SANITATION

URBAN HYGIENE

GERM THEORY
ROBERT KOCH 1876



Charles Jencks, “The Evolutionary Tree” from Modern Movements in Architecture, 1973.

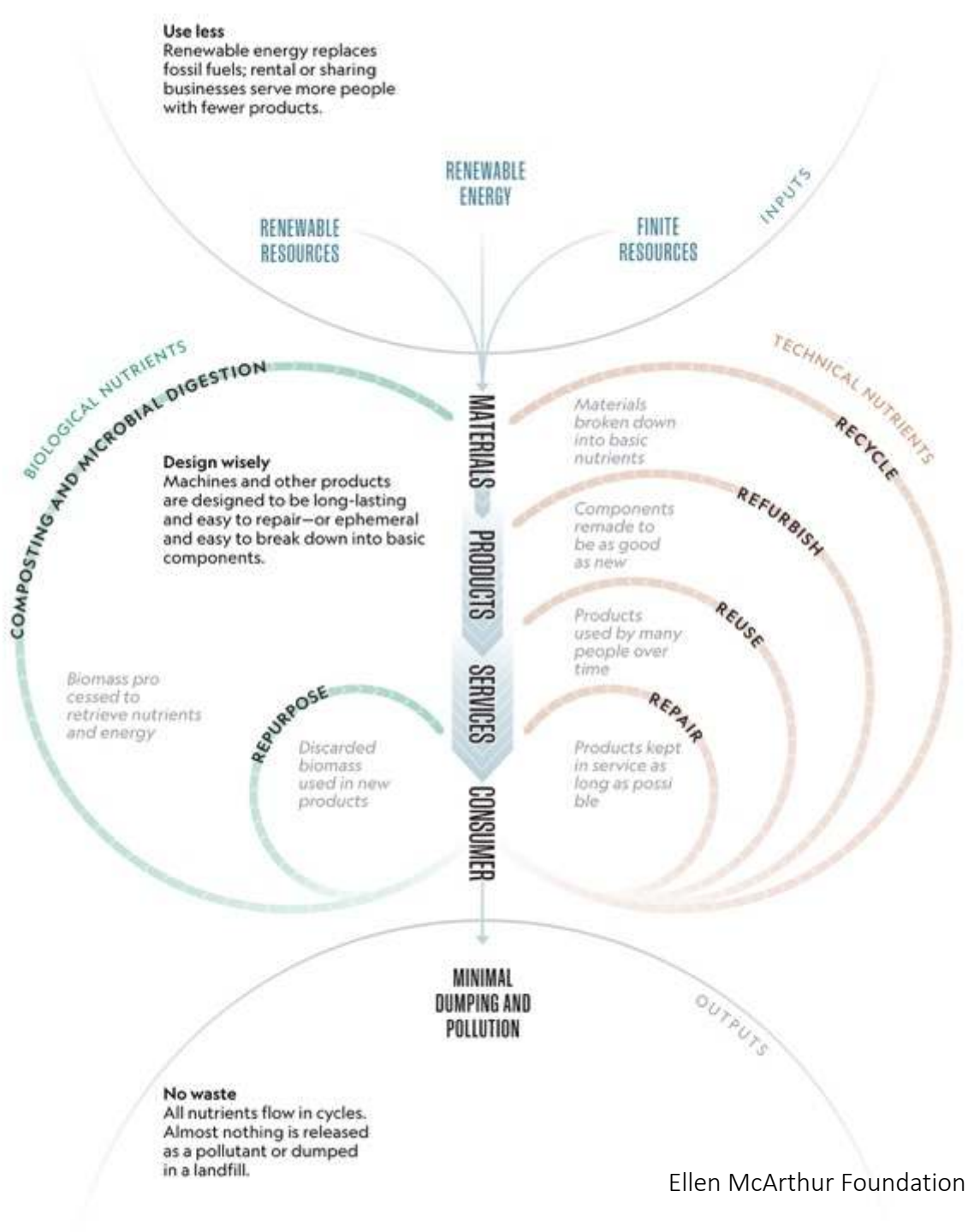
Late modern
OVER-SANITATION

MULTI-RESISTANCY

ALLERGIES
ASTHMA

Cyclic ecosystems in Biosphere
with microbial decomposition

a model for
Circular Economy in the Technosphere



Ellen McArthur Foundation

Microbiology - Definitions

Microbe: a microscopic organism

Microbiota: a group of microbes

Microbiome: the entire collection of microbes in a given environment and their theatre of activity

Cryptogam: fern, moss, alga, or fungus: a plant or plant-like organism reproducing by spores and not producing visible flowers or seed.

Holobiont: Discrete ecological unit through symbiosis

Omnipresent: '*Everything is everywhere'*

two nested layers of biodiversity …

1. Human Microbiome

Microorganisms of the inner layer – human gut, skin, airways

2. Environmental Microbiome

Microorganisms of the outer layer – soil, waters, plants, animals

Human bodies are colonised by microbes from the outer layer

Only 0.00001% of microbial species are human pathogens

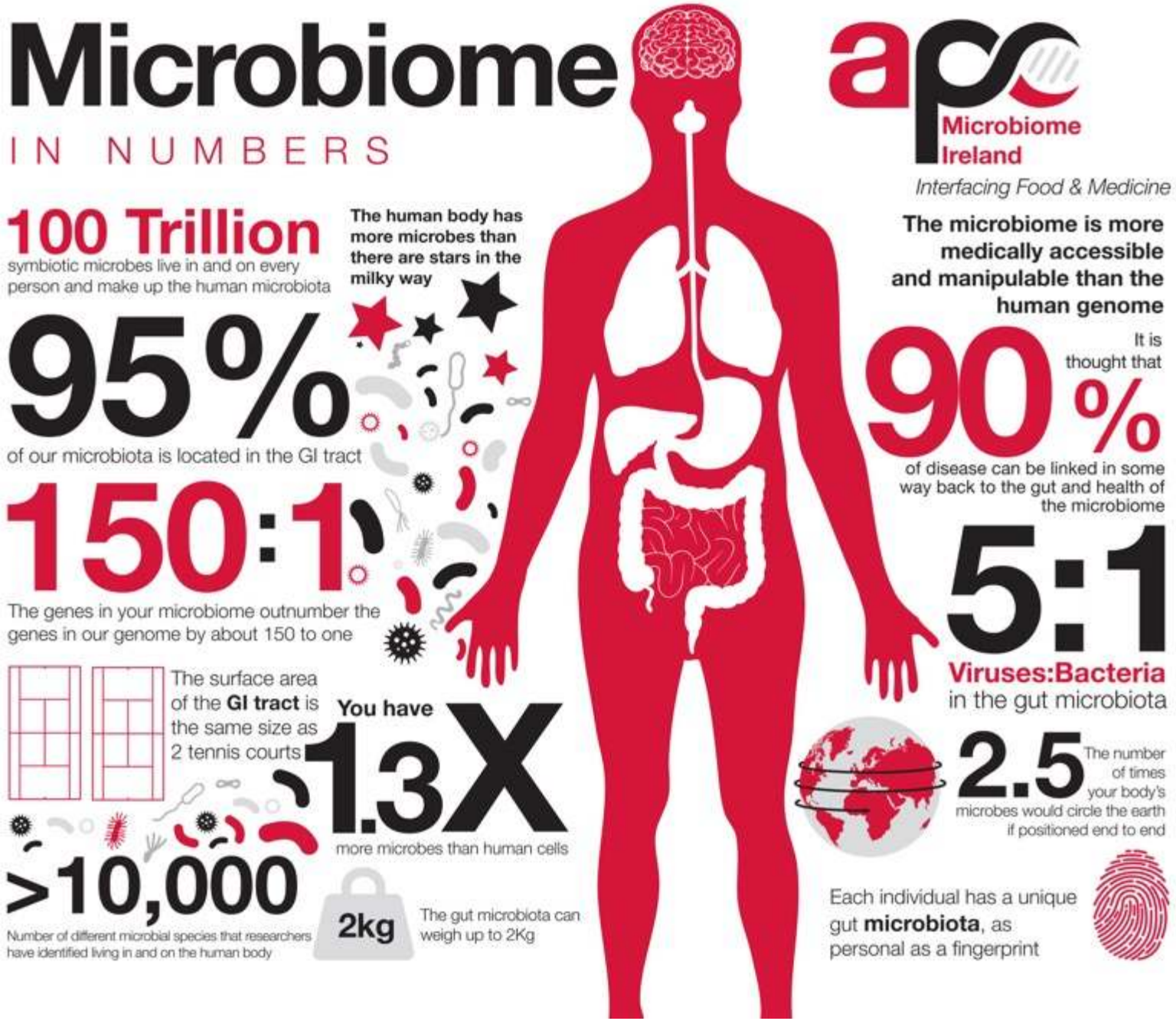
1. Human Microbiome

Microorganisms of the inner layer – human gut, skin, airways

Human Microbiome individually unique

A balanced Microbiome defines health

Recent findings on digestive and nervous system interaction



1. Human Microbiome

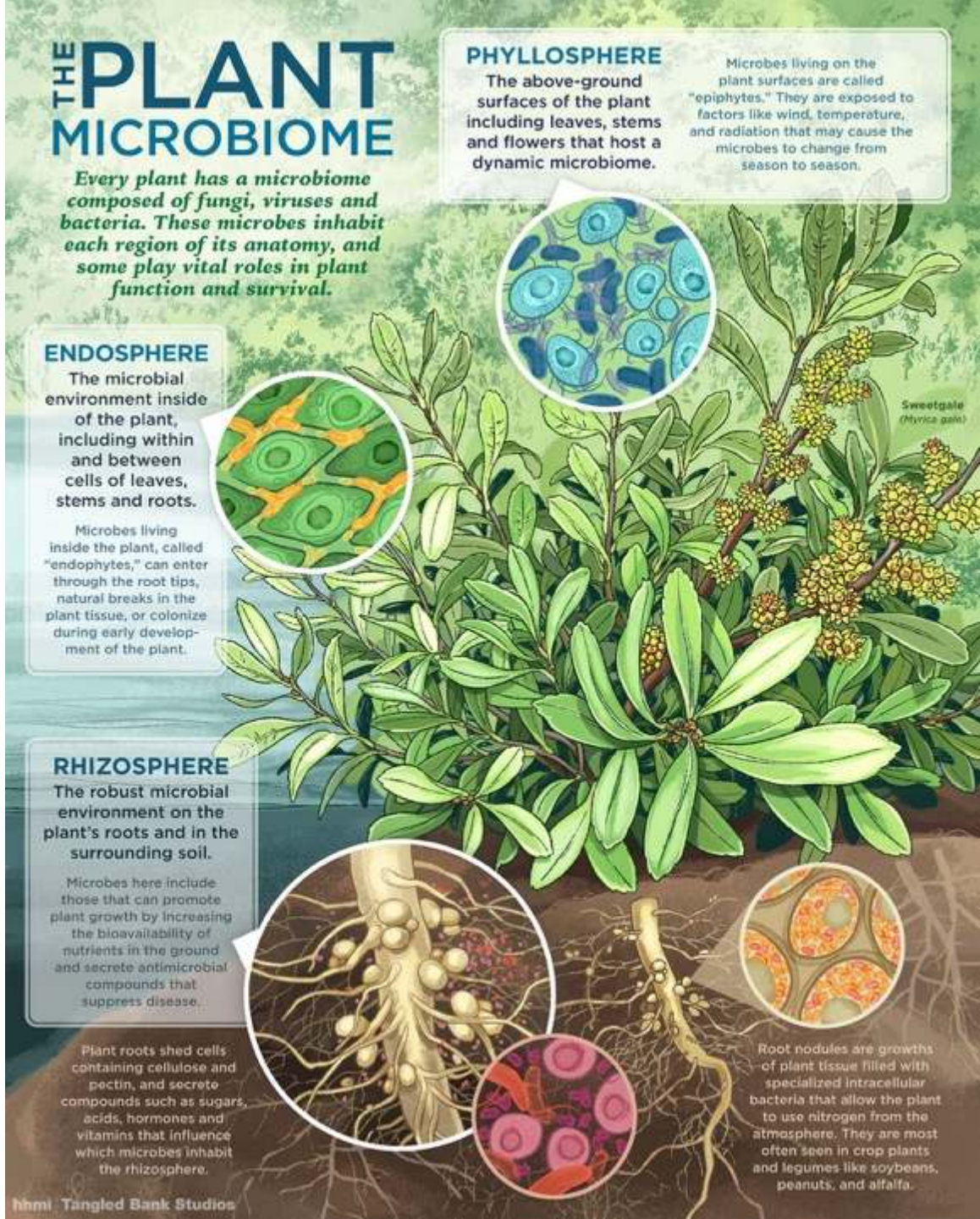
Gut microbes could drive and potentially cure brain disorders
That might lead to better and easier treatments for brain diseases.
Nature: 3. February, 2021

Illustration by Fabio Buonocore

2. Environmental Microbiome

Plants have several Microbiome

Inside every plant is a world of microbial life.
Microscopic organisms like fungi, viruses, and bacteria inhabit every region of the plant’s anatomy.



Tangled Bank Studios
science documentary production

Human Microbiome & Environmental Microbiome

Immunoregulation for human health

If a walk in the woods feels healthy,
There is now growing evidence
of beneficial microbial exchange and composition.

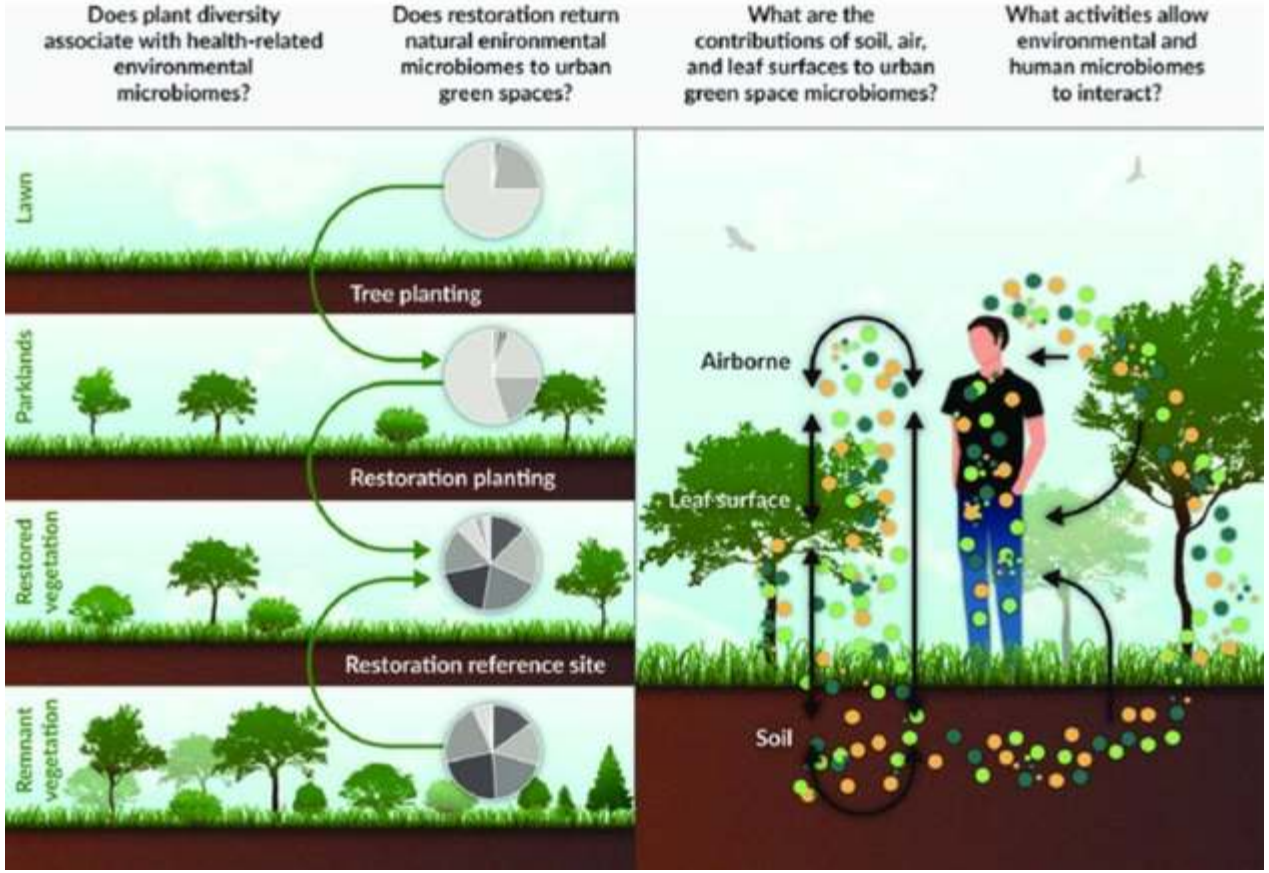
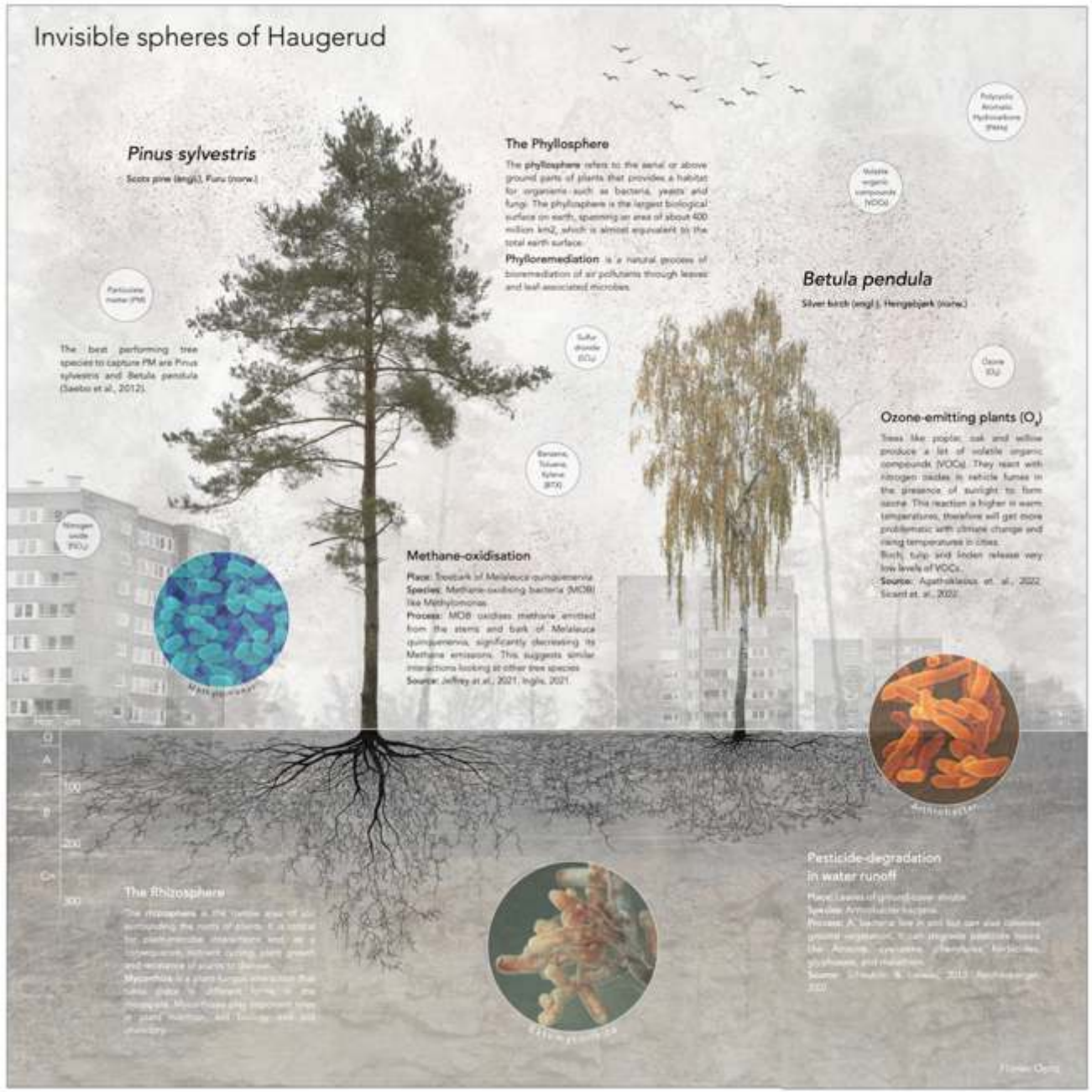
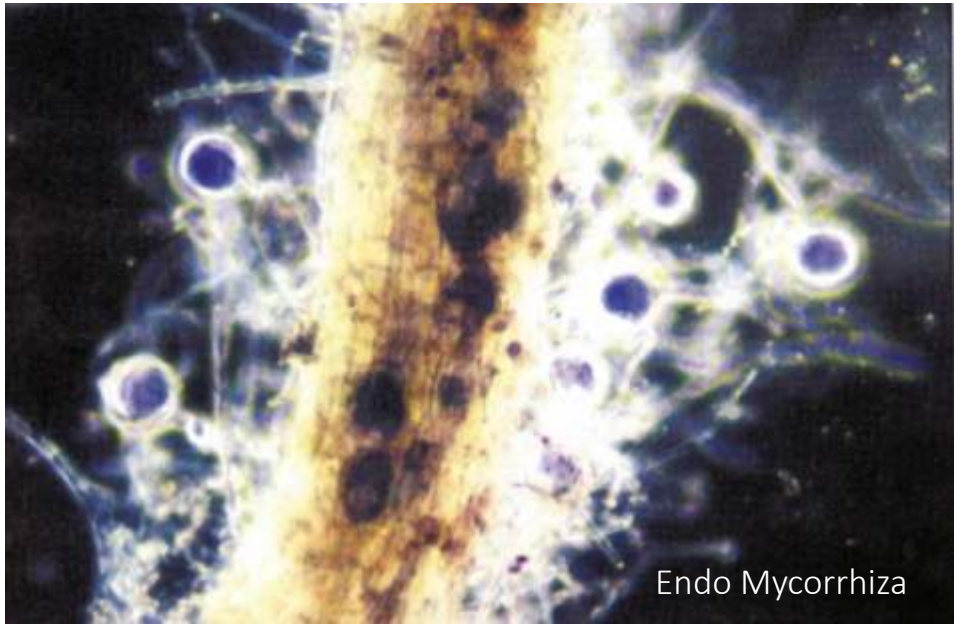
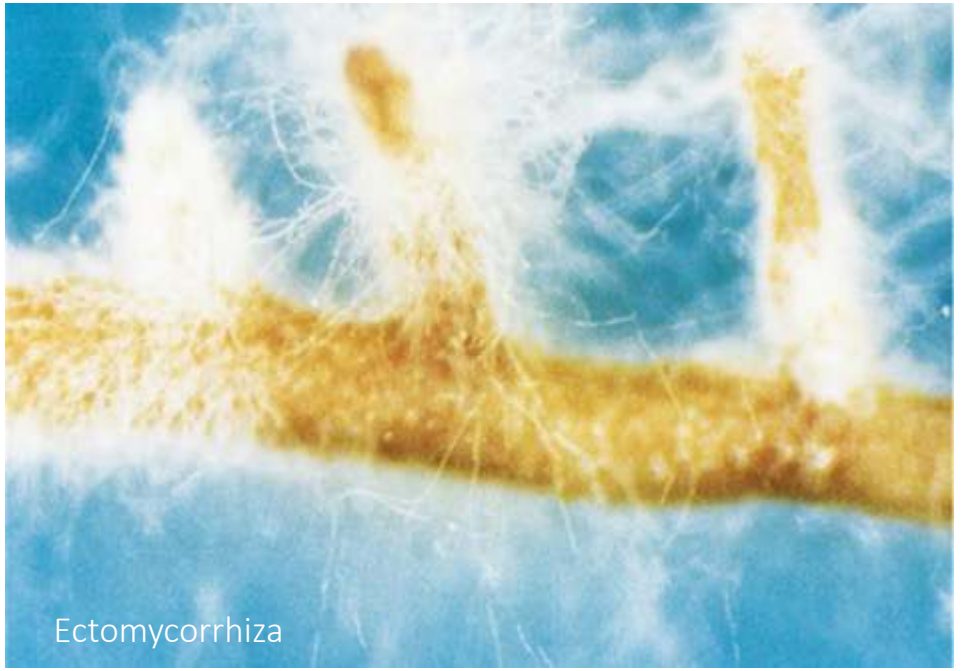


Fig. Some key knowledge gaps of the Microbiome Rewilding Hypothesis

Rhizosphere and Mycorrhizosphere







WOOD-WIDE-WEB

in Douglas-fir forests, Canada.

Rhizopogon: spatial topology of tree–mycorrhizal fungus interaction 30×30m plot containing 67 trees.

DNA markers indicate network of two ectomycorrhizal fungal species, R. vesiculosus and R. vinicolor.

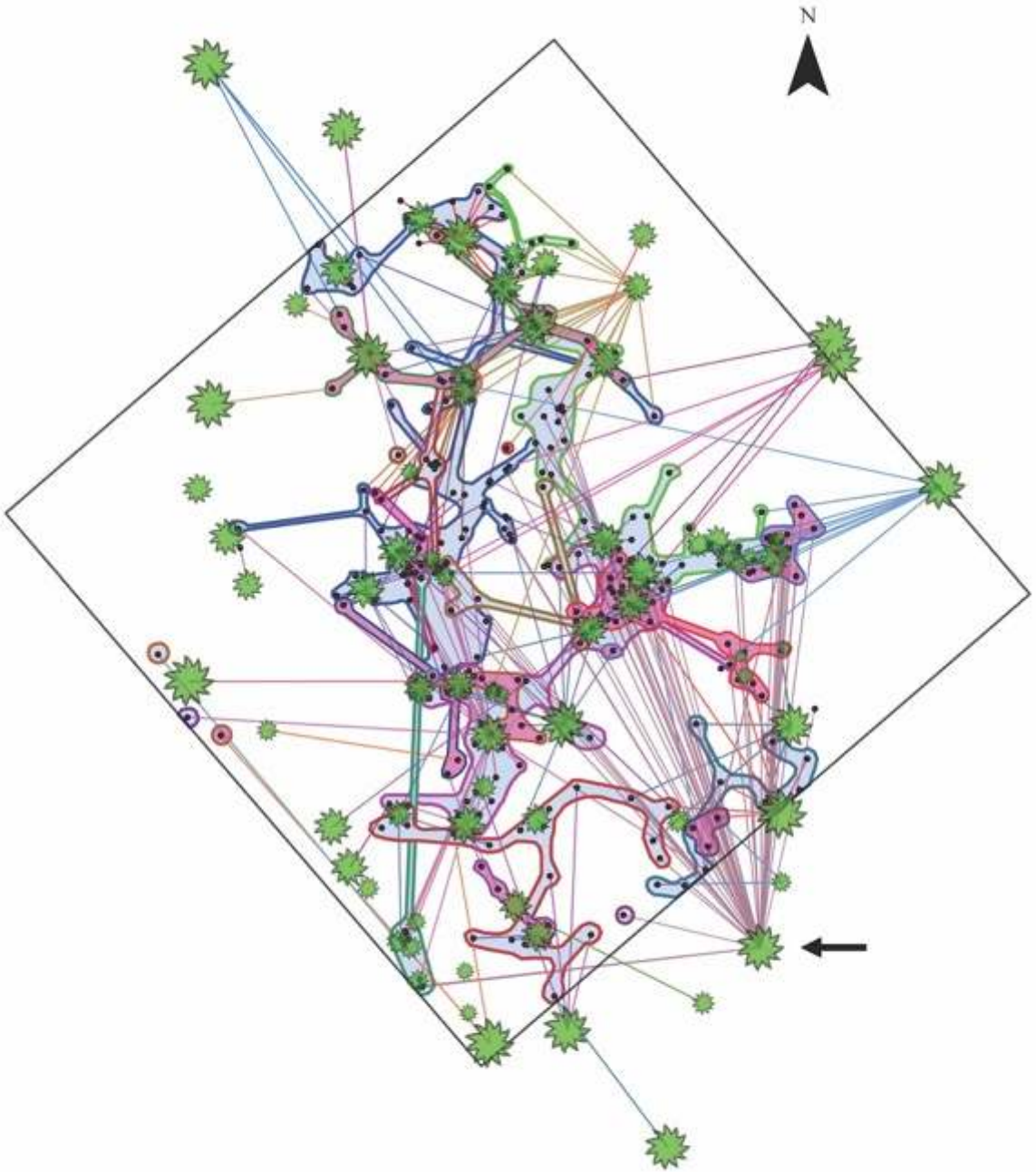
black dots 338 sample locations

Rhizopogon vesiculosus network blue background,

Rhizopogon vinicolor network with pink.

Lines illustrate the linkages between tree roots encountered in Rhizopogon ectomycorrhizas

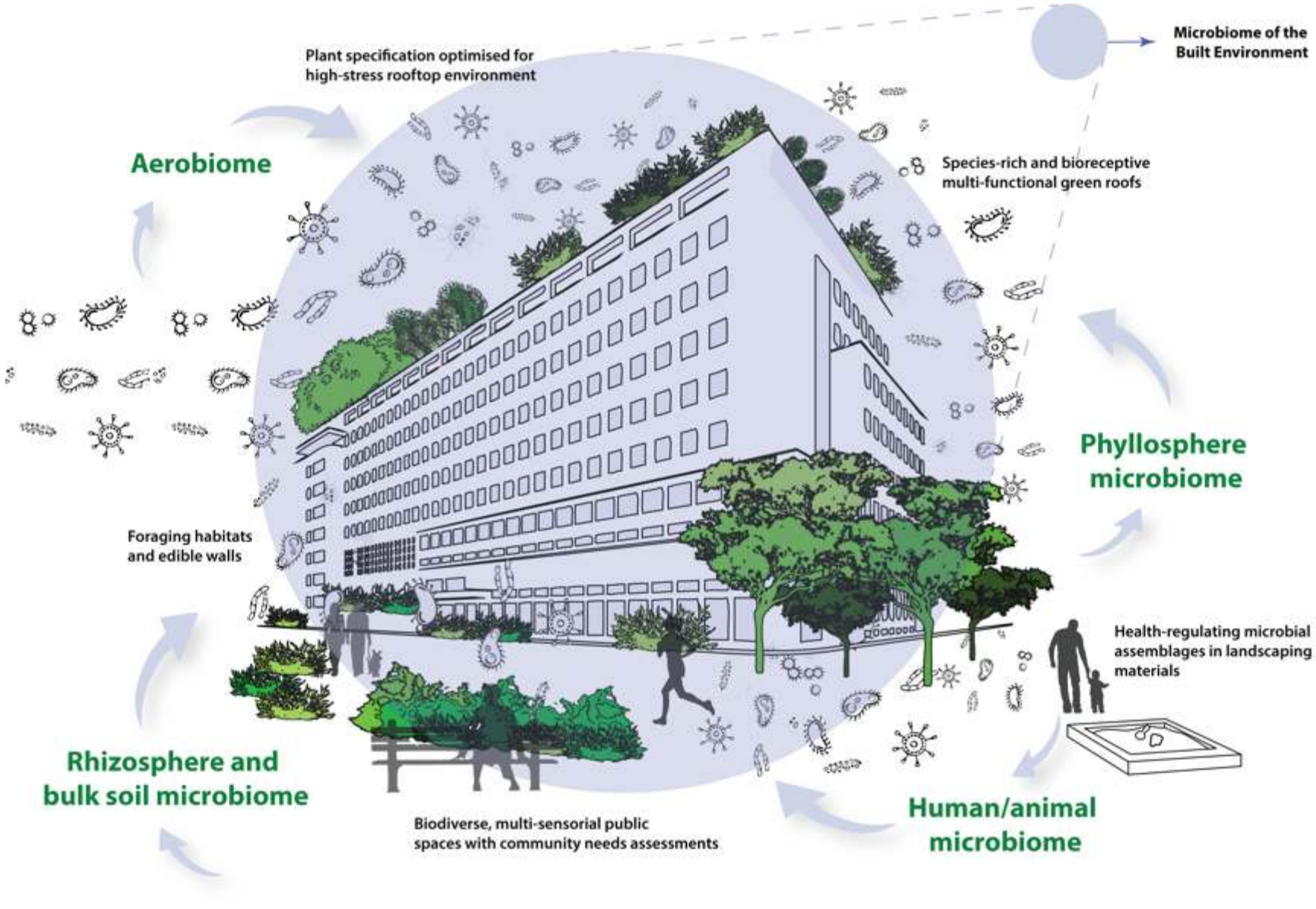
“Mother Tree” with 47 links: by eight R. vesiculosus and three R. vinicolor networks.



Ref: Beiler, K.J., Simard, S.W. (2015), Topology of tree–mycorrhizal fungus interaction networks in xeric and mesic Douglas-fir forests.

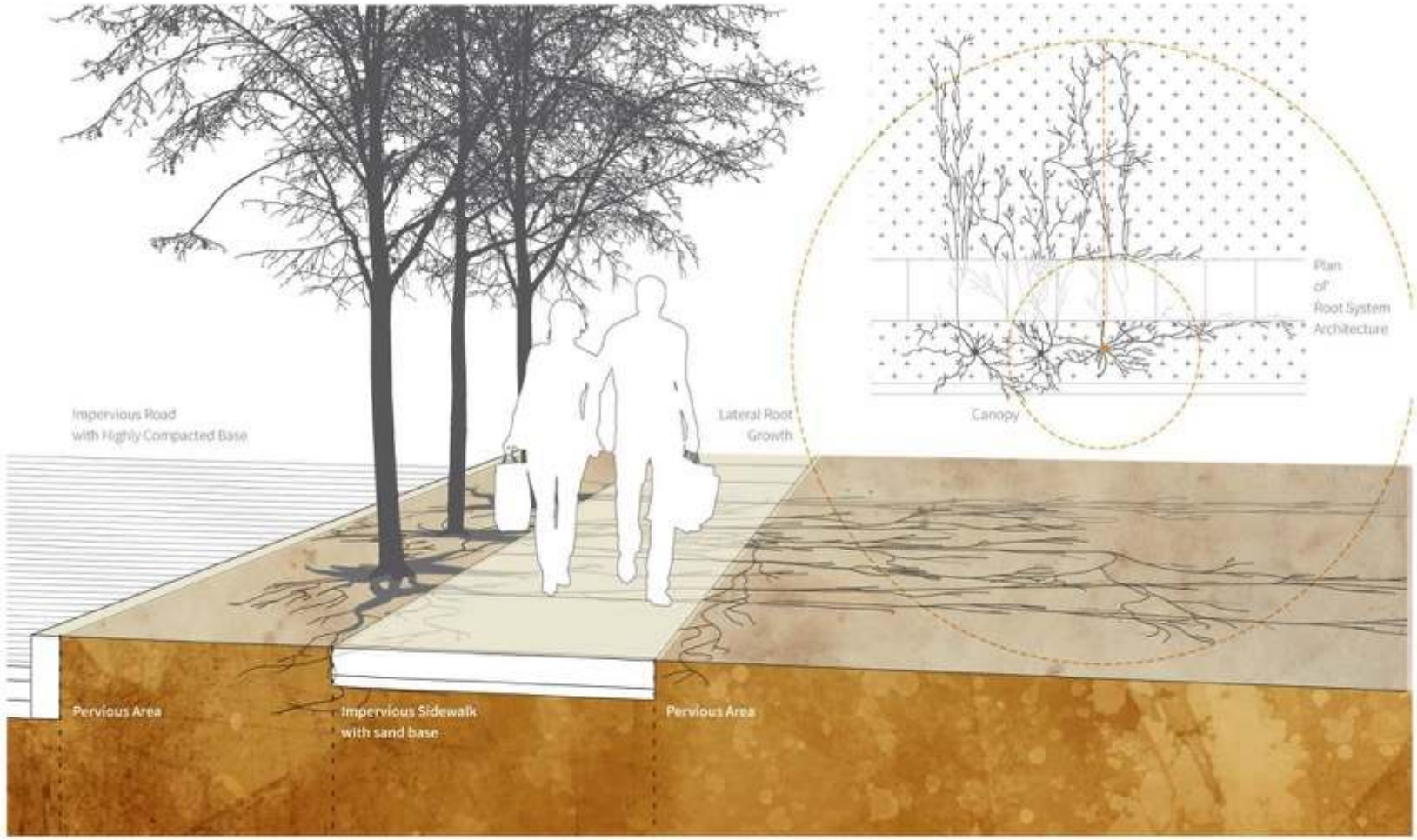
2. Environmental Microbiome

Can we design and restore urban ecosystems with explicit considerations for the microbiome
to enhance both human health and ecosystem functionality?



Microbiome-Inspired Green Infrastructure (MIGI) Jake Robinson, PhD

Challenges of a constraint urban site



ADAPTATIONS TO THE URBAN GROUND, ROOTS IN THE DESIGN PROCESS

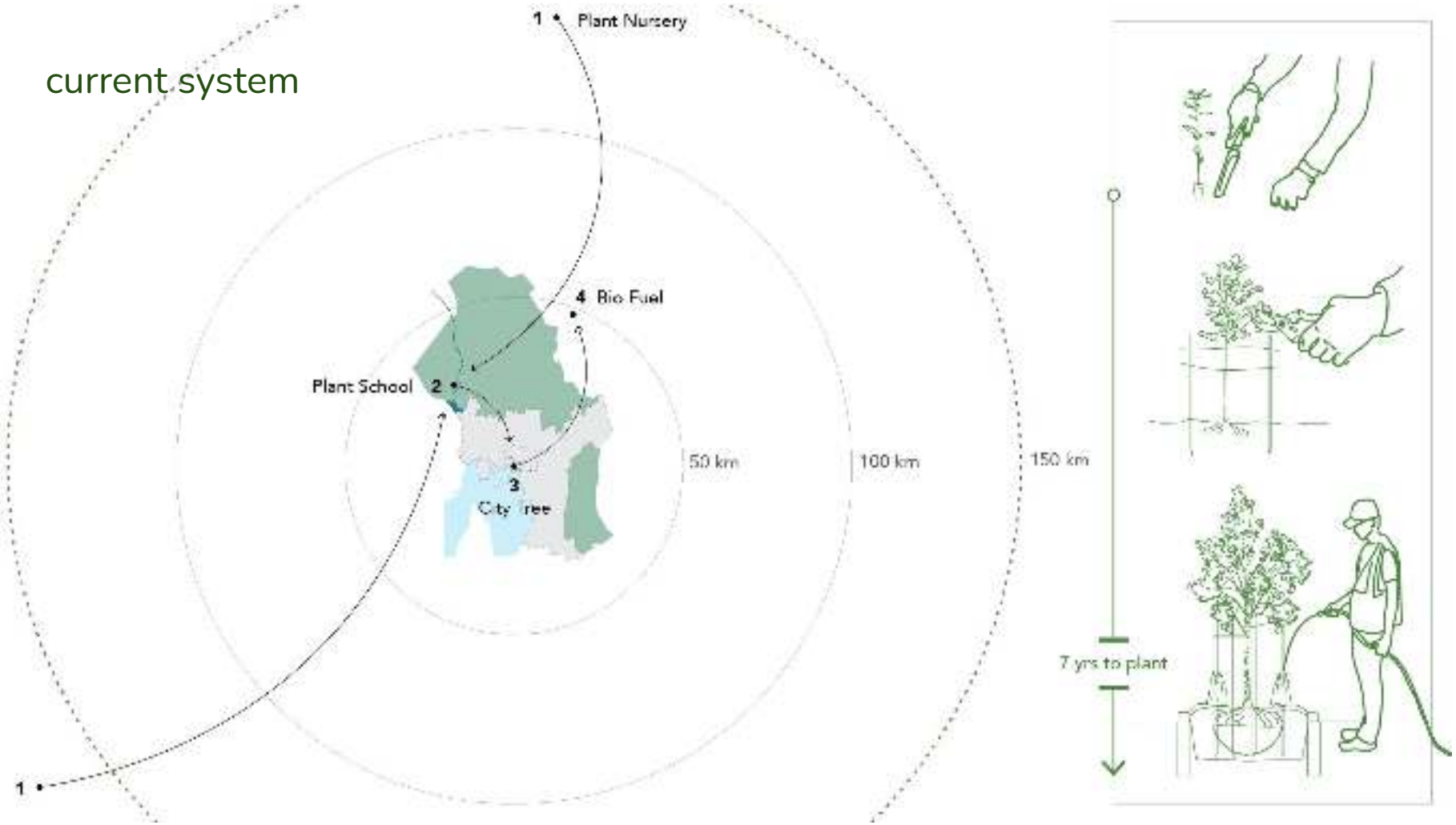
Gwendolyn McGinn, Thesis Uva, 2015

Microbiome Rewilding Hypothesis

Urban habitat restoration provides human health benefits through microbiome rewilding.

“Skogflekk”, City Studio Oslo, 2020

Domesticated, sterile clones from nurseries



“Skogflekk”, City Studio Oslo, 2020

The urban forest may already be there!?

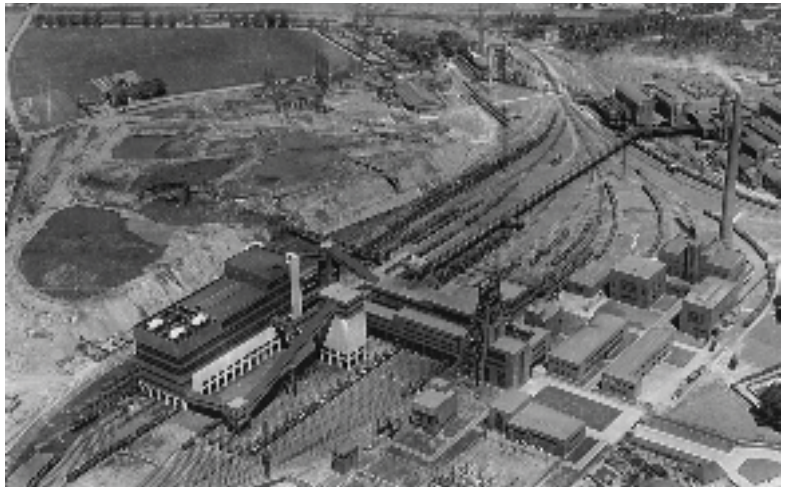
“Skogflekk”, City Studio Oslo, 2020

ZOLLVEREIN PARK

OUTDOOR FACILITIES OF THE UNESCO WORLD HERITAGE SITE OF THE ZOLLVEREIN COAL MINE AND COKING PLANT

Learning how to manage spontaneous urban vegetation to increase its ecological and social values may be a more sustainable strategy than attempting to restore historical ecosystems that flourished before the city existed.

Peter Del Tredici, 2010



The history of Zollverein Park dates back to the 1990‘s. Before the ending of coal extraction and the termination of coke production, the area around the winding towers and coke batteries was an unappreciated landscape, a forgotten space: a no-man‘s-land where flora and fauna were rather furtive; humans were to be found rarely, particularly since the former work place got fenced off, immured and secured against intruders: a restricted area in an urban environment.

Under these conditions nature began to grow: birches and shrubs, ferns and moss covered the area with a green-coloured carpet.

Subsequently, the area of the Zollverein colliery and coking plant took a rapid development. In 2001 Zollverein became UNESCO World Heritage, in 2002 a masterplan for the urban development of Zollverein was made by OMA/ Rem Koolhaas which was expanded by another masterplan for the so called “industrial nature” Zollverein by Agence Ter/ Henri Bava in 2003. Finally, in 2005 our interdisciplinary team of landscape architects, artists, communication designers

Experience shows that without on-going management, the default vegetation of the vast majority of urban landscapes is a cosmopolitan assemblage of early-successional, disturbance-tolerant species that are pre-adapted to the conditions of the urban environment.

Peter Del Tredici, 2010

Inner-city areas with relatively old patches of spontaneous vegetation be actively conserved for urban biodiversity.

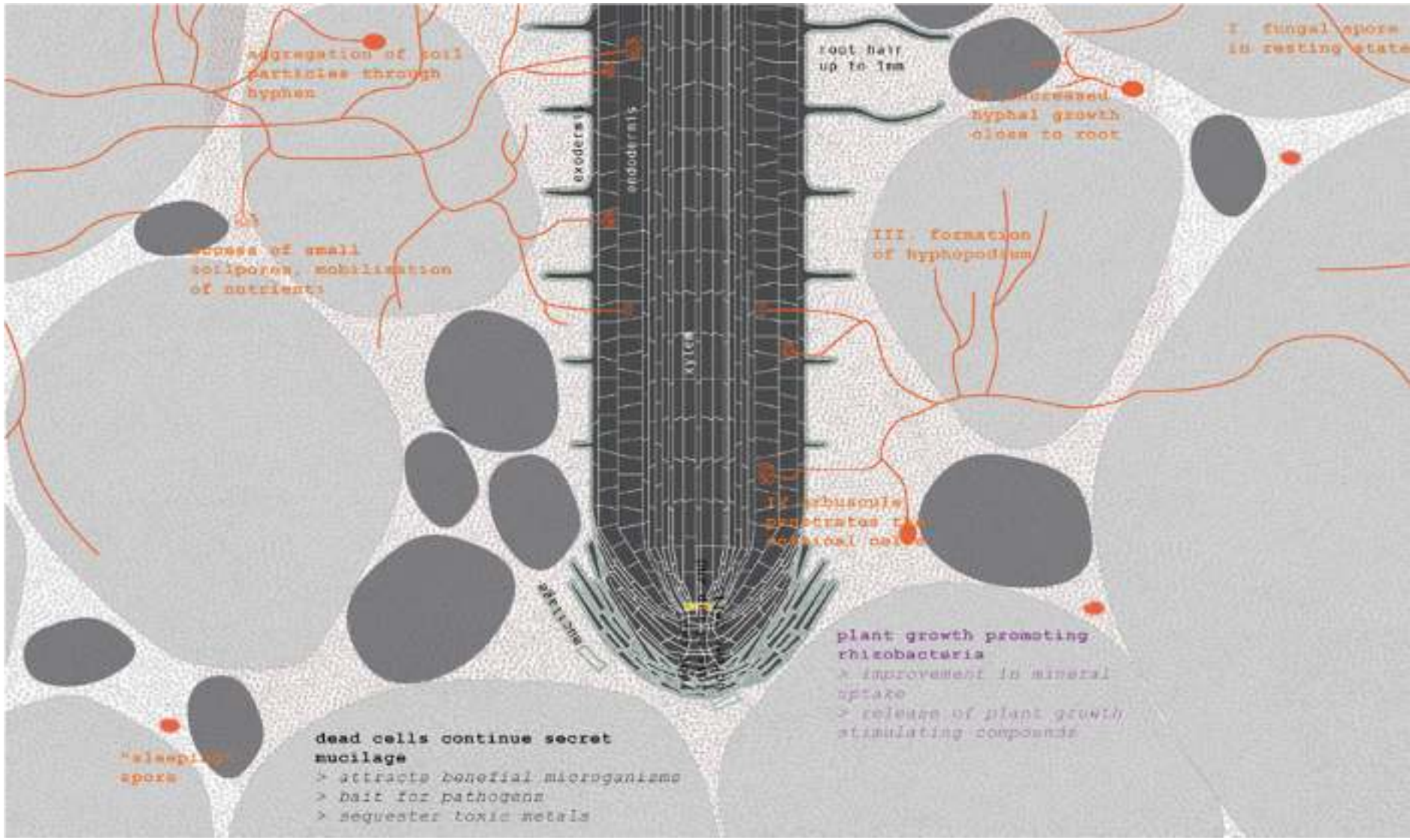
Ingo Kowarik, 2005

Activation of soil microbial life in the rhizosphere.

Rhizodepot Diagram:

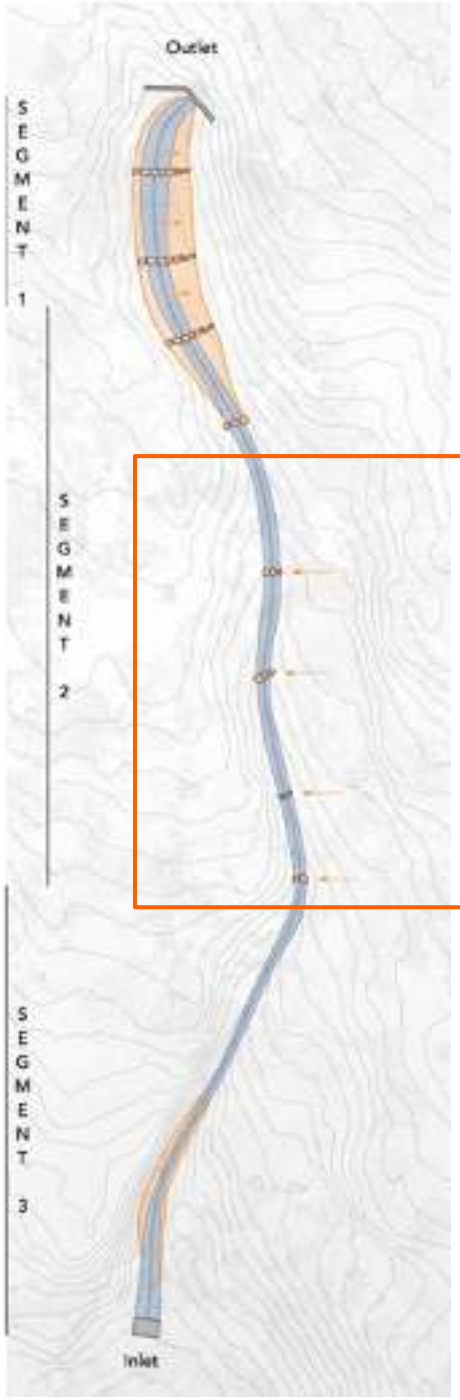
Root growth with sugar-rich secretion activates dormant microorganisms.

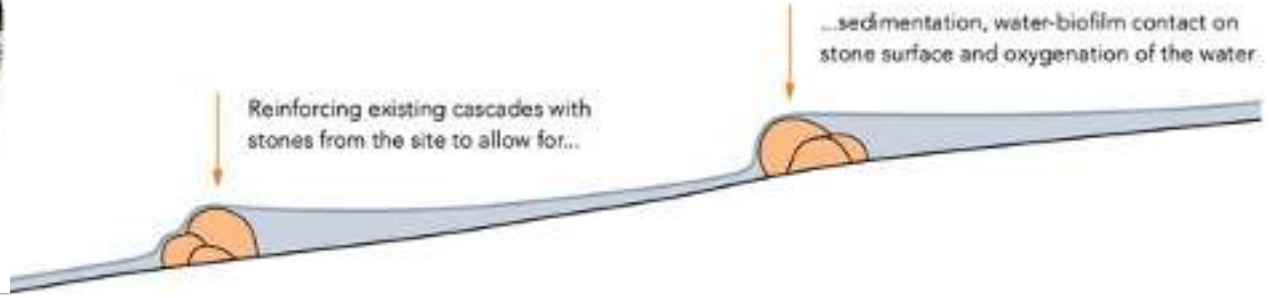
A process serving soil formation, aggregation, nutrition and increases water infiltration, and toxin breakdown.

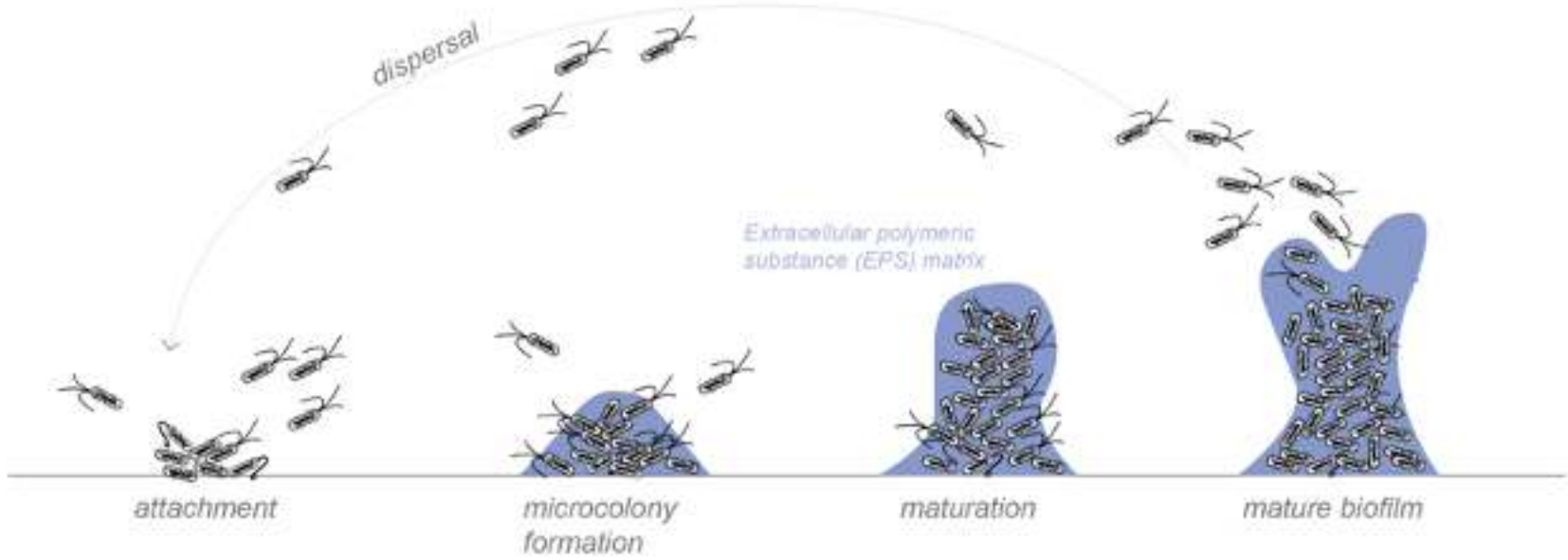


McNear Jr., D. H. (2013) The Rhizosphere

Reinforcing existing cascades to promote biofilm growth







Graphic: Florian Opitz

Pfeifer’s Paper Chromatography Experiment
Sample: Current Studio Workshop, NMBU 2023

presented based on selected papers (Ford et al., 2019; Ford et al., 2021; Graciano et al., 2020; Kokornaczyk et al., 2017).

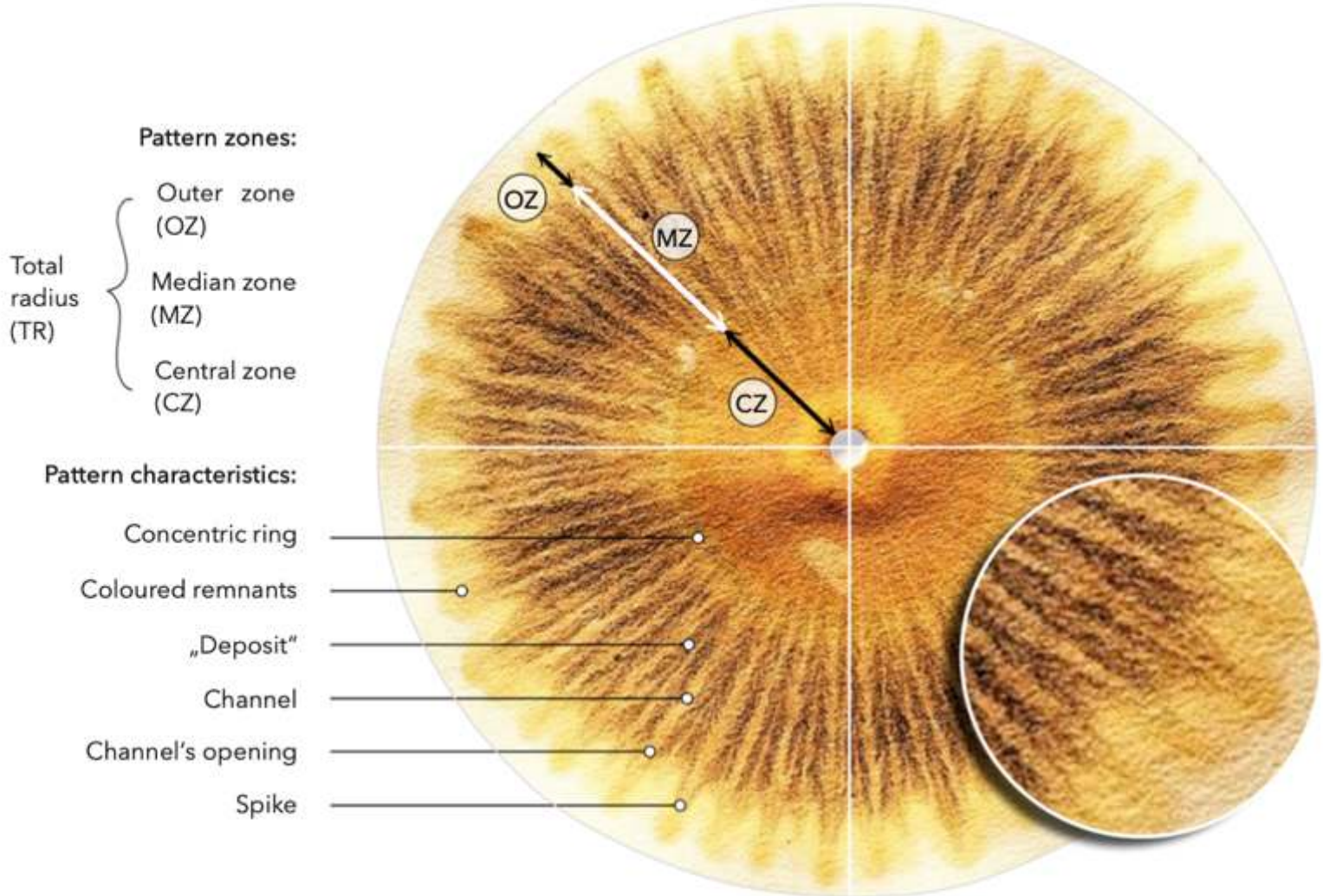


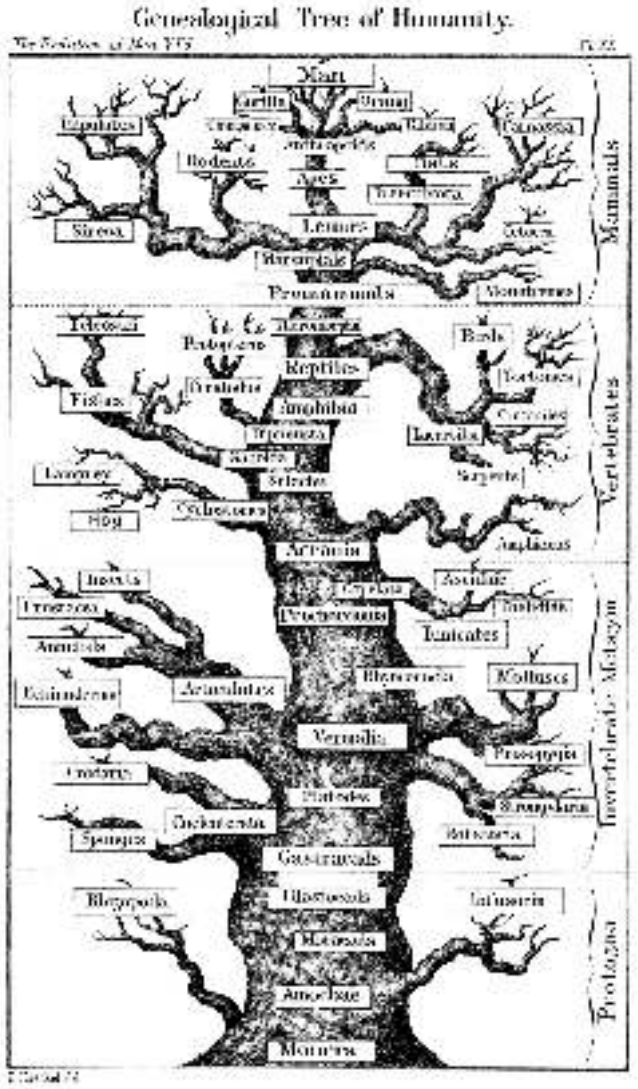
Figure X. Chromatogram features based on Ford et al. (2021) and Kokornaczyk et. al. (2017). *Graphic: Opitz, 2023. Underlaying photo: Bischof Pian, 2017.*

Pfeifer's Paper Chromatography

Florian Opitz Thesis Work
Master in Lanndscape Architecture, GLA NMBU 2023


Rain Garden mesocosm re-use, NMBU

Tree of Life classifications



Ernst Haeckel, The Evolution of Man (1879).

Little friends / Invisible friends

Already and always there.

Incredible useful and productive

Step up and grow to meet the occasion.

Existed before us and will likely outlast us.