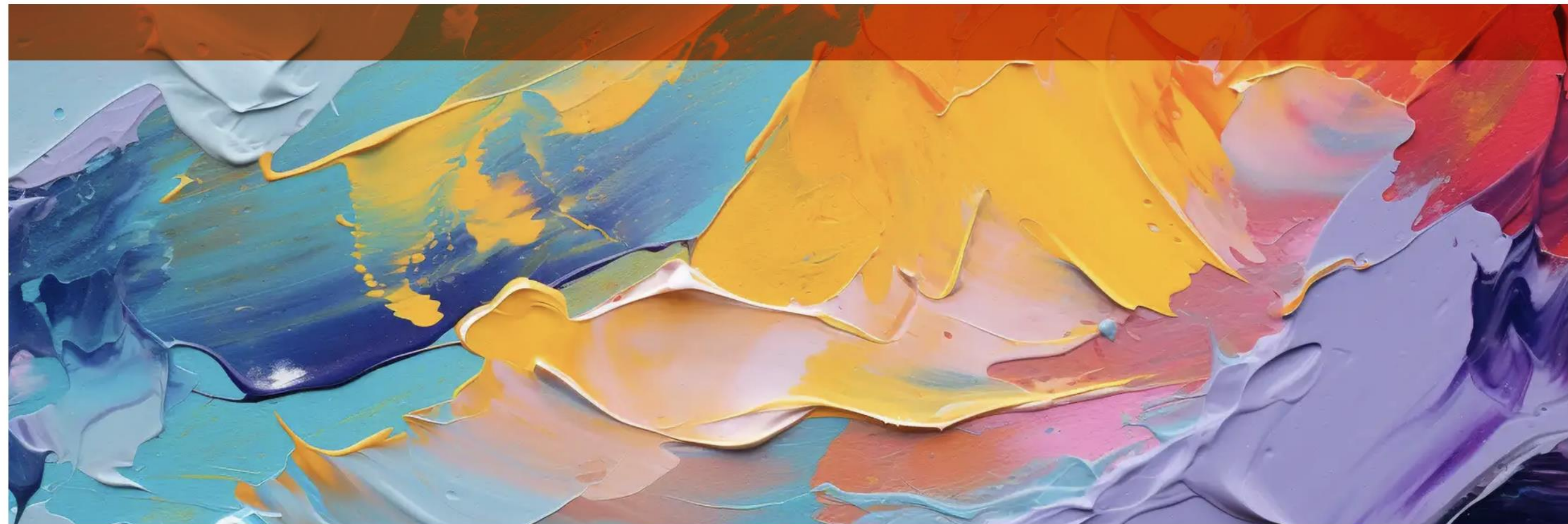




Biodiversität und das unsichtbare Netz des Lebens

f.eh-Symposium | Natur – Mensch – Gesundheit: Das unterschätzte Potenzial der Vielfalt. Wien, 14.10. 2025

Martin Grassberger

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ÖÄK Diplom Umweltmedizin
ÖÄK Diplom Phytotherapie
Baubiologe IBN, BBI
Facharbeiter Landwirtschaft
Universität Wien
SFU Wien
martingrassberger.com

*„Die großen Probleme der Welt
sind das Ergebnis der Differenz
zwischen der Funktionsweise der
Natur und der Denkweise der
Menschen.“*

*– Gregory Bateson (angloamerikanischer Biologe, Sozialwissenschaftler,
Kybernetiker und Philosoph, 1904–1980)*



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THE SCIENCES

Revolution Postponed: Why the Human Genome Project Has Been Disappointing

The Human Genome Project has failed so far to produce the medical miracles that scientists promised. Biologists are now divided over what, if anything, went wrong—and what needs to happen next

By Stephen S. Hall on October 1, 2010

„Im Durchschnitt erklärt die Genetik nicht mehr als fünf bis zehn Prozent des Risikos für die häufigsten Erkrankungen, einschließlich bestimmter Krebsarten, Diabetes und Alzheimer.“

Patron J, Serra-Cayuela A, Han B et al. Assessing the performance of genome-wide association studies for predicting disease risk. PLoS One. 2019 Dec 5;14(12):e0220215

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Health

We know almost nothing about thousands of proteins in the human body

Scientists have created an "unknome" of proteins encoded by human genes, whose existence is known but whose functions are mostly not

By Michael Le Page

📅 8 August 2023

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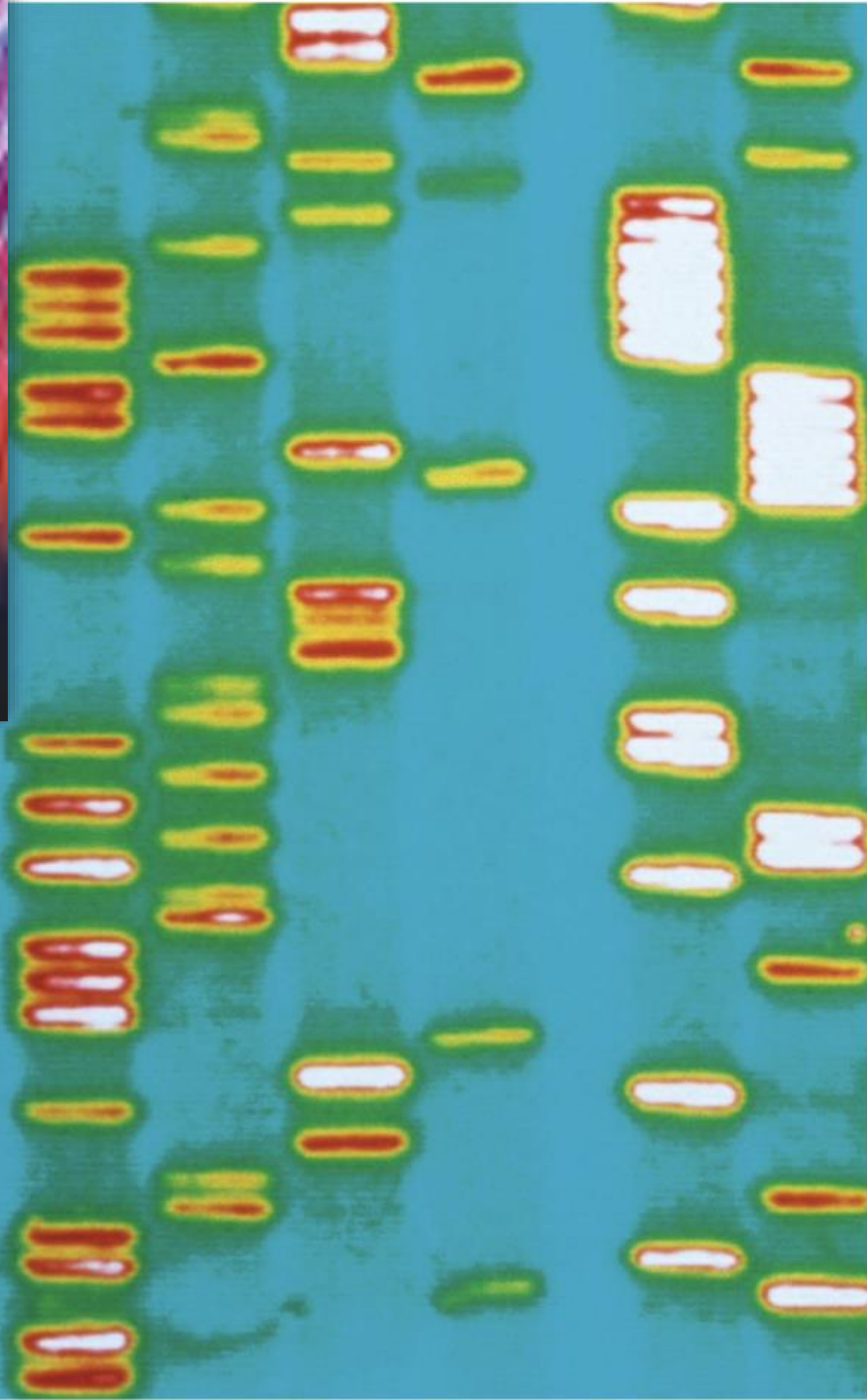
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SCIENCE PRACTICE

Known Unknowns

15 JUNE 2012 VOL 336 SCIENCE www.sciencemag.org

„[...] it is the absence of knowledge that should concern us.“



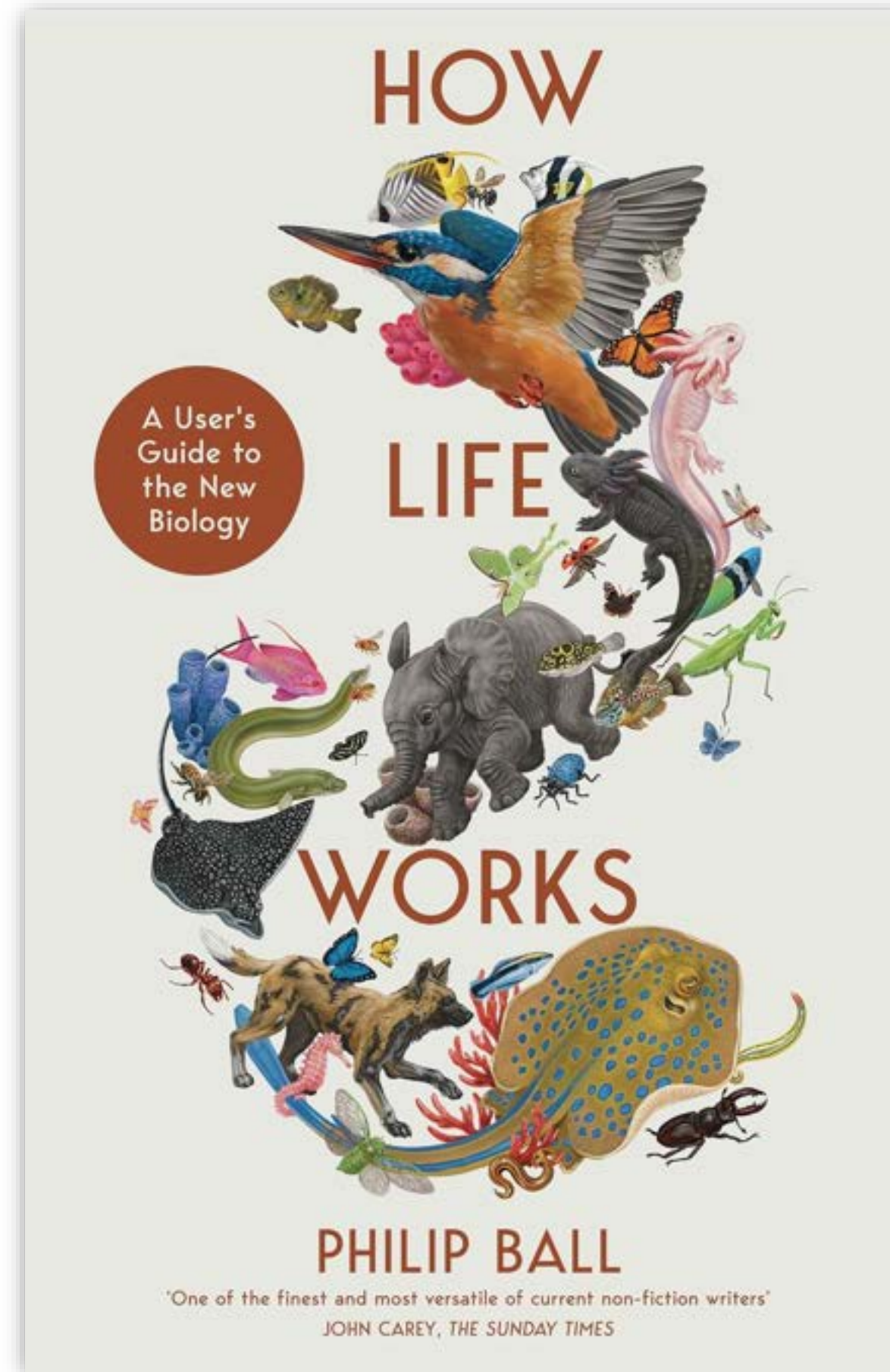
PETERMENZEL/SPL

DNA sequencing has become routine, but the roles of individual genes can be hard to be pin.

Genes are not the blueprint for life

The view of biology often presented to the public is oversimplified and out of date. **By Denis Noble**

For too long, scientists have been content in espousing the lazy metaphor of living systems operating simply like machines, says science writer Philip Ball in *How Life Works*. Yet, it's important to be open about the complexity of biology – including what we don't know – because public understanding affects policy, health care and trust in science. “So long as we insist that cells are computers and genes are their code,” writes Ball, life might as well be “sprinkled



“...Wir stehen am Anfang eines tiefgreifenden Umdenkens darüber, wie das Leben funktioniert.”

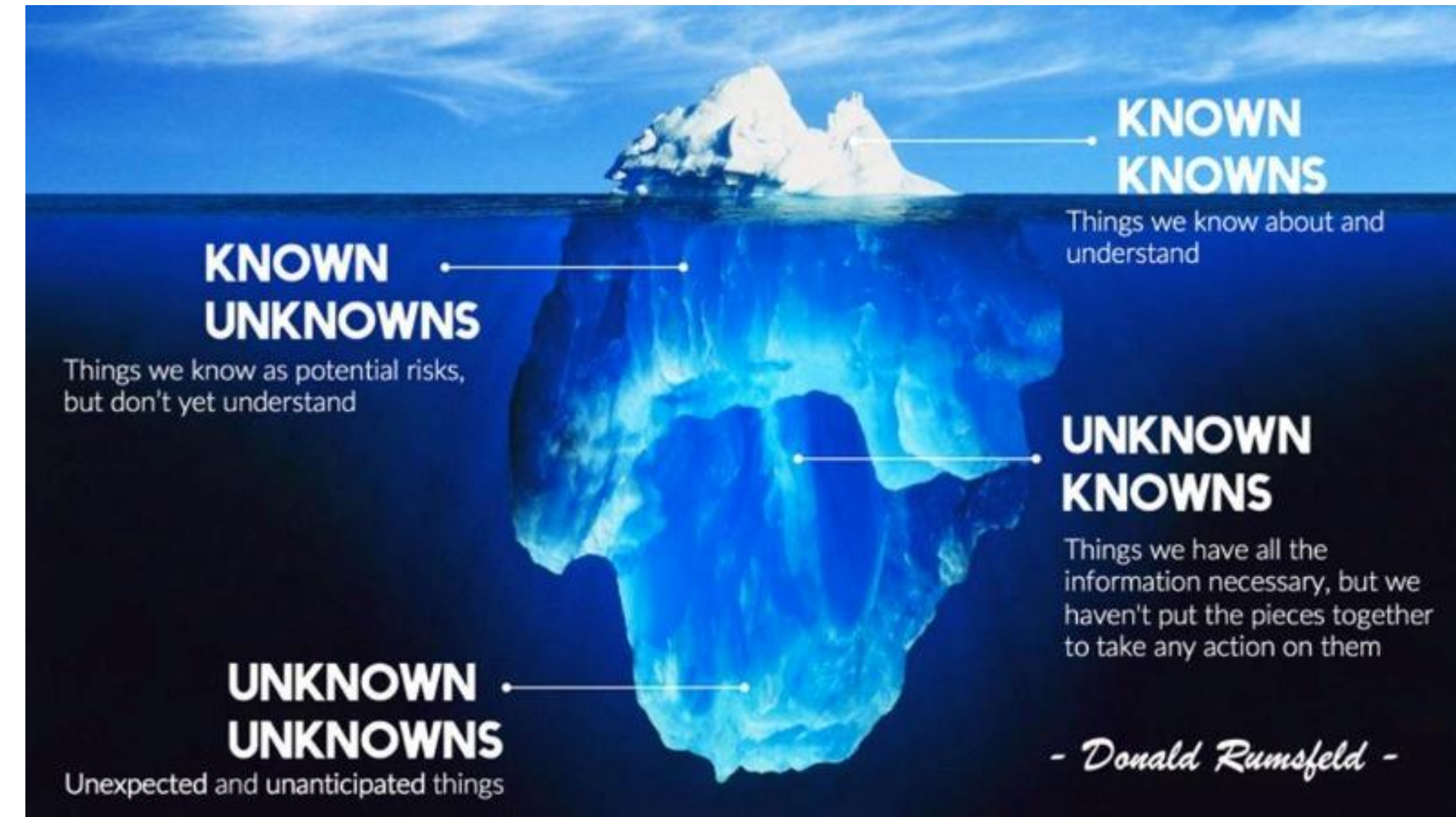


Various species of sea life found along the California coast (pictured).

PHOTOGRAPHS BY DAVID LIITTSCHWAGER, NATIONAL GEOGRAPHIC

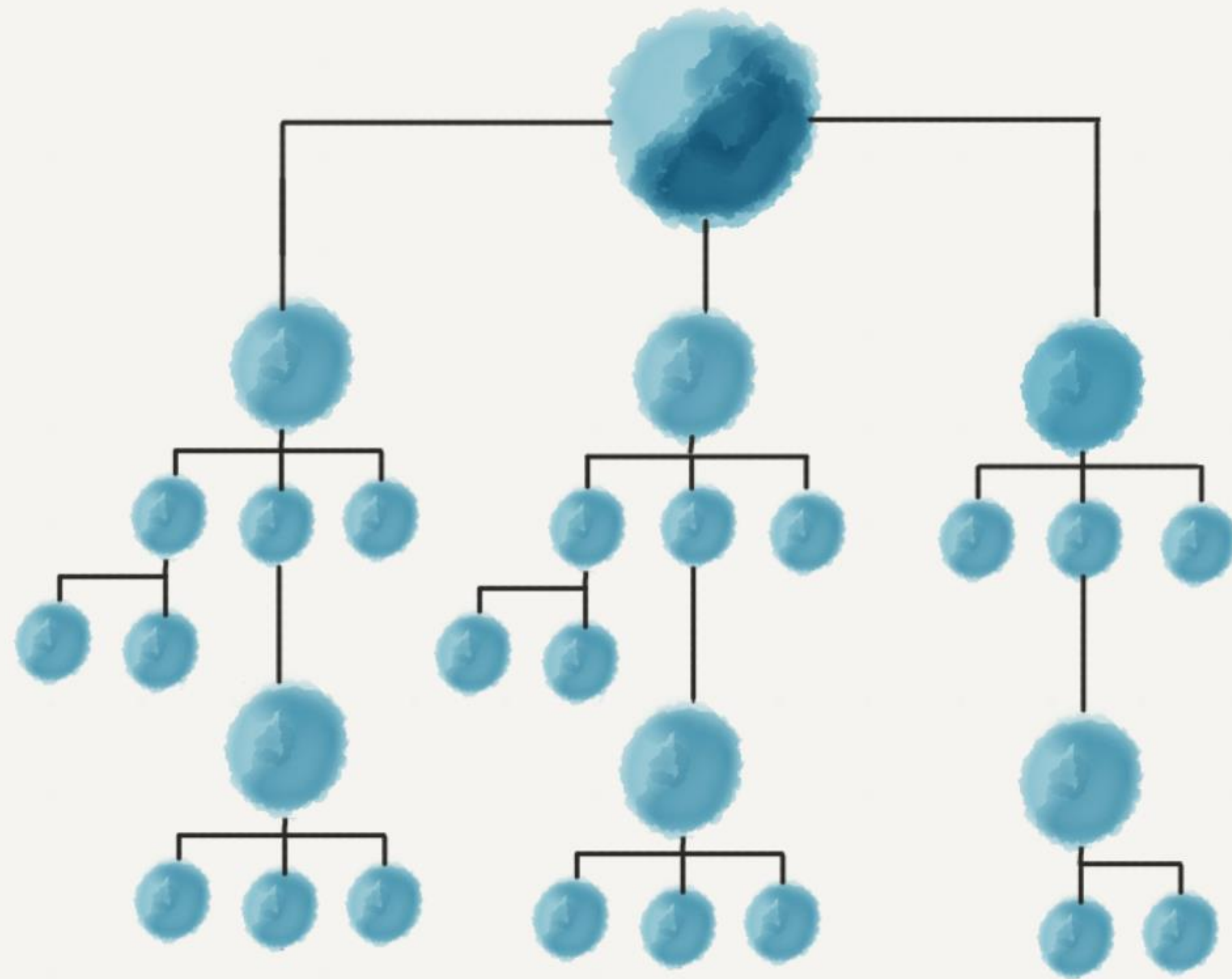
86 Percent of Earth's Species Still Unknown?

<https://www.nationalgeographic.com/science/article/110824-earths-species-8-7-million-biology-planet-animals-science>



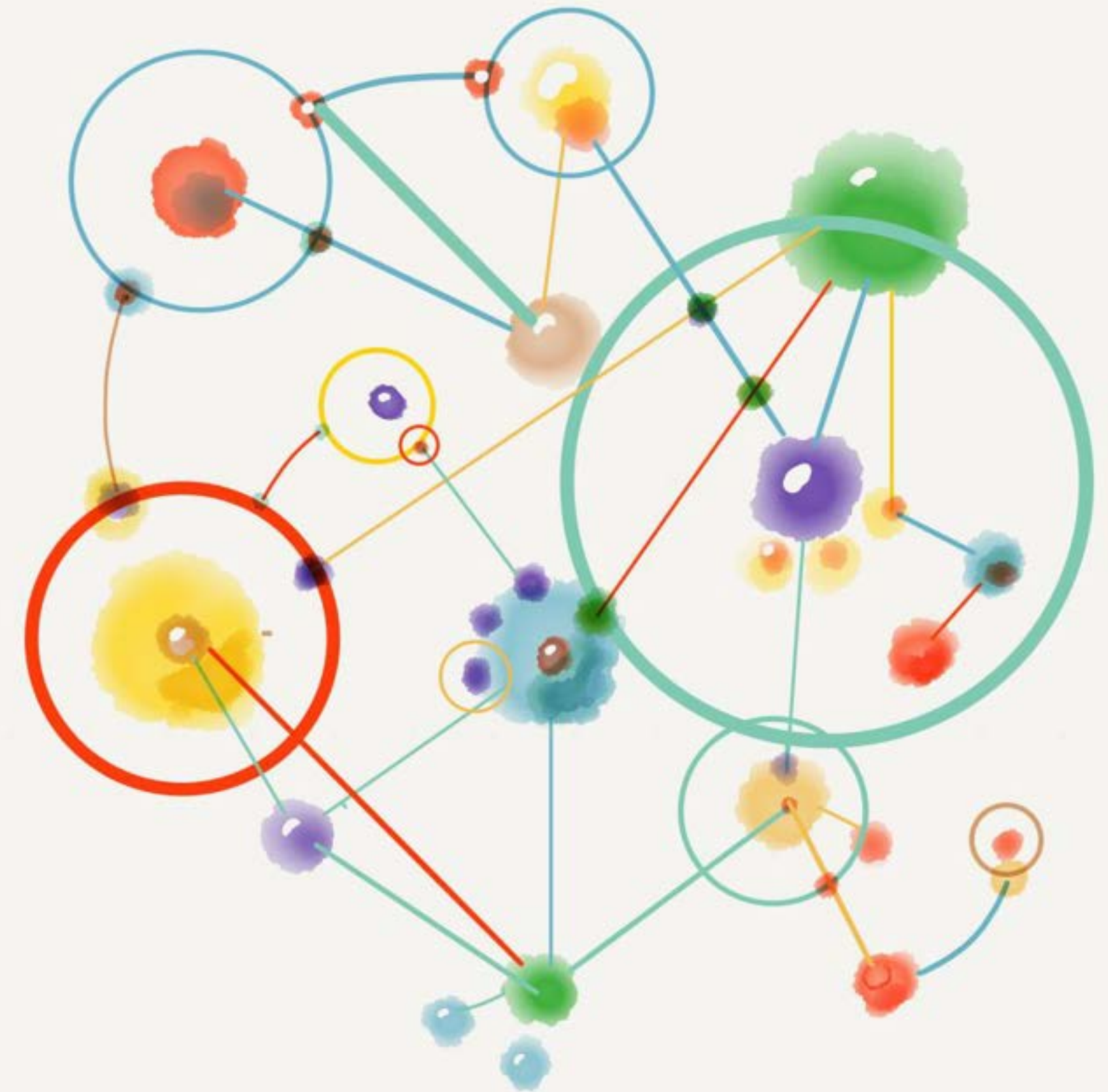
Dominanz basiertes System

reduktive Maschinen-Logik



Kooperationsbasiertes System

“living systems logic”



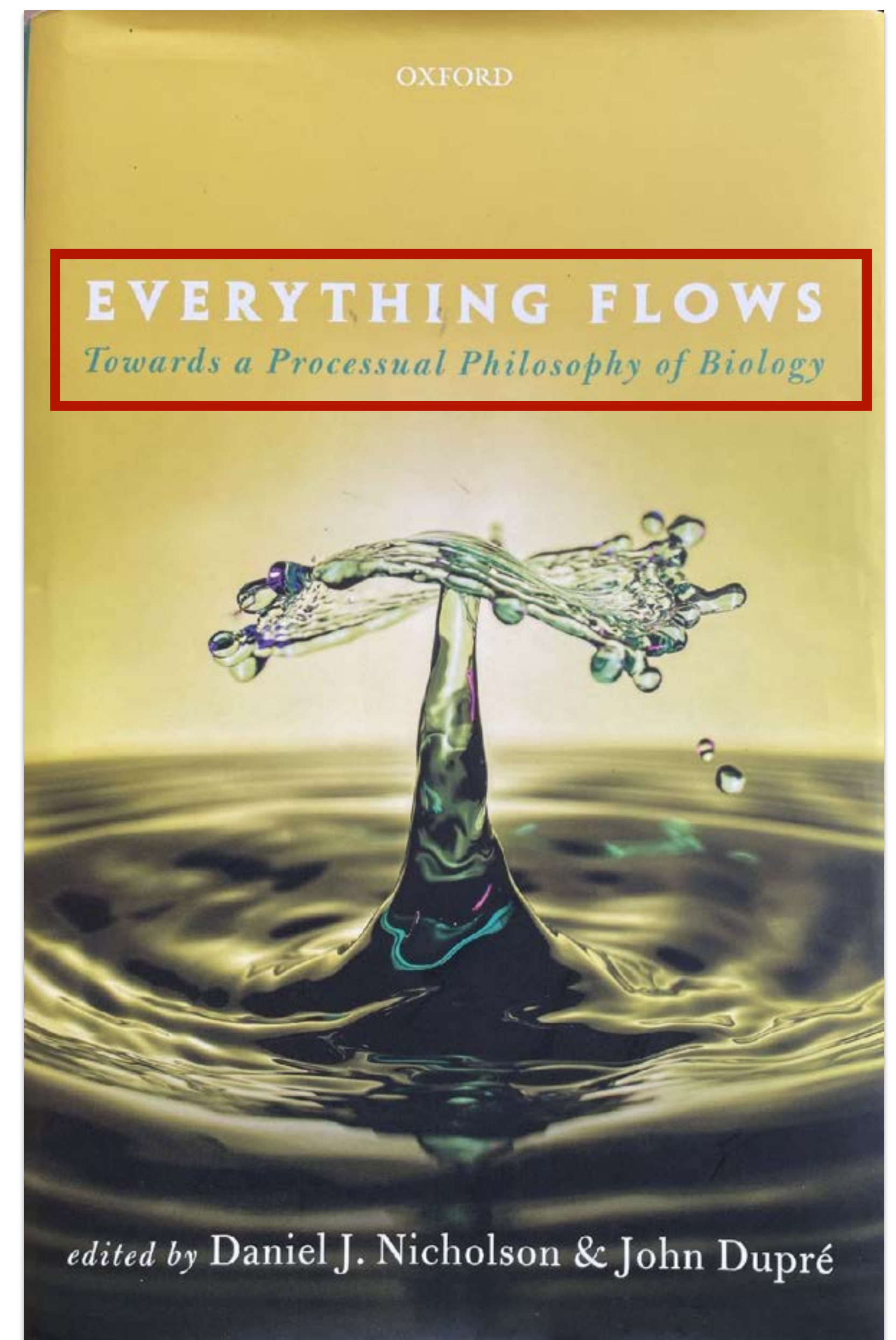




L. v. Beethoven, Sinfonie Nr. 9, op. 125, autographe Partitur, Seite aus dem 4. Satz

„Die ganze Natur ist eine Melodie, in der eine tiefe Harmonie verborgen ist. Die Natur schafft ewig neue Gestalten; was da ist, war noch nie, was da war – kommt nicht wieder – alles ist neu und doch immer das Alte.“

– Johann Wolfgang von Goethe (1749 - 1832)



Prozesse und Beziehungen
„Alles fließt...“

Komplexe adaptive Systeme

Lokale Wechselwirkungen, globale Wirkung

Nichtlinear

Anpassungsfähig

Selbstorganisierend

Selbstverstärkend

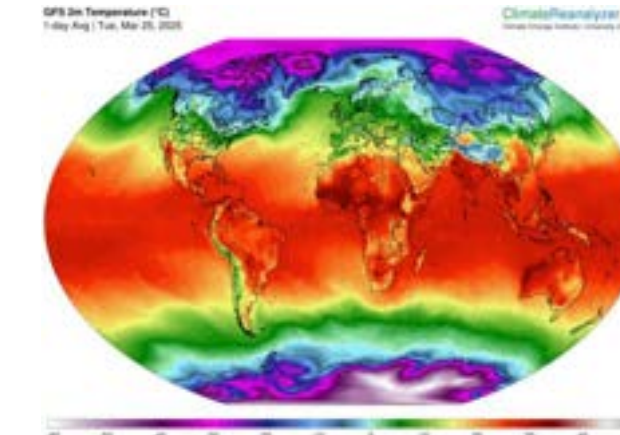
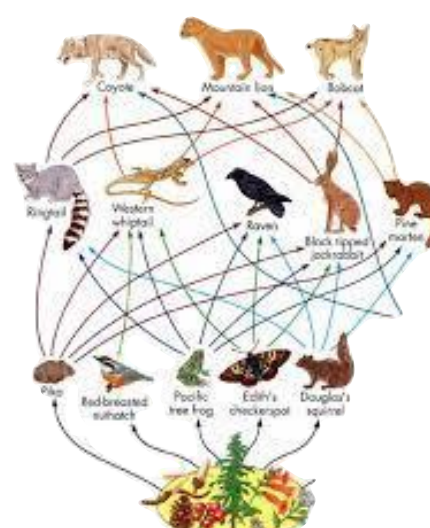
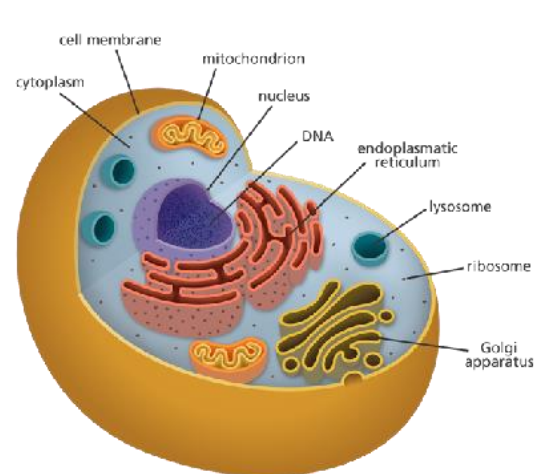
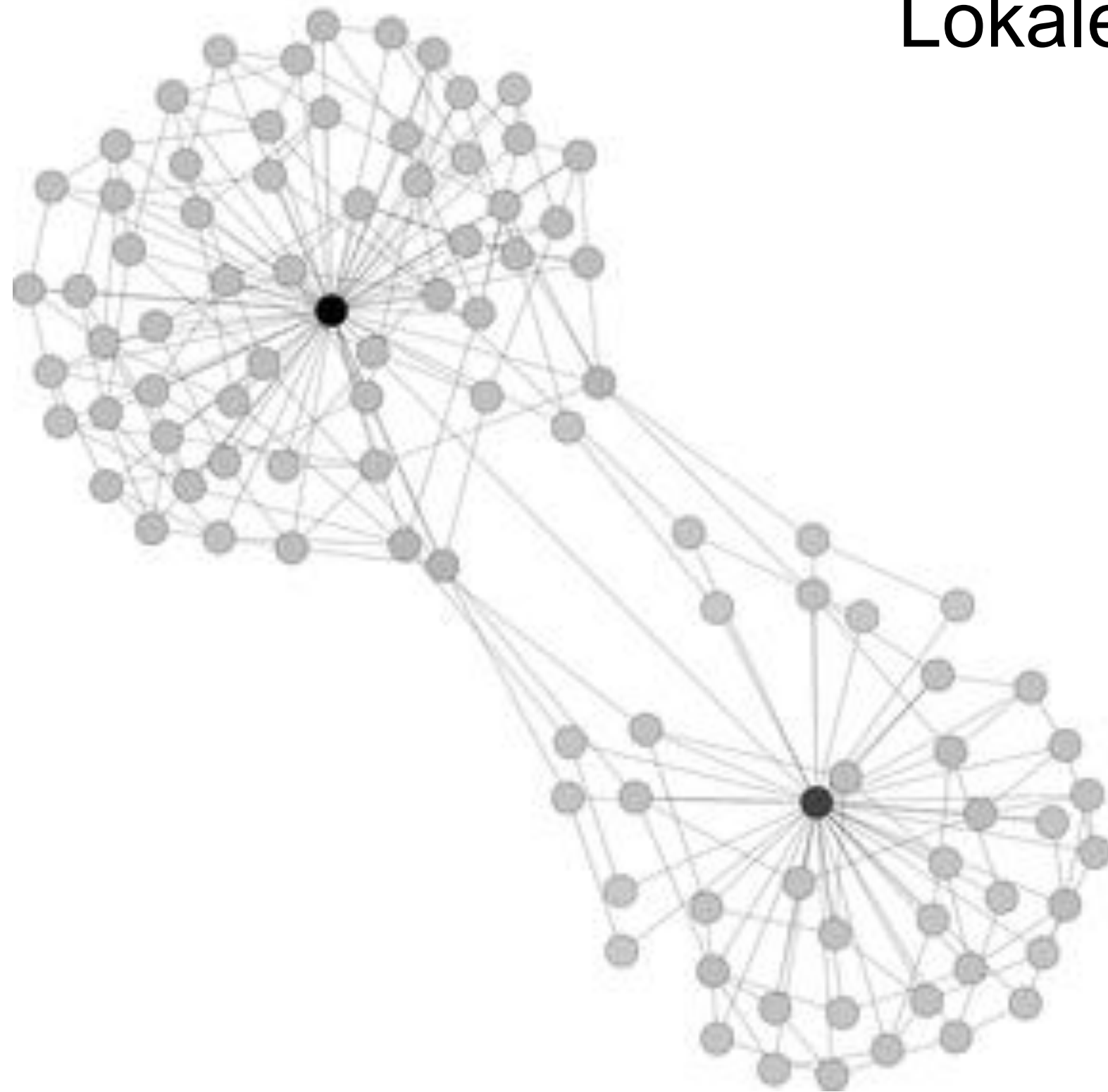
Redundant

Robust

Resilient u. „Antifragil“

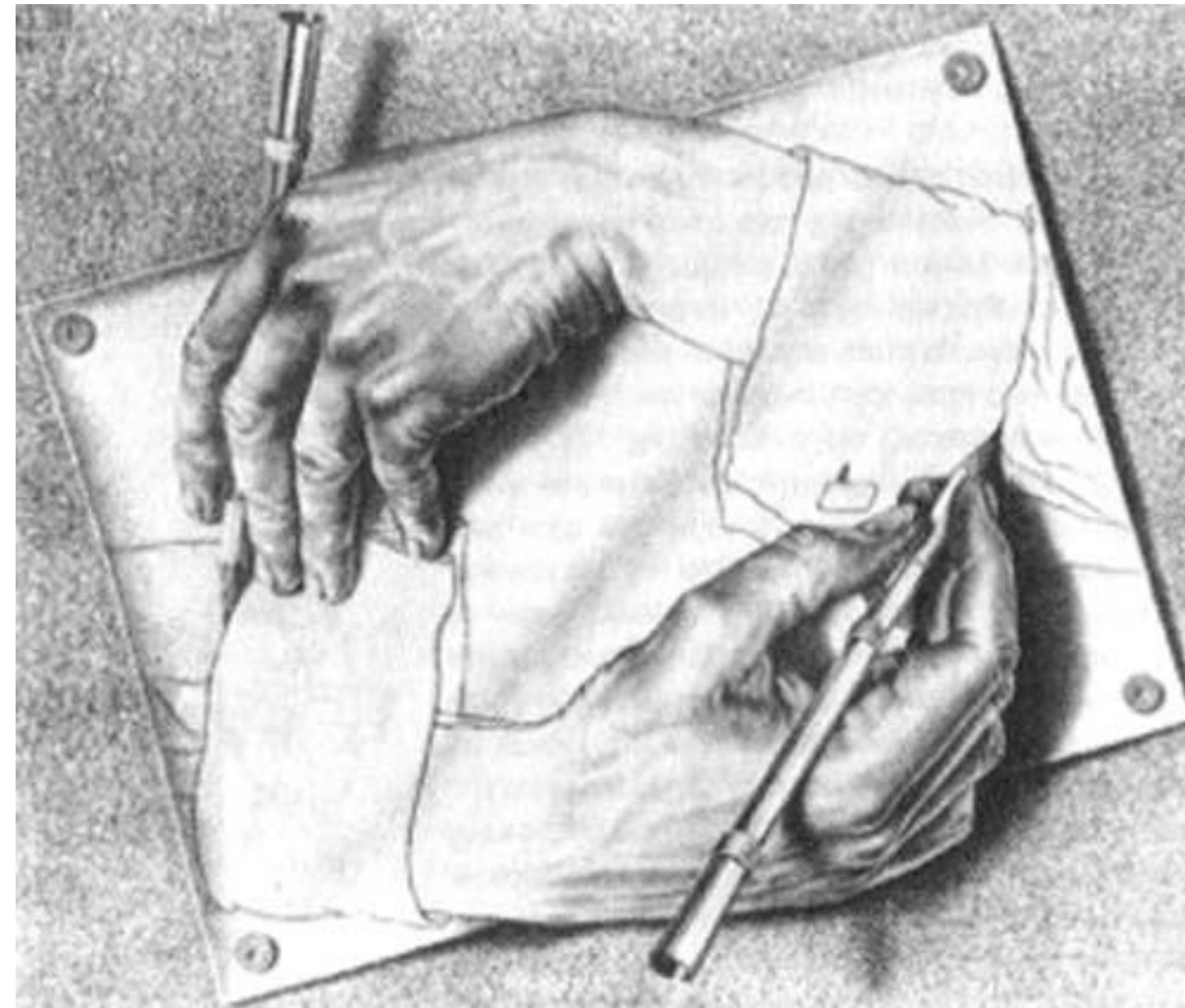
Indeterminiert

Emergent



Autopoiesis

(Maturana & Varela)



... der Prozess der **Selbsterschaffung und -erhaltung** eines **Systems** durch die Produktion seiner eigenen Elemente



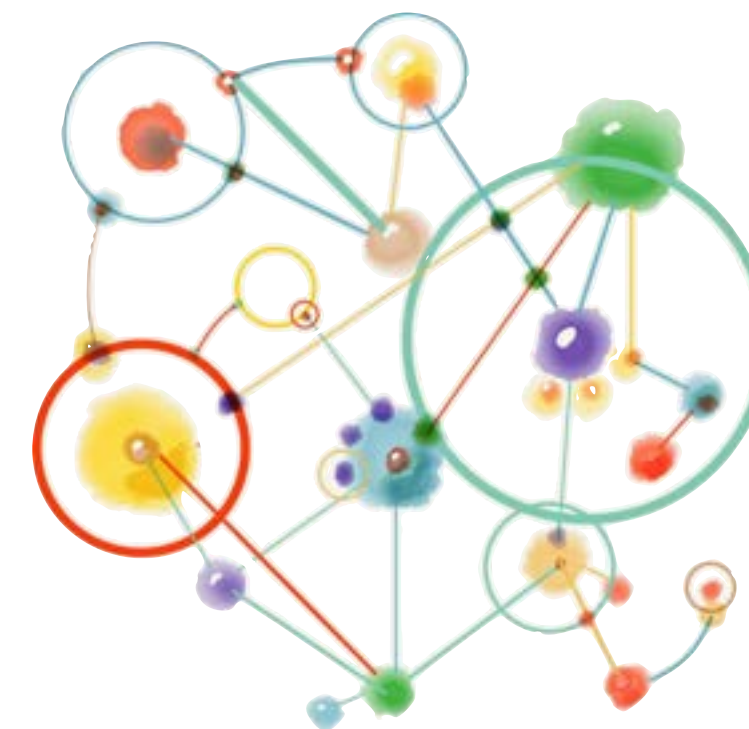
<https://donellameadows.org/donella-meadows-legacy/photos-dana/>

„Dancing with Systems“

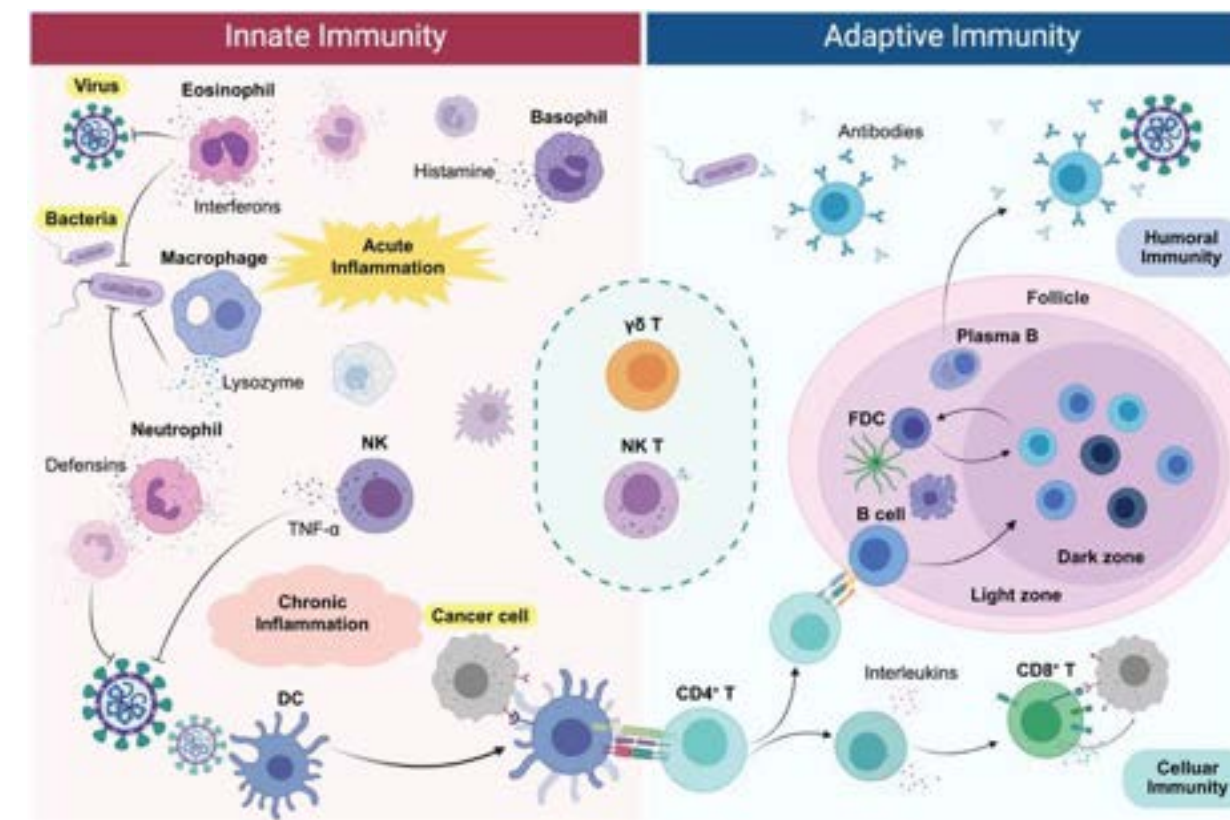
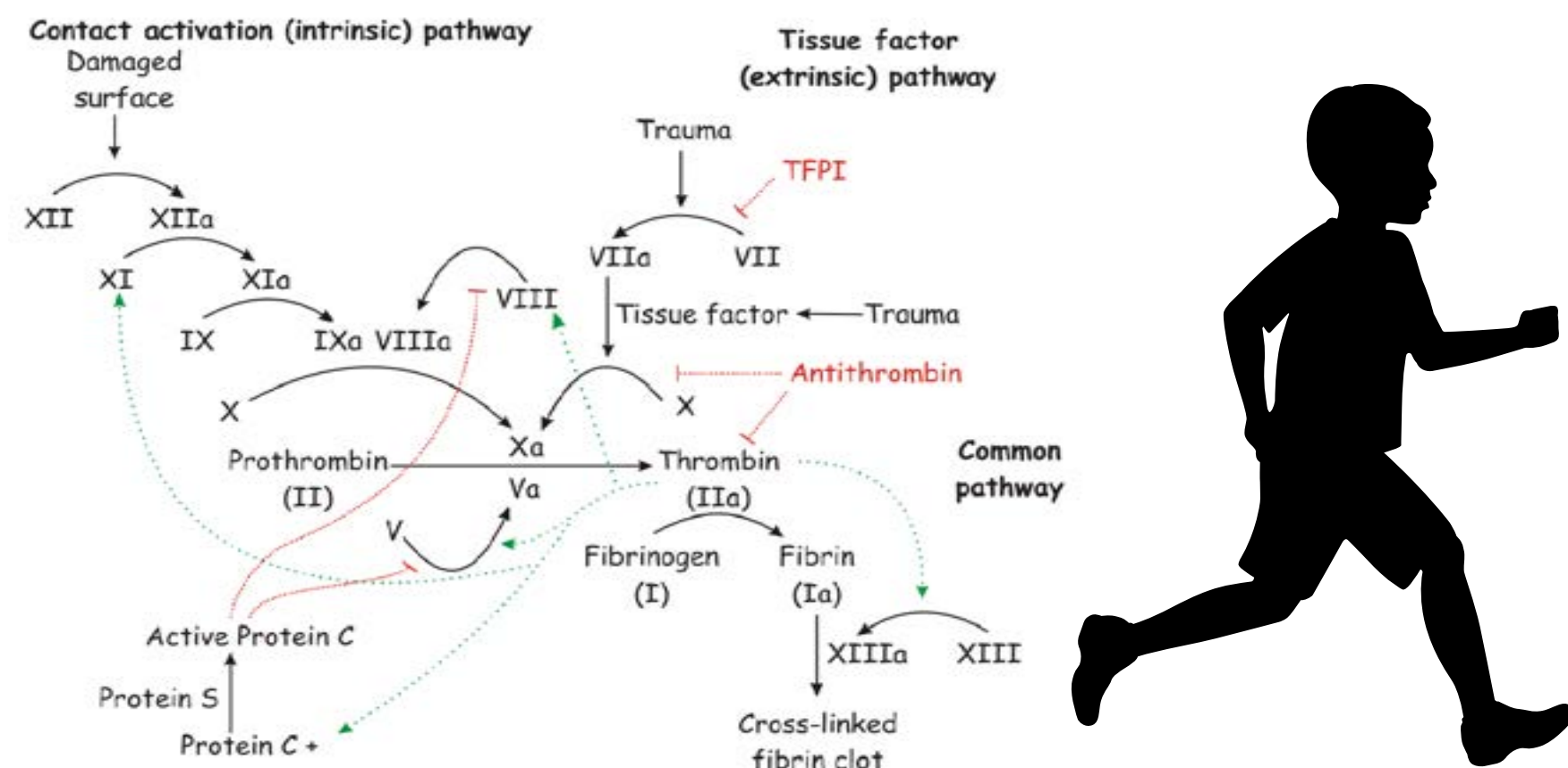
– Donella H. Meadows

„Wir können einem System unseren Willen nicht aufzwingen. Wir können hören, was uns das System sagt, und entdecken, wie seine Eigenschaften und unsere Bedürfnisse zusammenarbeiten können, um etwas viel Besseres hervorzubringen, als es jemals allein durch unseren Willen hervorgebracht werden könnte.“

– Donella H. Meadows



Der Mensch als komplex-adaptives System



- Gerinnungssystem
- Verdauungssystem
- Nervensystem
- Immunsystem
- Herz-Kreislaufsystem
- Mikrobiom
- etc...

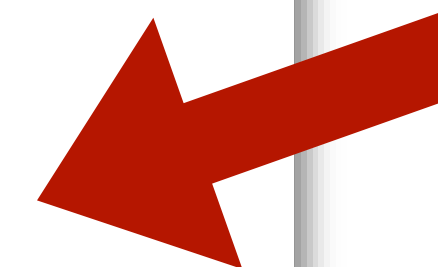
VOLUME 87, No. 4

THE QUARTERLY REVIEW OF BIOLOGY

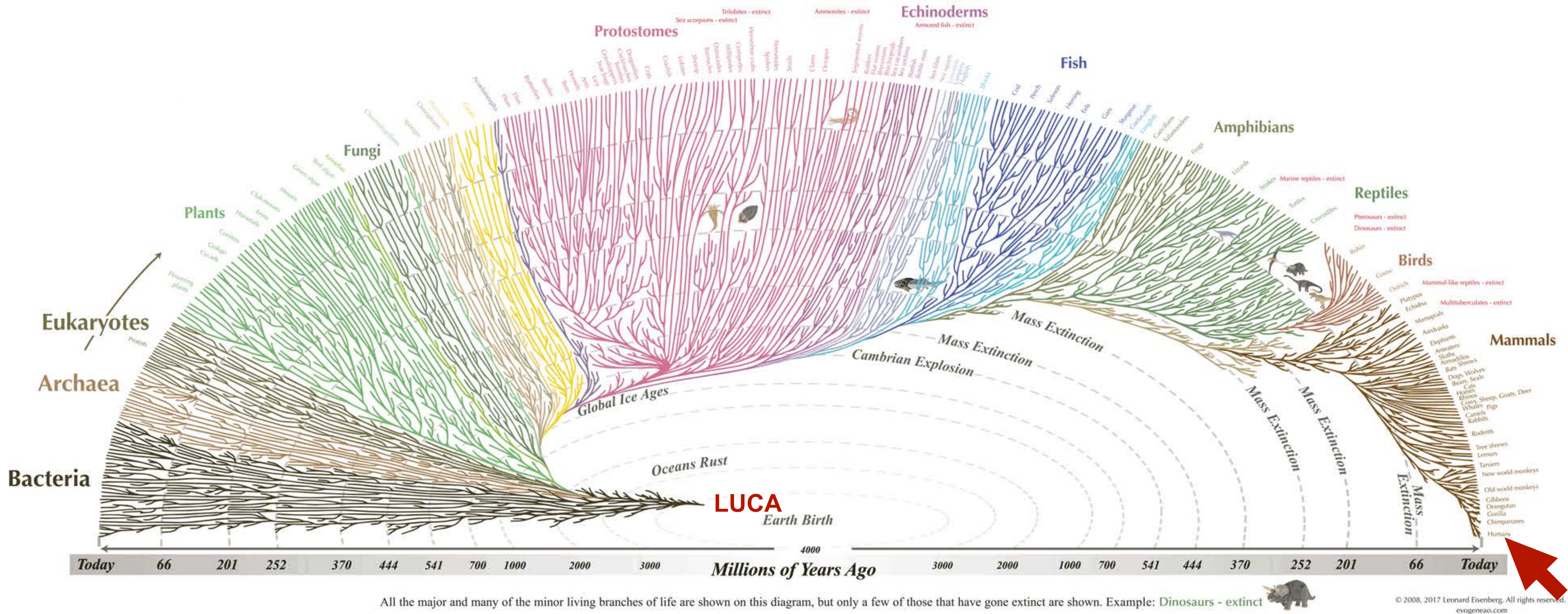
DECEMBER 2012



A SYMBIOTIC VIEW OF LIFE: WE HAVE NEVER BEEN INDIVIDUALS



Co-Evolution

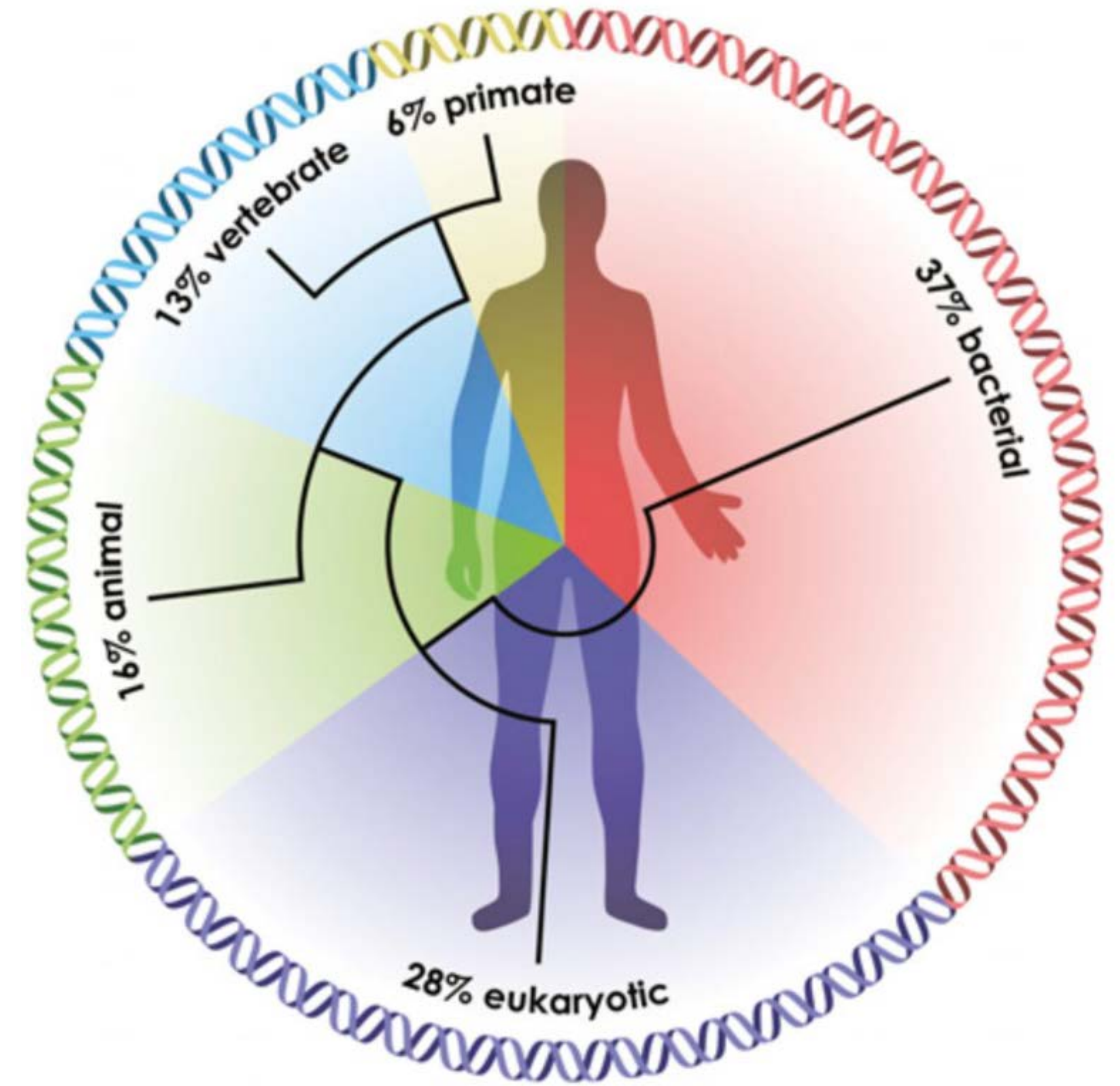
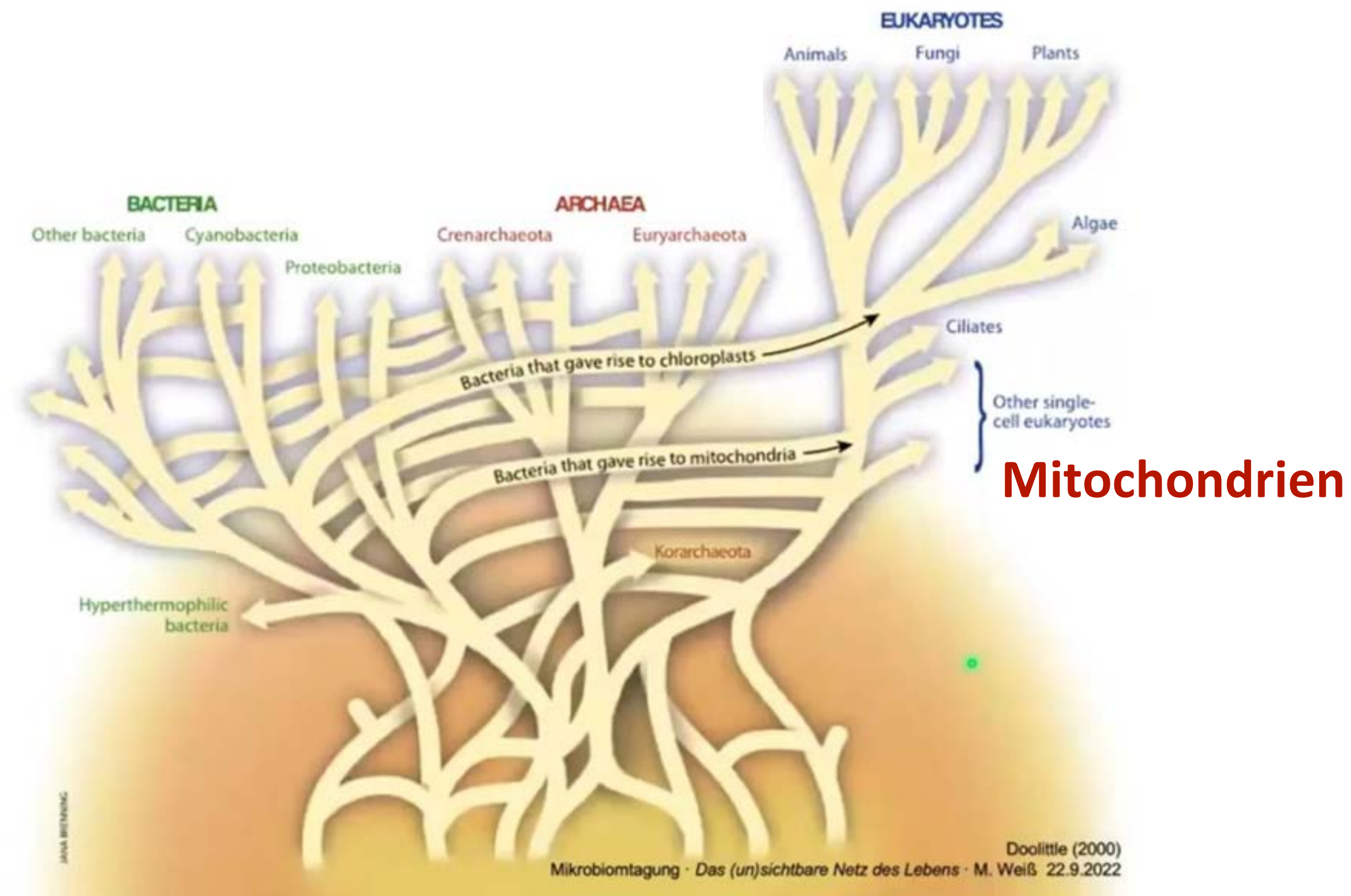


Die Evolution der Landpflanzen begann vor etwa 475 Millionen Jahren.
Die ältesten Pilzfossilien sind 715 bis 810 Millionen Jahre alt.

<http://evogeneao.com/en>

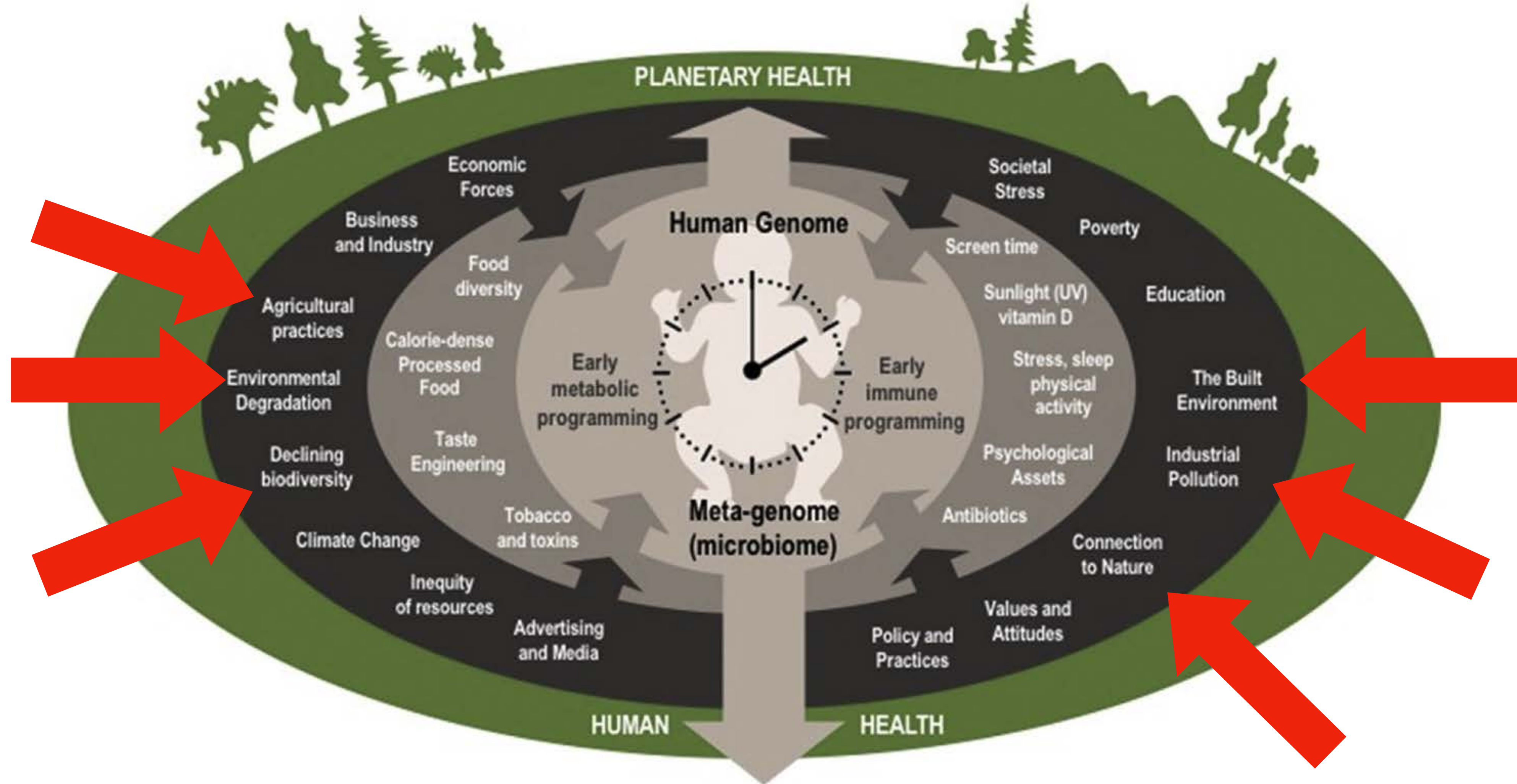
Die Antwort auf viele Fragen: Unsere lange Vergangenheit

Co-Evolution und die **Biodiversität in uns !**

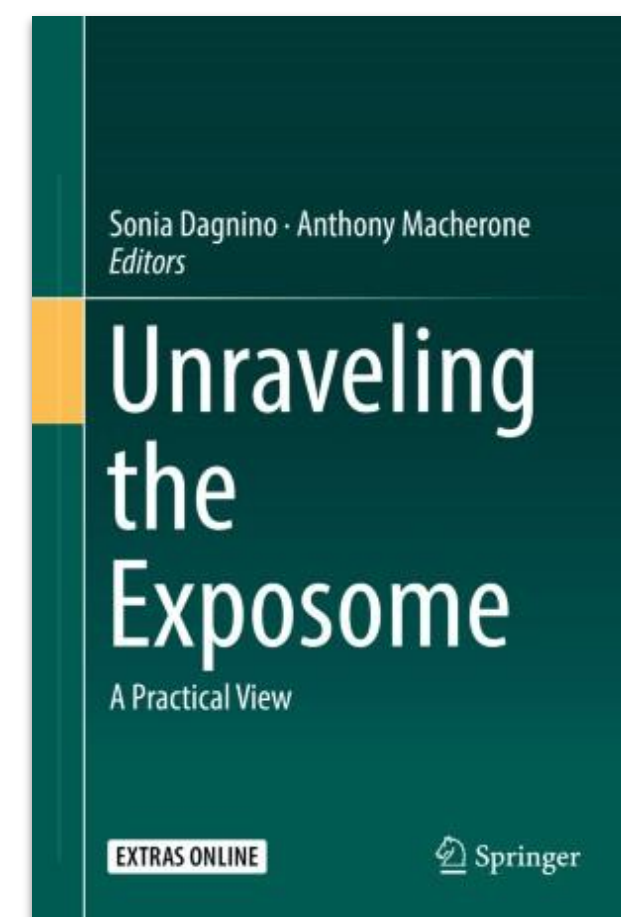
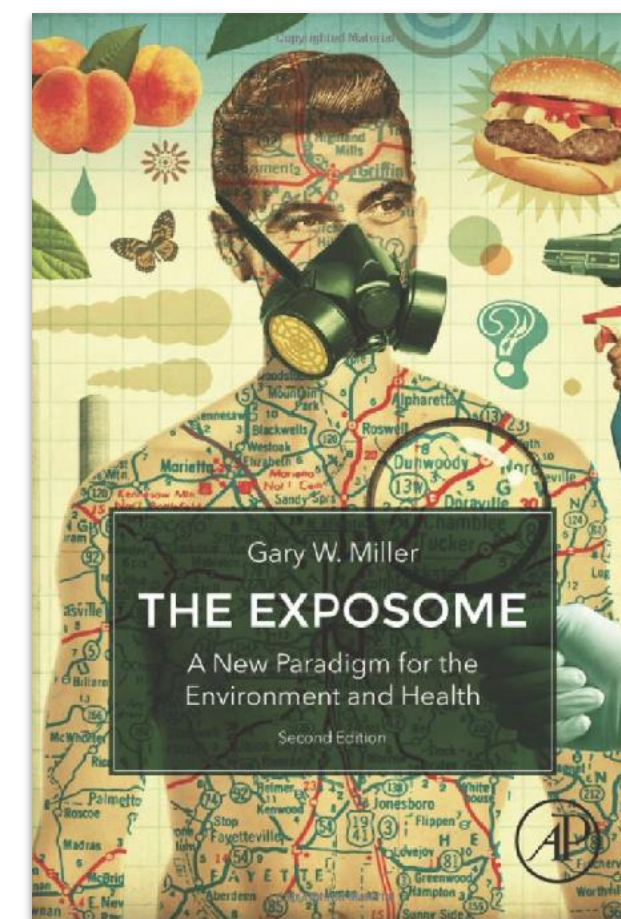


McFall-Ngai M, et al. Animals in a bacterial world, a new imperative for the life sciences. Proc Natl Acad Sci U S A. 2013 Feb 26;110(9):3229-36.

The **Exposome** Across the Life Course and Around the Clock



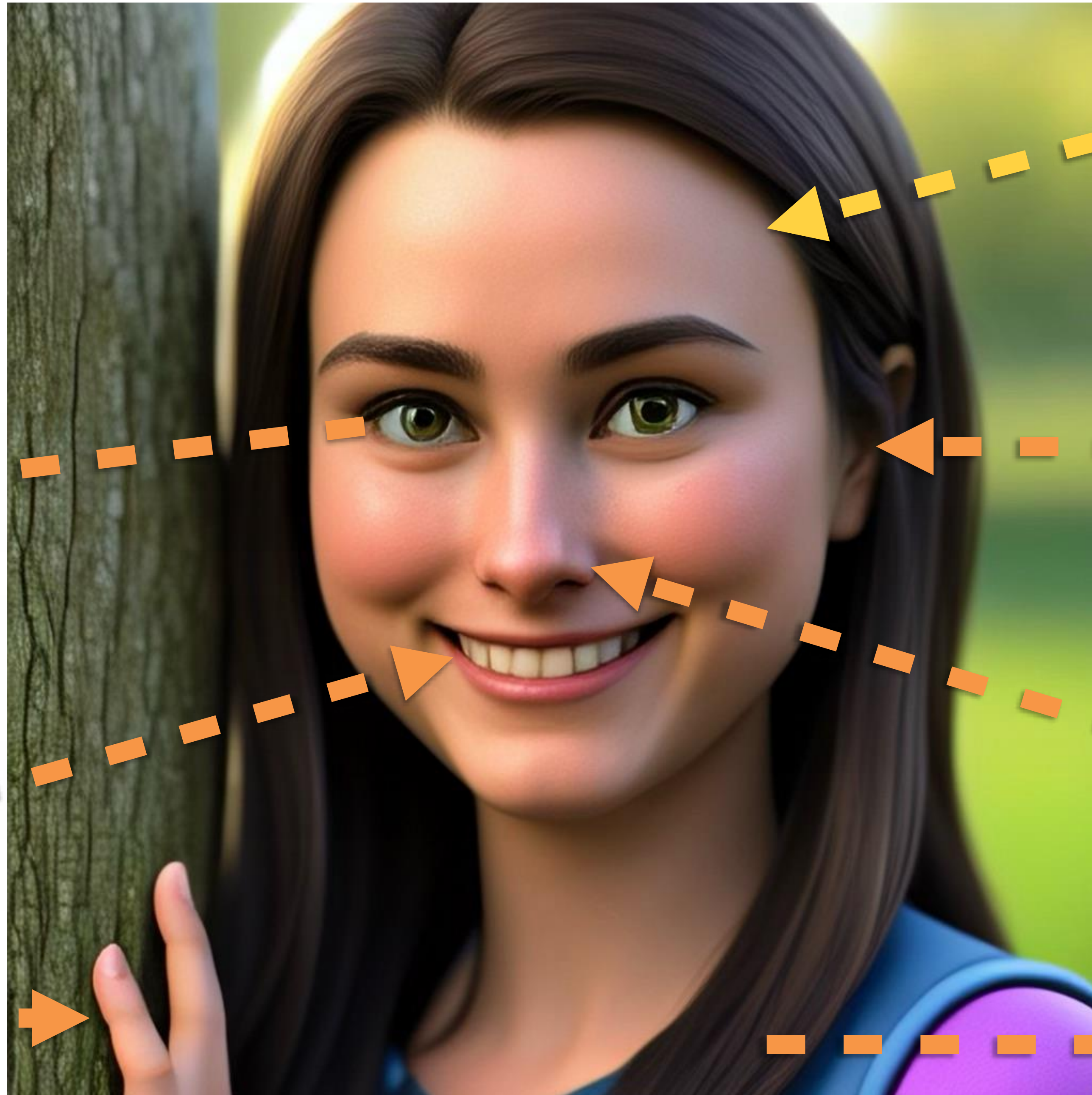
Predisposition to inflammation, metabolic and immune dysregulation
Effect on all organ systems across the life span – increase in early and later onset NCDs



sehen

orale Aufnahme

Kontakt



hören

riechen,
einatmen

?

THREE INCREASING LEVELS OF DIET QUALITY



ENERGY SUFFICIENT DIET
meets needs for short-term subsistence

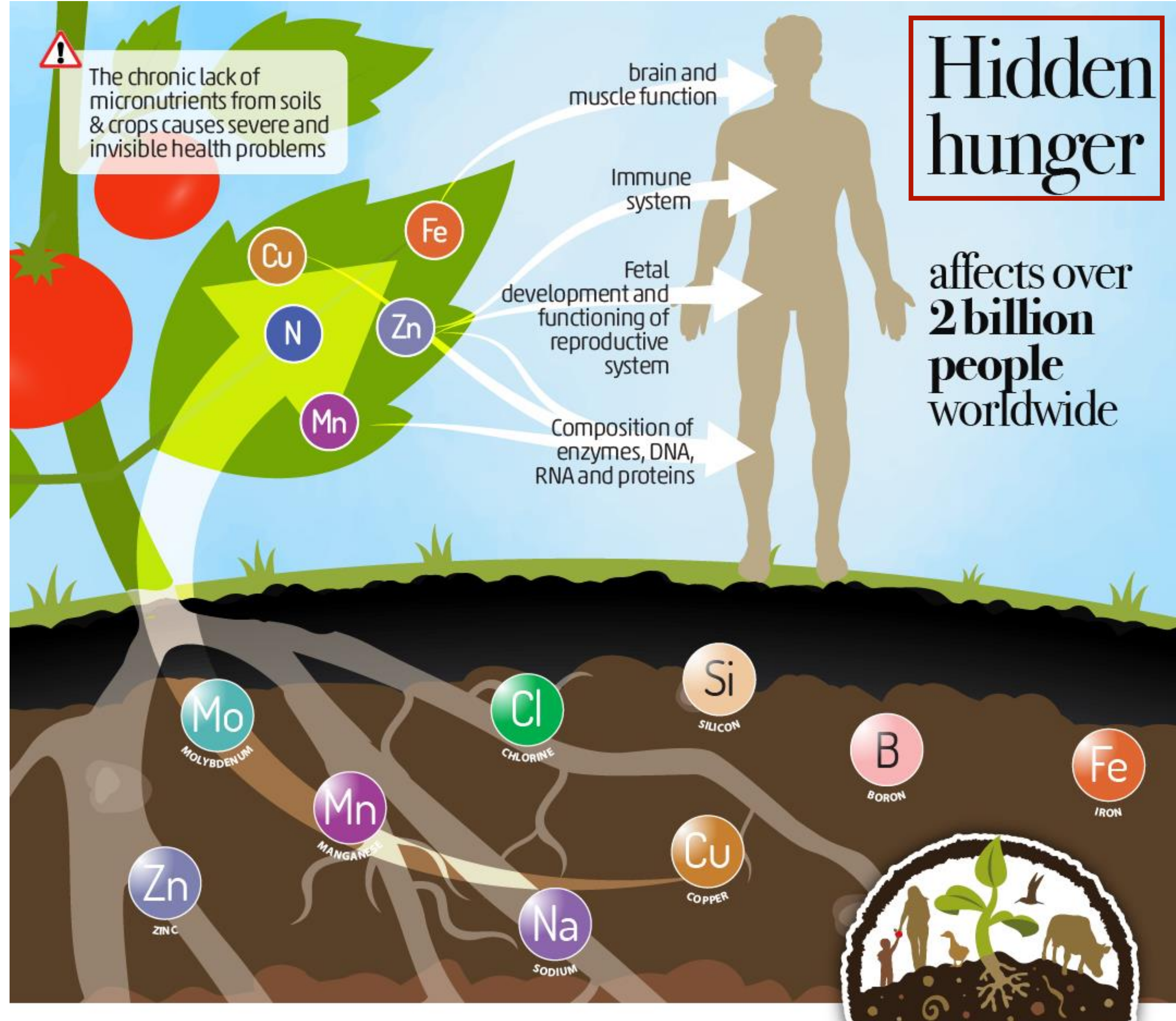
NUTRIENT ADEQUATE DIET
meets required levels of all essential nutrients

Mikronährstoffe

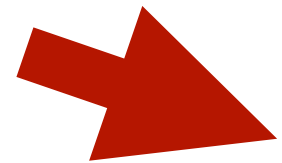
HEALTHY DIET
includes foods from several food groups and
has greater diversity within food groups

**Ballaststoffe,
Sekundäre Pflanzenstoffe**

ausreichend „Kalorien“



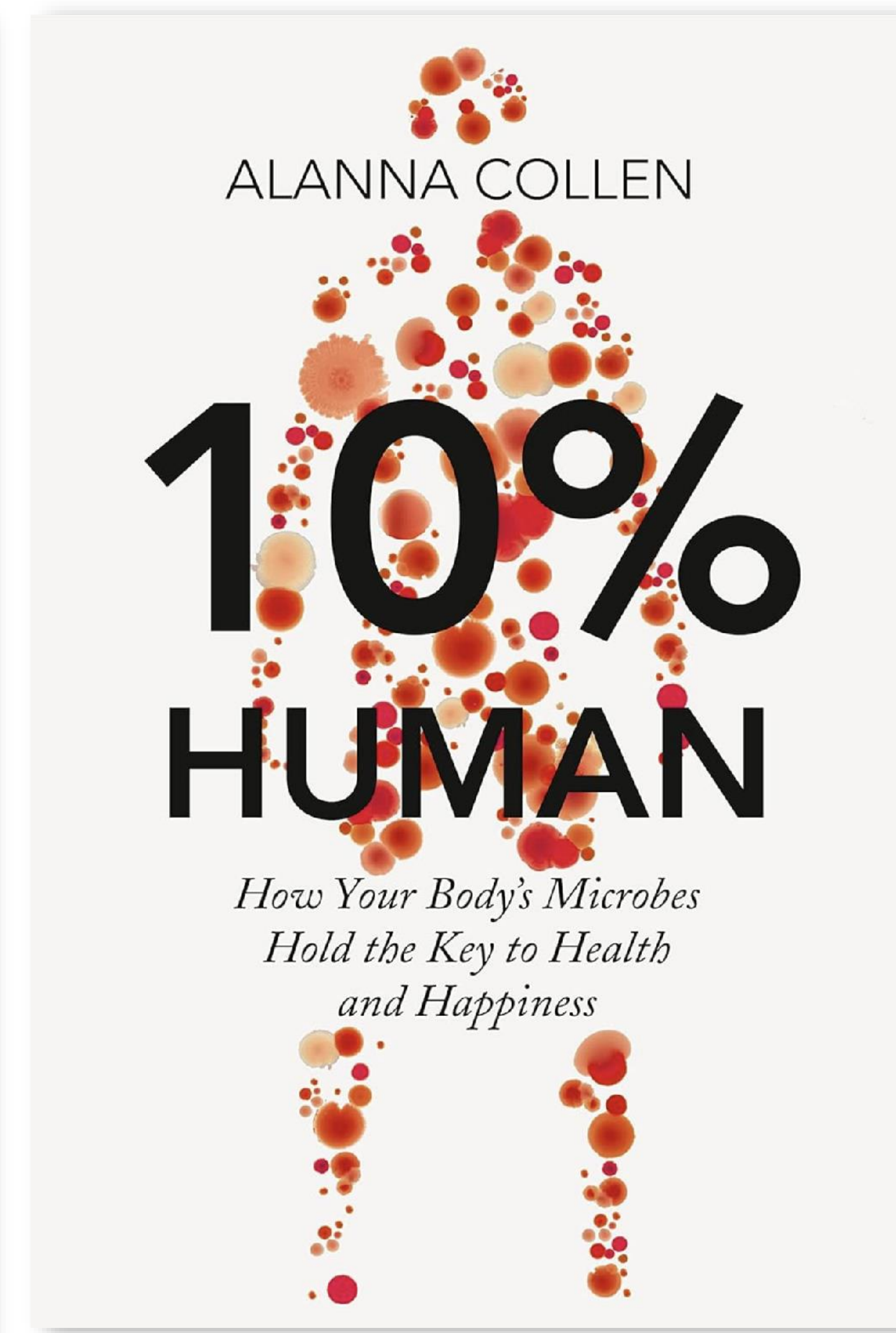
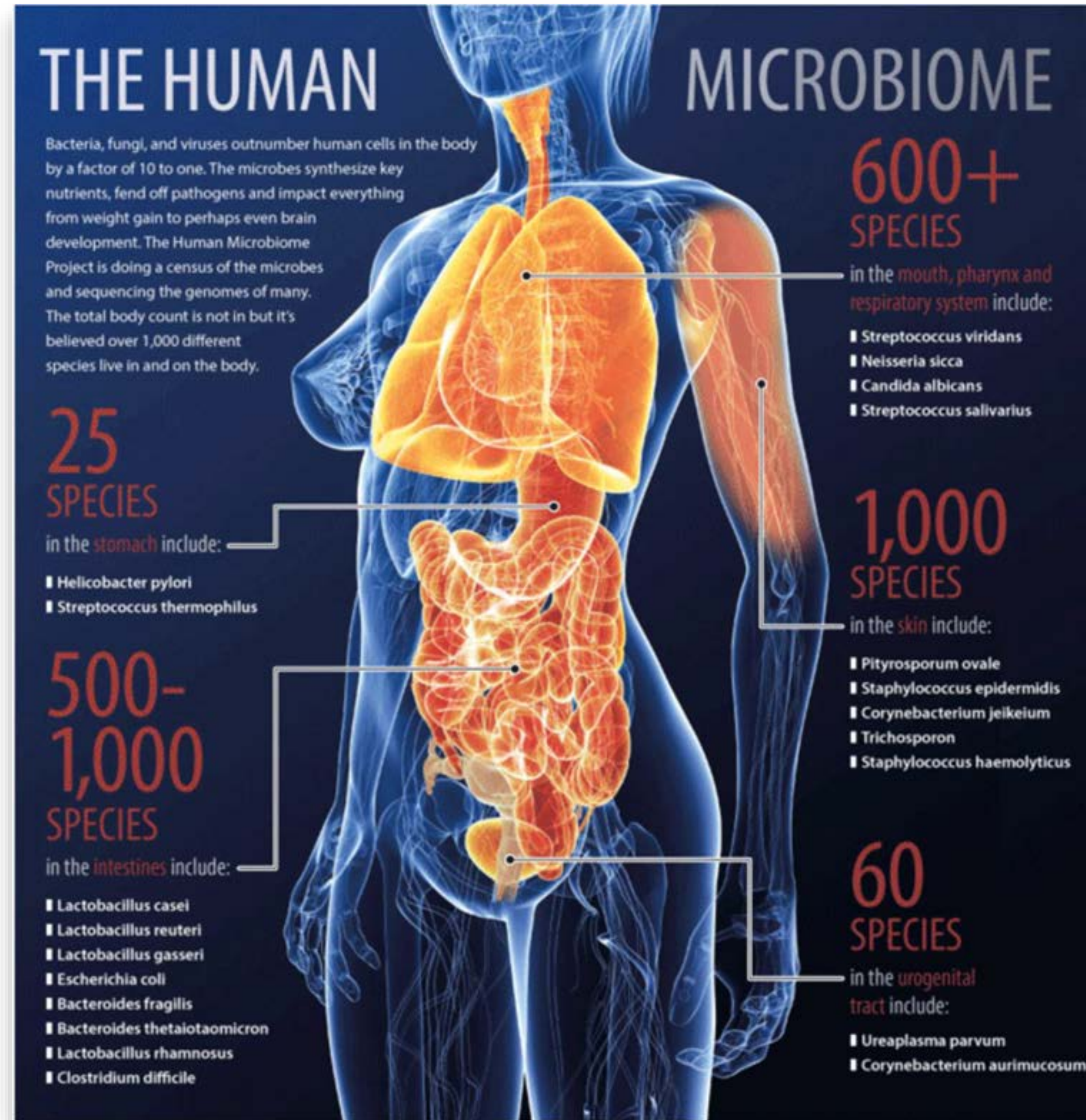
Lebendiger,
biodiverser Boden



Sekundäre Pflanzenstoffe - „Phytochemicals“

Chemische Gruppen		Bedeutung für Pflanzen (u.a.)		Vorkommen (u.a.)
Phenolische Verbindungen (enthalten eine oder mehrere Phenylgruppen)	Flavonoide	Farbstoffe (rot, hellgelb, blau, violett)		Äpfel, Birnen, Trauben, Kirschen, Pflaumen, Beerenobst, Zwiebeln, Grünkohl, Auberginen, Soja, schwarzer und grüner Tee ...
	Phenolsäuren	Abwehr von Fressfeinden		Kaffee, Tee, Vollkornprodukte, Wein, Nüsse ...
	Phytoöstrogene	Hormonwirkung		Getreide und Hülsenfrüchte (z.B. Soja), Leinsamen ...
Terpene (Enthalten eine oder mehrere Isopren-Einheiten)	Carotinoide	Farbstoffe (gelb, orange, rot)		Karotten, Tomaten, Paprika, grünes Gemüse, Grapefruit, Marillen, Melonen, Kürbis ...
	Monoterpene	Duft- und Aromastoffe		Zitronen, Minze, Thymian, Kümmel, Rosmarin ...
	Phytosterine	Membranbaustoff, Hormonwirkung		Nüsse, Pflanzensamen (z.B. Sonnenblumen, Sesam, Soja), Hülsenfrüchte ...
	Saponine	Abwehr von Fressfeinden und Pilzen		Hülsenfrüchte, Soja, Spargel, Hafer, Leinsamen ...
Niedermolekulare stickstoffhaltige Verbindungen (Enthalten abgesehen von Stickstoff häufig auch Schwefel)	Glucosinolate	Abwehr von Fressfeinden und Pathogenen		Alle Kohlsorten, Rettich, Radieschen, Knoblauch ...
	Sulfide (Alliine)	Duft- und Aromastoffe		Zwiebel, Lauch, Knoblauch, Schnittlauch ...





Der Mensch = ein „**Holobiont**“ („Gesamtlebewesen“)

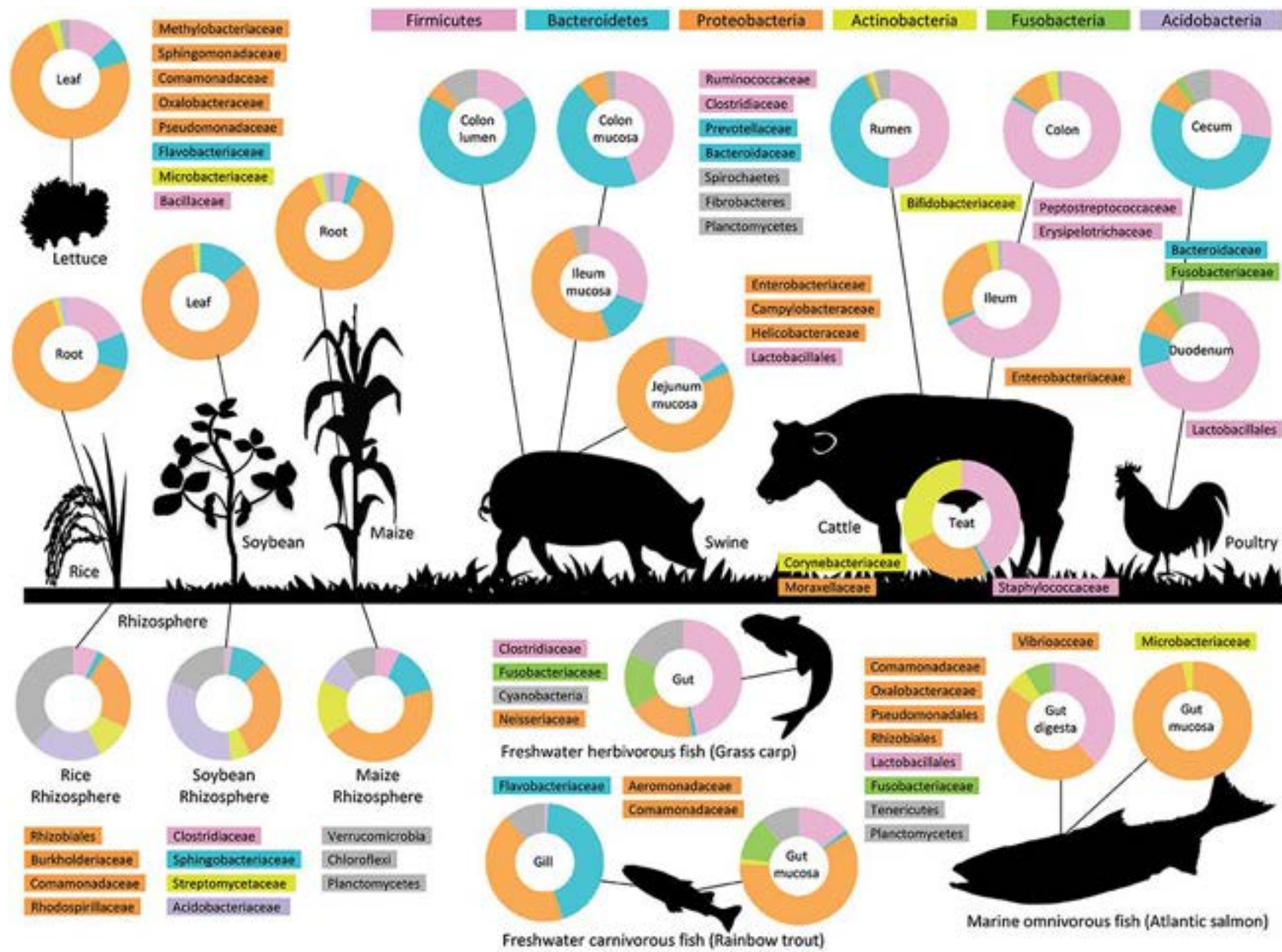
REVIEWS

Soil microbiomes and one health

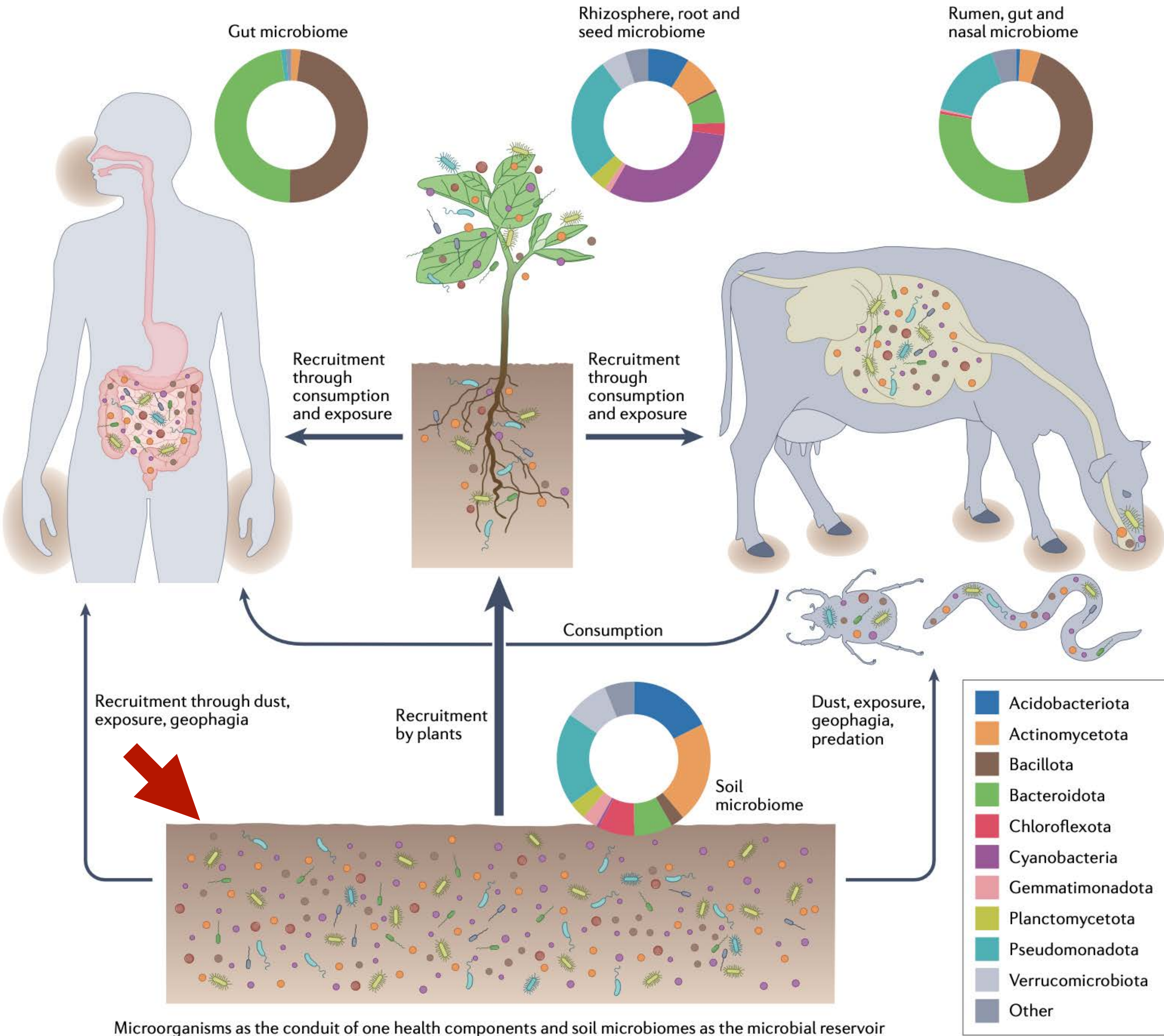
Samiran Banerjee¹ and Marcel G. A. van der Heijden^{2,3}

Abstract | The concept of one health highlights that human health is not isolated but connected to the health of animals, plants and environments. In this Review, we demonstrate that soils are a cornerstone of one health and serve as a source and reservoir of pathogens, beneficial microorganisms and the overall microbial diversity in a wide range of organisms and ecosystems. We list more than 40 soil microbiome functions that either directly or indirectly contribute to soil, plant, animal and human health. We identify microorganisms that are shared between different one health compartments and show that soil, plant and human microbiomes are perhaps more interconnected than previously thought. Our Review further evaluates soil microbial contributions to one health in the light of dysbiosis and global change and demonstrates that microbial diversity is generally positively associated with one health. Finally, we present future challenges in one health research and formulate recommendations for practice and evaluation.

Banerjee S, van der Heijden MGA. Soil microbiomes and one health. Nat Rev Microbiol. 2023 Jan;21(1):6-20.



Ikeda-Ohtsubo W, et al. Front Nutr. 2018;5:90.



Microorganisms as the conduit of one health components and soil microbiomes as the microbial reservoir



Babies who share their homes with a dog are much less likely to grow up into adults with allergies than those who don't.

MICROBIOME

Puppy power

Once anathema, it now seems that a 'dirty' environment can enrich a baby's microbiome and lessen her or his likelihood of developing everything from obesity to asthma. Again, it seems that we can rely on man's best friend to help us out.



Research

Original Investigation

Early Exposure to Dogs and Farm Animals and the Risk of Childhood Asthma

Tove Fall, PhD; Cecilia Lundholm, MSc; Anne K Örtqvist, PhD; Katja Fall, PhD; Fang Fang, PhD; Åke Hedhammar, PhD; Olle Kämpe, PhD; Erik Ingelsson, PhD; Catarina Almqvist, PhD





PERSPECTIVE

Regulation of the immune system by biodiversity from the natural environment: An ecosystem service essential to health

Graham A. Rook¹

Centre for Clinical Microbiology, Department of Infection, and the National Institute for Health Research and University College London Hospitals Biomedical Research Centre, University College London, London NW3 2PF, United Kingdom

Edited by Ruslan Medzhitov, Yale University School of Medicine, New Haven, CT, and approved October 1, 2013 (received for review July 23, 2013)

Epidemiological studies suggest that living close to the natural environment is associated with long-term health benefits including reduced death rates, reduced cardiovascular disease, and reduced psychiatric problems. This is often attributed to psychological mechanisms, boosted by exercise, social interactions, and sunlight. Compared with urban environments, exposure to green spaces does indeed trigger rapid psychological, physiological, and endocrinological effects. However, there is little evidence that these rapid transient effects cause long-term health benefits or even that they are a specific property of natural environments. Meanwhile, the illnesses that are increasing in high-income countries are associated with failing immunoregulation and poorly regulated inflammatory responses, manifested as chronically raised C-reactive protein and proinflammatory cytokines. This failure of immunoregulation is partly attributable to a lack of exposure to organisms ("Old Friends") from mankind's evolutionary past that needed to be tolerated and therefore evolved roles in driving immunoregulatory mechanisms. Some Old Friends (such as helminths and infections picked up at birth that established carrier states) are almost eliminated from the urban environment. This increases our dependence on Old Friends derived from our mothers, other people, animals, and the environment. It is suggested that the requirement for microbial input from the environment to drive immunoregulation is a major component of the beneficial effect of green space, and a neglected ecosystem service that is essential for our well-being. This insight will allow green spaces to be designed to optimize health benefits and will provide impetus from health systems for the preservation of ecosystem biodiversity.



Blutdrucksenkung

Reduktion negativer Emotionen

Stressreduktion

Steigerung mentaler Gesundheit

Reduzierter Cortisol-Spiegel

Verbesserte Immunfunktion

Wen et al. *Environmental Health and Preventive Medicine* (2019) 24:70
<https://doi.org/10.1186/s12199-019-0822-8>

Environmental Health and Preventive Medicine

REVIEW ARTICLE Open Access

Medical empirical research on forest bathing (*Shinrin-yoku*): a systematic review

Ye Wen^{1,2}, Qi Yan¹, Yangliu Pan¹, Xinren Gu^{1*} and Yuanqiu Liu^{1*}

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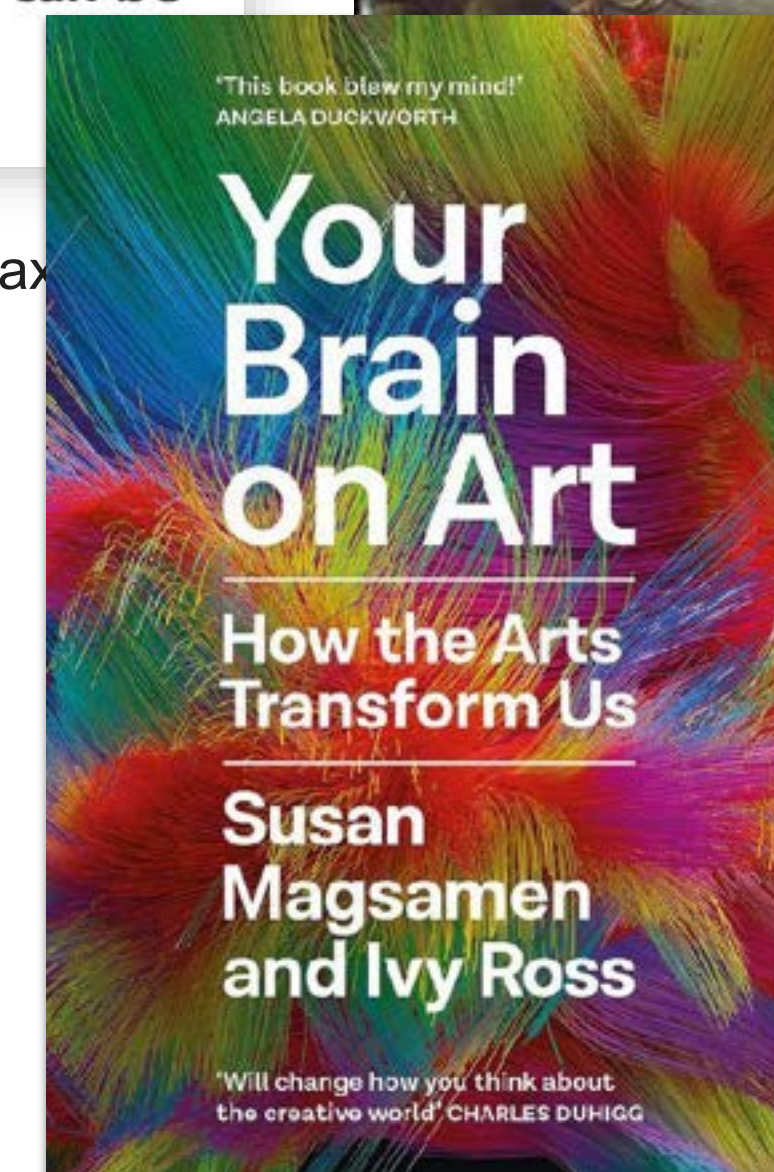
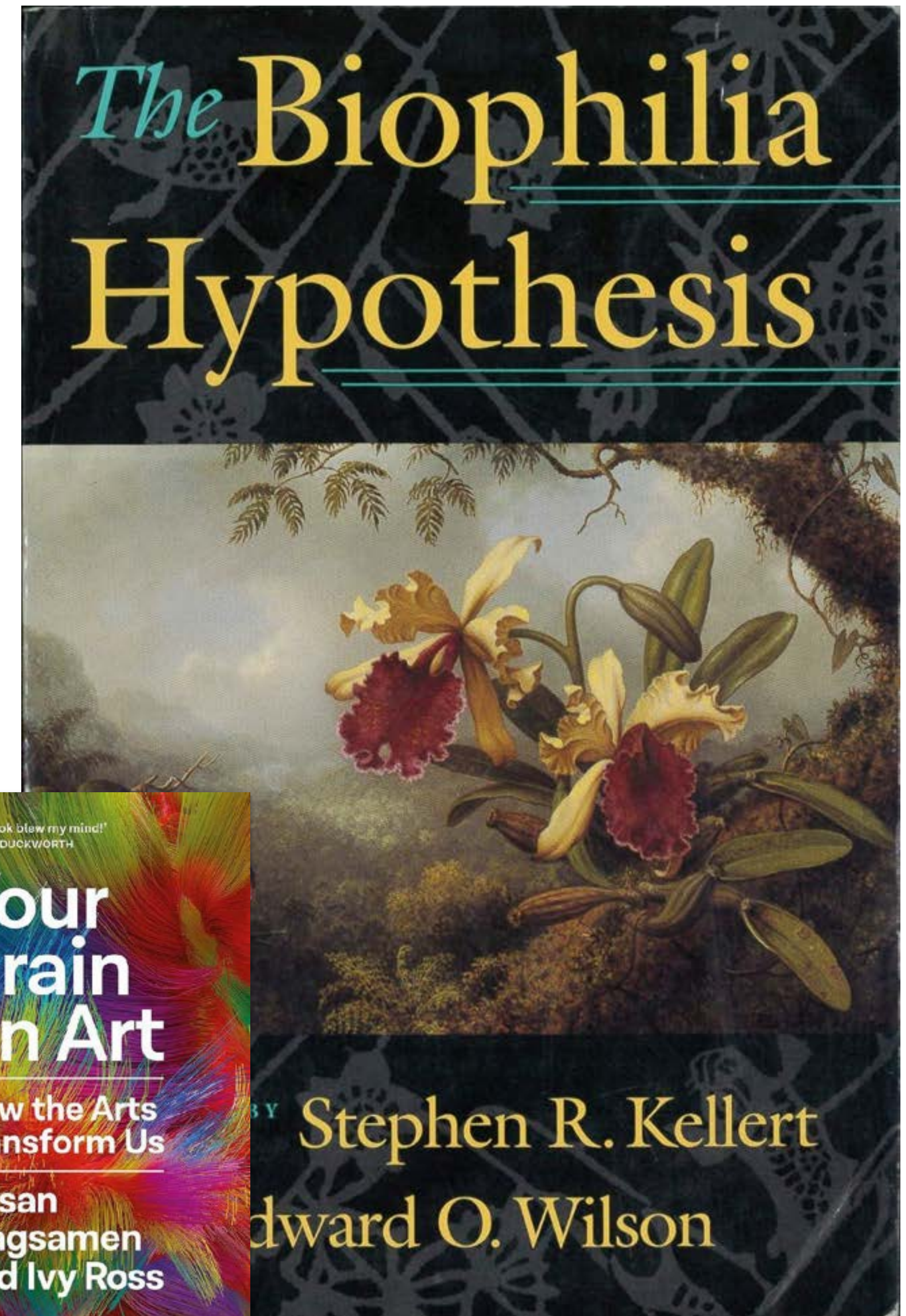
SOCIAL SCIENCES

Nature and mental health: An ecosystem service perspective

Gregory N. Bratman^{1,2,3,4*}, Christopher B. Anderson^{3,5}, Marc G. Berman^{6,7}, Bobby Cochran⁸, Sjerp de Vries⁹, Jon Flanders^{10,11}, Carl Folke^{12,13,14}, Howard Frumkin^{15,16}, James J. Gross¹⁷, Terry Hartig^{18,19}, Peter H. Kahn Jr.^{1,20}, Ming Kuo²¹, Joshua J. Lawler^{1,2}, Phillip S. Levin^{1,2,22}, Therese Lindahl¹⁴, Andreas Meyer-Lindenberg²³, Richard Mitchell²⁴, Zhiyun Ouyang²⁵, Jenny Roe²⁶, Lynn Scarlett²⁷, Jeffrey R. Smith^{3,5}, Matilda van den Bosch^{28,29}, Benedict W. Wheeler³⁰, Mathew P. White³⁰, Hua Zheng²⁵, Gretchen C. Daily^{3,4,5,31*}

A growing body of empirical evidence is revealing the value of nature experience for mental health. With rapid urbanization and declines in human contact with nature globally, crucial decisions must be made about how to preserve and enhance opportunities for nature experience. Here, we first provide points of consensus across the natural, social, and health sciences on the impacts of nature experience on cognitive functioning, emotional well-being, and other dimensions of mental health. We then show how ecosystem service assessments can be expanded to include mental health, and provide a heuristic, conceptual model for doing so.

Bratman GN et al. Nature and mental health: An ecosystem service perspective. Sci Adv. 2019 Jul 24;5(7):eaax



Ambient greenness, access to local green spaces, and subsequent mental health: a 10-year longitudinal dynamic panel study of 2.3 million adults in Wales

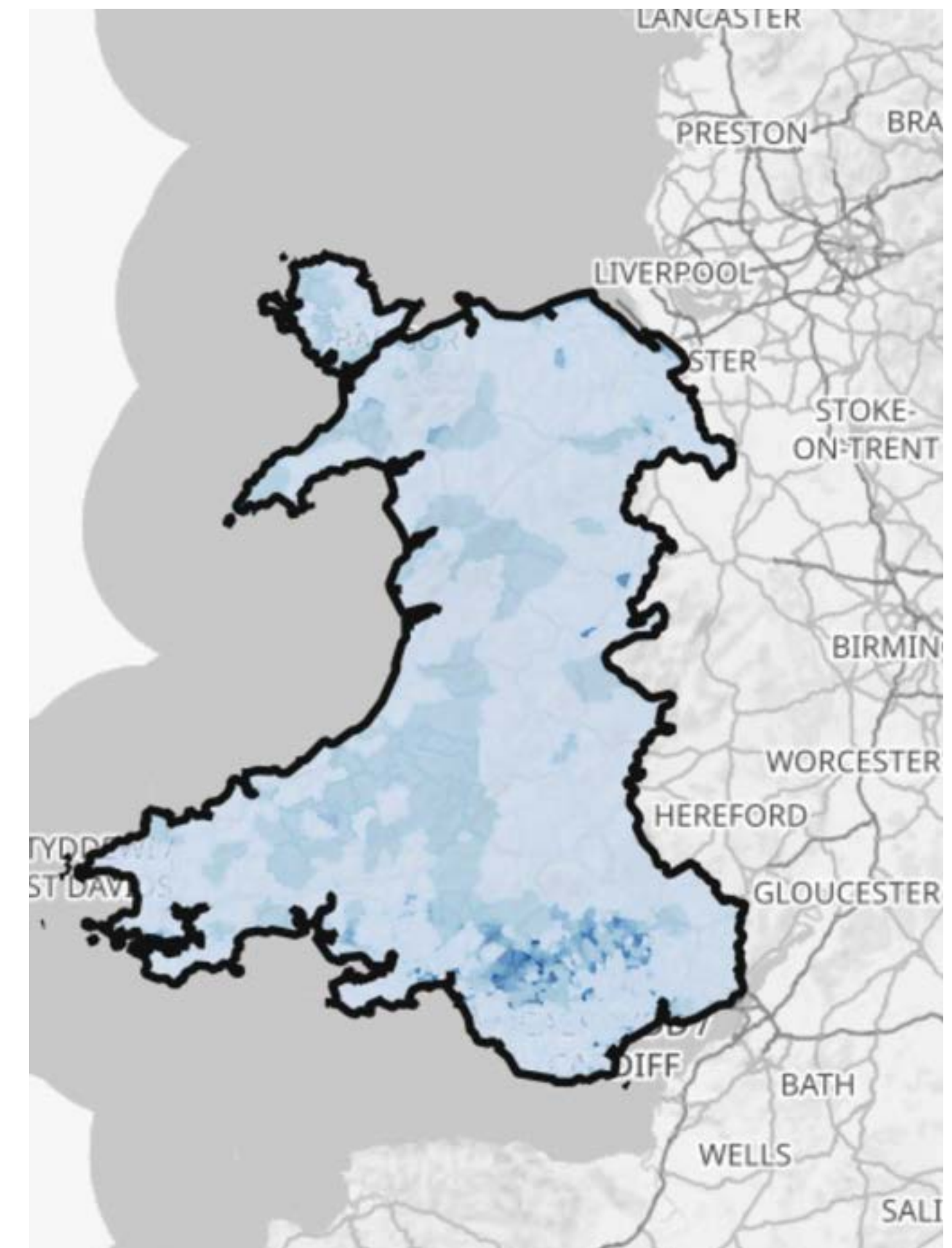
Rebecca S Geary, Daniel Thompson, Amy Mizen, Asma Bari, Joanne K Garrett, Francis M Rowney, Alan Watkins, Ronan A Lyons, Gareth Stratton, Rebecca Lovell, Mark Nieuwenhuijsen, C Parker, Jiao Song, Dialehti Tsimpida, James White, Mathew P White, Susan Williams, Benedict W Wheeler, Richard Fry, Sarah E

Lancet Planet Health
2023; 7: e809-18

Ergebnisse:

Die Exposition gegenüber **mehr Umgebungsgrün** war verbunden mit:

- einer signifikant **geringeren Wahrscheinlichkeit für psychische Erkrankungen**
- Pro 360 m Entfernung zum nächsten „Green-Blue-Space“ (GBS) ansteigende Wahrscheinlichkeit für psychische Erkrankungen.





Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood

Kristine Engemann^{a,b,c,1}, Carsten Bøcker Pedersen^{c,d,e}, Lars Arge^f, Constantinos Tsirogiannis^f, Preben Bo Mortensen^{c,d,e}, and Jens-Christian Svenning^{a,b}

^aSection for Ecoinformatics & Biodiversity, Department of Bioscience, Aarhus University, 8000 Aarhus C, Denmark; ^bCenter for Biodiversity Dynamics in a Changing World, Department of Bioscience, Aarhus University, 8000 Aarhus C, Denmark; ^cCentre for Integrated Register-based Research, Aarhus University, 8210 Aarhus V, Denmark; ^dNational Centre for Register-based Research, School of Business and Social Sciences, Department of Economics and Business Economics, Aarhus University, 8210 Aarhus V, Denmark; ^eThe Lundbeck Foundation Initiative for Integrative Psychiatric Research, Aarhus University, 8210 Aarhus V, Denmark; and ^fCenter for Massive Data Algorithmics, Department of Computer Science, Aarhus University, 8200 Aarhus N, Denmark

Edited by Terry Hartig, Uppsala University, Uppsala, Sweden, and accepted by Editorial Board Member Susan T. Fiske January 14, 2019 (received for review May 2, 2018)

Urban residence is associated with a higher risk of some psychiatric disorders, but the underlying drivers remain unknown. There is increasing evidence that the level of exposure to natural environments impacts mental health, but few large-scale epidemiological studies have assessed the general existence and importance of such associations. Here, we investigate the prospective association between green space and mental health in the Danish population. Green space presence was assessed at the individual level using high-resolution satellite data to calculate the normalized difference vegetation index within a 210 × 210 m square around each person's place of residence (~1 million people) from birth to the age of 10. We show that high levels of green space presence during childhood are associated with lower risk of a wide spectrum of psychiatric disorders later in life. Risk for subsequent mental illness for those who lived with the lowest level of green space during childhood was up to 55% higher across various disorders compared with those who lived with the highest level of green space. The association remained even after adjusting for urbanization, socioeconomic factors, parental history of mental illness, and parental age. Stronger association of cumulative green space presence during childhood compared with single-year green space presence suggests that presence throughout childhood is important. Our results show that green space during childhood is associated with better mental health, supporting efforts to better integrate natural environments into urban planning and childhood life.

geographic information systems | mental health | psychological ecosystem services | remote sensing | urban planning

The number of people living in cities is increasing, and, globally, more than 50% of the human population is now city dwellers, with no sign of this trend slowing down (1). Urban living often offers good sanitation, access to health care, nutrition, and education (2), but has also been associated with adverse health effects (3, 4). In some societies, urban residents have almost 50% higher risk of developing psychiatric disorders such as anxiety and

Dose-response relationships from other studies show that higher doses of green space are associated with better mental health (13), and long-lasting positive effects of moving to greener areas (18) suggest causation, albeit most of these studies are small and cross-sectional. Whether the association with green space is specific or applies to a broader spectrum of psychiatric disorders and to what degree the association is independent from urbanization in general or just mirrors the urban-rural gradient are unknown. Access to green space partially depends on socioeconomic factors, such as housing prices, and the extent to which this explains associations between green space and mental illnesses is another unknown aspect.

Exposure to green space may influence mental health through both psychological and physiological pathways, as green spaces serve as settings for individual and social behavior and can mitigate negative influences of other aspects of the physical environment (19). These mechanistic pathways could vary for different psychiatric disorders, with green space as a shared risk-decreasing

Significance

Growing up in urban environments is associated with risk of developing psychiatric disorders, but the underlying mechanisms are unknown. Green space can provide mental health benefits and possibly lower risk of psychiatric disorders. This nation-wide study covering >900,000 people shows that children who grew up with the lowest levels of green space had up to 55% higher risk of developing a psychiatric disorder independent from effects of other known risk factors. Stronger association between cumulated green space and risk during childhood constitutes evidence that prolonged presence of green space is important. Our findings affirm that integrating natural environments into urban planning is a promising approach to improve mental health and reduce the rising global burden of psychiatric disorders.



<https://www.savills.co.uk/blog/article/299903/residential-property/green-spaces-in-new-developments.aspx>



<https://ciudadesamigas.org/wp-content/uploads/2020/08/Children-and-Nature-UrbanGreenSpace-FINAL.pdf>

SCIENTIFIC REPORTS

OPEN

Neighborhood greenspace and health in a large urban center

Omid Kardan¹, Peter Gozdyra², Bratislav Mistic³, Faisal Moola⁴, Lyle J. Palmer⁵, Tomáš Paus⁶ & Marc G. Berman^{1,7}

Received: 08 February 2015

N = 31.109

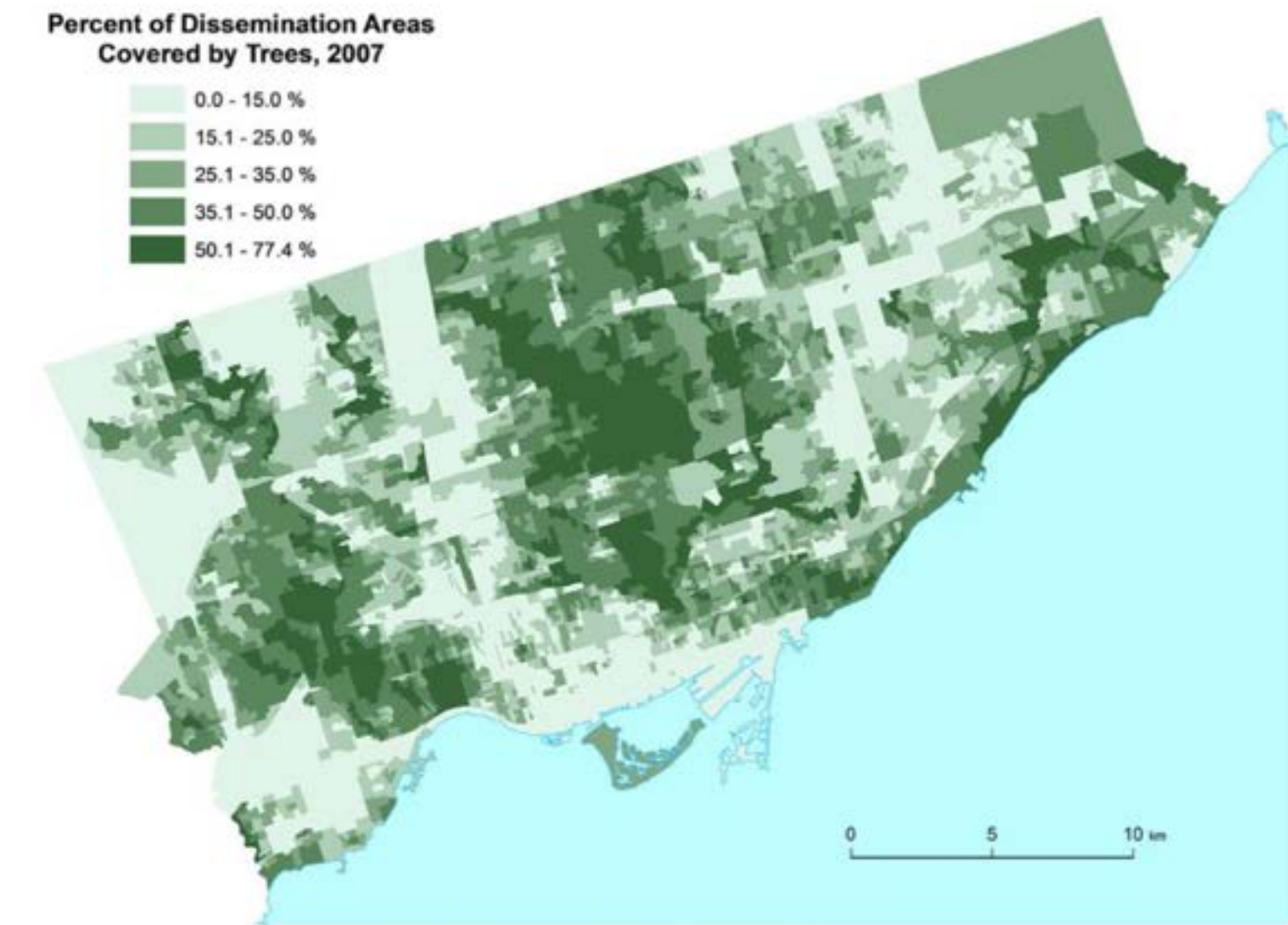


Figure 2. The Greenspace map of the city of Toronto constructed from the Geographical Information System (GIS) polygon data set Forest and Land Cover. The levels are shown in units of 10–15% for display purposes only as we analyzed these data as a continuous variable. This figure was created using Environmental Systems Research Institute's (ESRI) ArcGIS software v. 10.2.

Ergebnisse:

- Menschen, die in Gebieten mit einer **höheren Straßenbaumdichte** leben, haben ein **höheres Gesundheitsempfinden** und **weniger kardio-metabolische Erkrankungen** im Vergleich zu Menschen aus Gegenden mit geringerer Straßenbaumdichte
- Die **Effektgröße** der Auswirkungen der Straßenbaumdichte scheint **vergleichbar mit der von sozioökonomischen Variablen**, von denen bekannt ist, dass sie mit einer besseren Gesundheit korrelieren (HK-Erkrankungen: 20.200 Can\$ ≈ + 10 Bäume pro Häuserblock!)



Is tree loss associated with cardiovascular-disease risk in the Women's Health Initiative? A natural experiment

Geoffrey H. Donovan^{a,*}, Yvonne L. Michael^b, Demetrios Gatzolis^a, Jeffrey P. Prestemon^c, Eric A. Whitsel^d

2002–2010 N = 161,808

Women living in a county infested with emerald ash borer had an increased risk of cardiovascular disease (HR=1.25, 95% CI: 1.20–1.31)

Asiatische Eschenprachtkäfer



https://de.wikipedia.org/wiki/Asiatischer_Eschenprachtkäfer

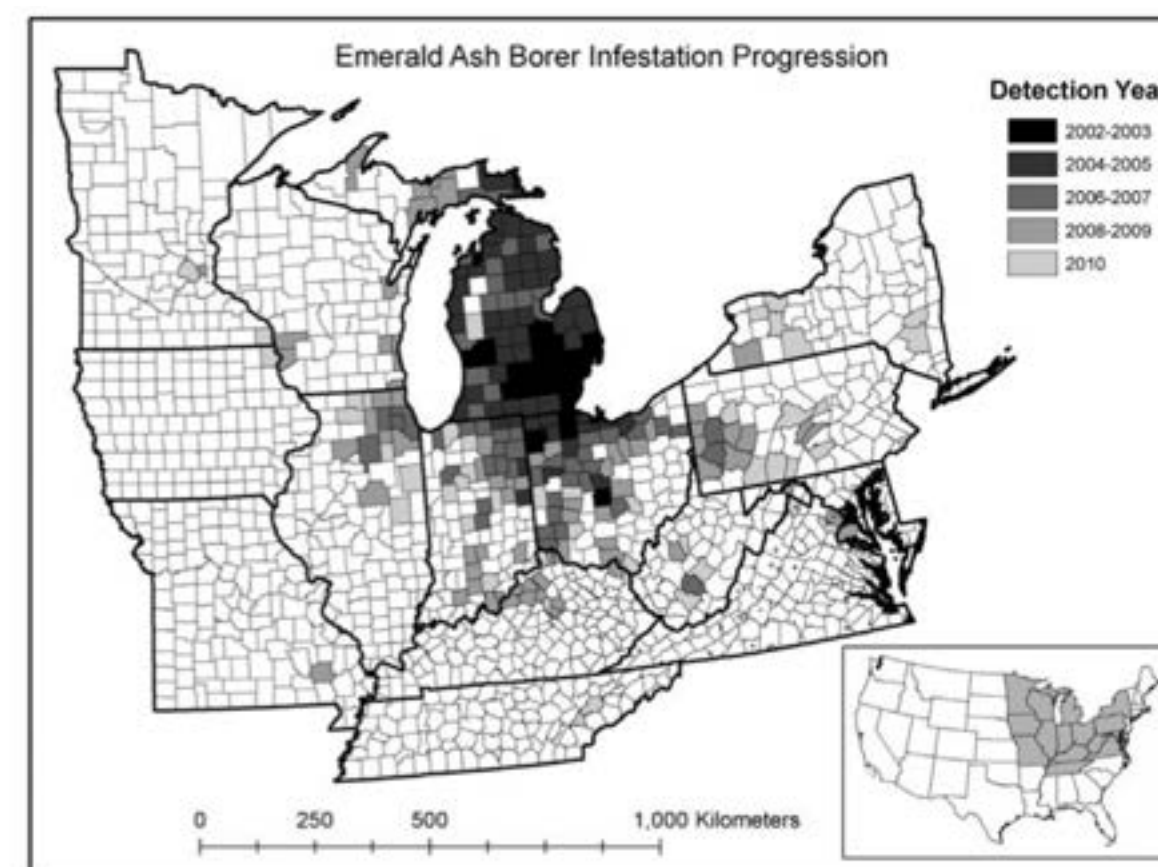


Fig. 1. Spread of the emerald ash borer by county 2002–2010.

a



b

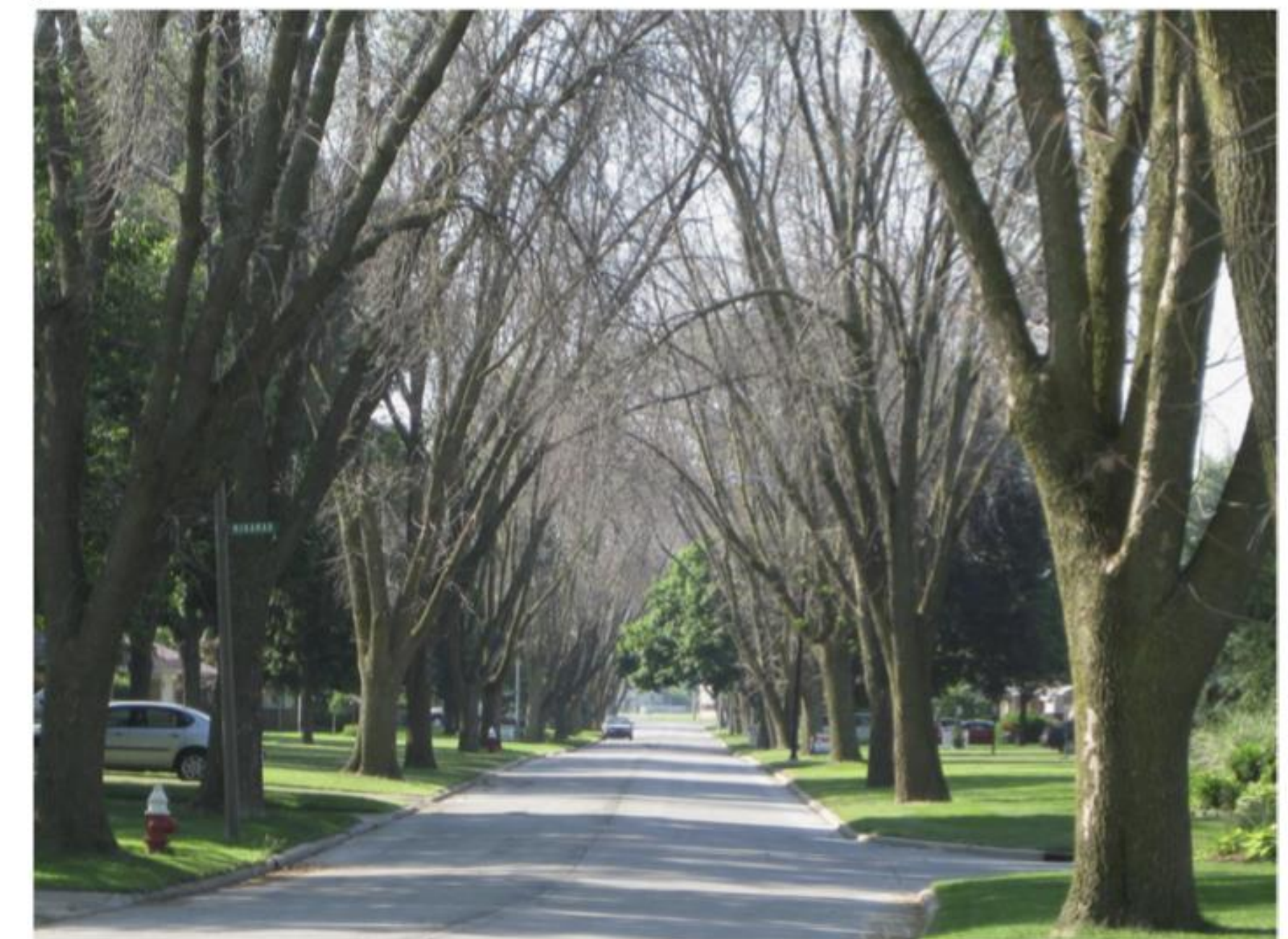
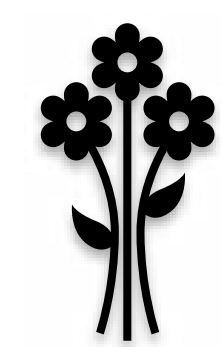


Fig. 2. (a and b) A street lined with ash trees in Toledo, OH in 2006 and 2009 (photo credit: Dan Herms Ohio State University).



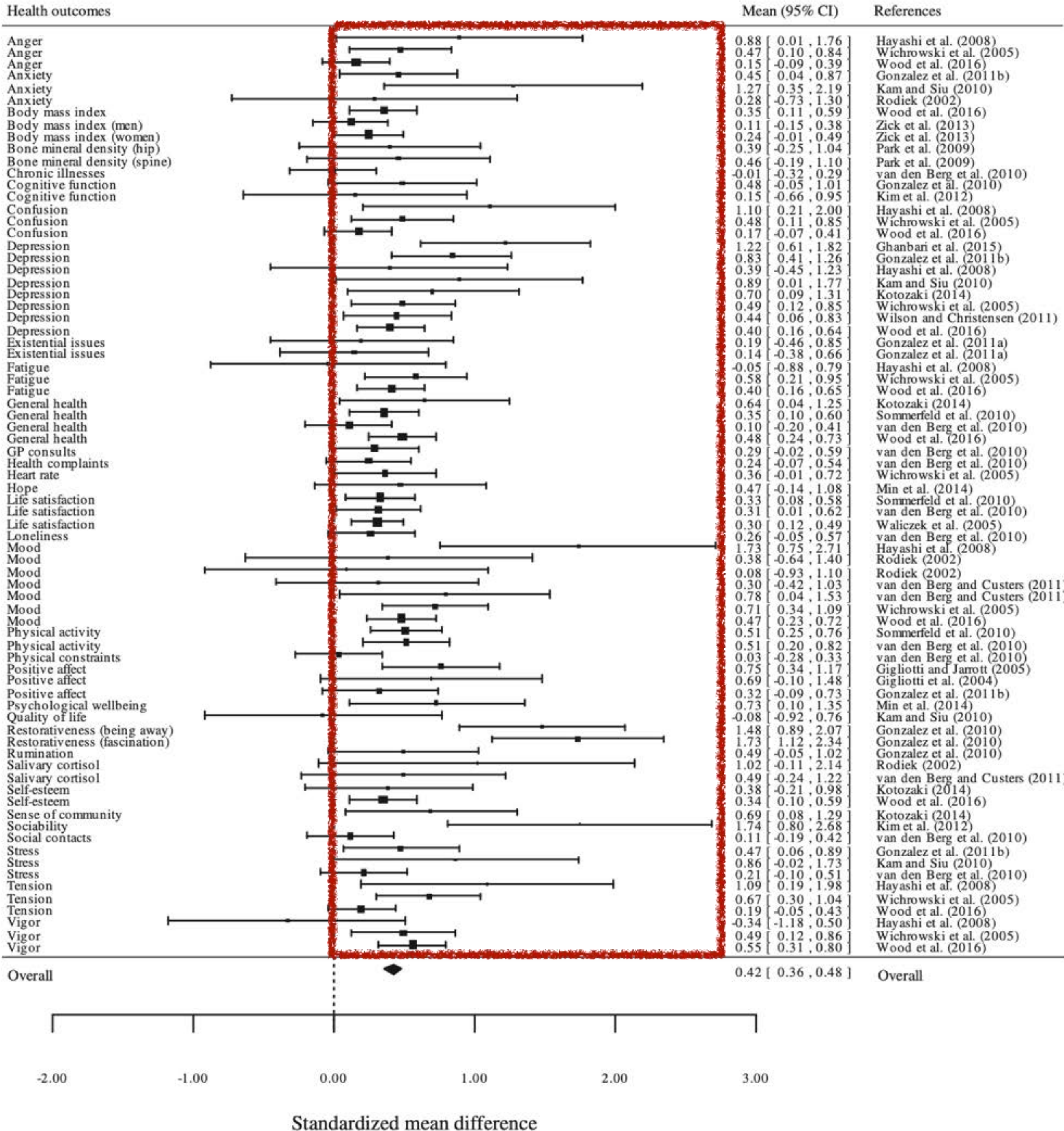
Review Article

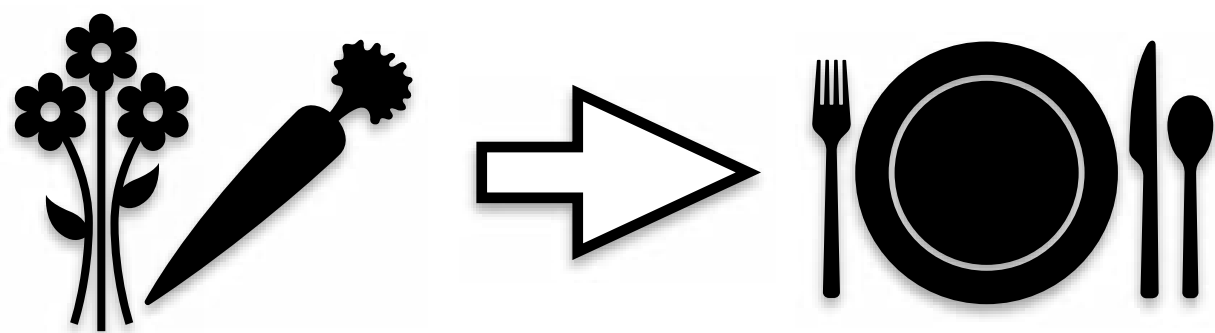
Gardening is beneficial for health: A meta-analysis

Masashi Soga^{a,*}, Kevin J. Gaston^b, Yuichi Yamaura^c

Typically, gardening can help improve physiological outcomes associated with LTCs such as blood glucose levels, cortisol levels, HRV, blood lipids and salivary stress cortisol. Similar findings were identified by Nicklett *et al*⁸⁴ and Ohly *et al*⁸⁶ who reported positive physiological outcome measures on a range of biometrics including urinalysis, total fat, body mass index and systolic/diastolic blood pressure as outcomes. These findings, coupled with this review, demonstrate positive outcomes for a range of population needs including those living with obesity, diabetes, cardiovascular disease and other LTCs.

Howarth M et al. What is the evidence for the impact of gardens and gardening on health and well-being: a scoping review and evidence-based logic model to guide healthcare strategy decision making on the use of gardening approaches as a social prescription. BMJ Open. 2020 Jul 19;10(7):e036923.





Edible horticultural Therapy (EHT)



Original Article
Food Science and Technology

ISSN 0101-2061 (Print)
ISSN 1678-457X (Online)

DOI: <https://doi.org/10.1590/fst.53022>



Value of edible horticultural therapy for schizophrenic

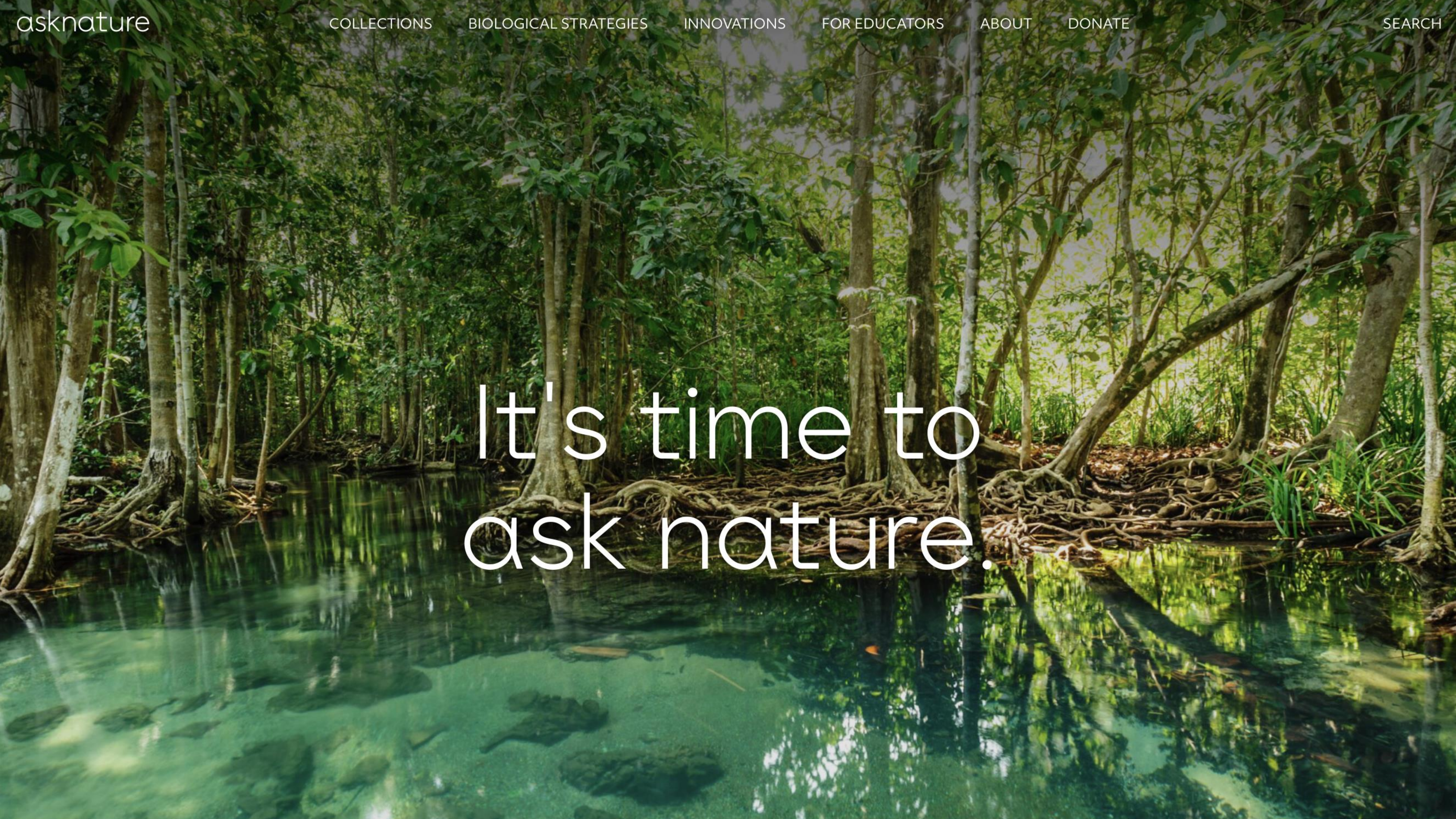
Tao LIU^{1#}, Mingchao LI^{2#}, Qiuming JI^{1*} , Yu CHEN^{1*} , Chi LI^{1*} , Fan ZHOU^{1#},
Cairong WANG¹, Haiying CHEN¹, Hui HE³

Abstract

To investigate the value of edible horticultural therapy (EHT) for long-term-hospitalized (LTH) female patients who suffered from schizophrenia. 60 female schizophrenic patients hospitalized in our hospital were randomly divided into EHT group and control group, with 30 cases in each group. The EHT group was combined with EHT on the basis of drug treatment, and the control group was only treated with drug treatment. The Brief Psychiatric Rating Scale (BPRS), the Chinese version Scale of Social Functioning for Psychotic Inpatients (SSFPI), and the Life Satisfaction Index A (LSIA) were compared and analyzed between two groups. After 6 weeks of treatment, the SSFPI score of EHT group increased and was significantly higher than that of the control group. After treatment, the LSIA index of EHT group was higher than that of the control group, and the difference between the two groups was statistically significant ($P < 0.05$). The BPRS index of EHT group was significantly lower than that before treatment, but there was little change in the control group. There was significant difference between the two groups ($P < 0.05$). EHT maybe valuable for improving clinical symptoms of schizophrenia and recovery of social function. Clinical registration number: [researchregistry7590](https://www.researchregistry.org/record/researchregistry7590)

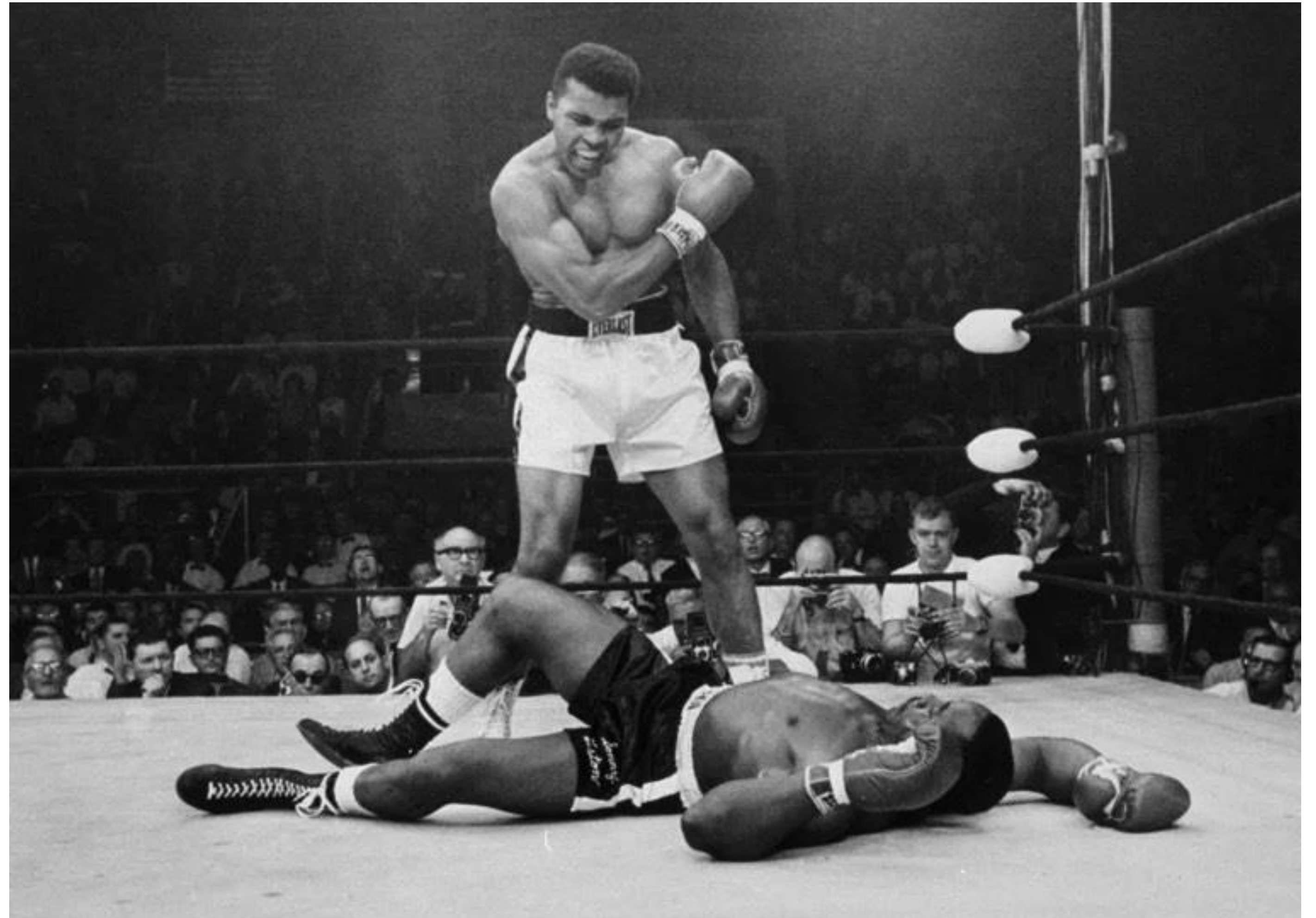
Keywords: edible horticultural therapy; schizophrenia; social function; life satisfaction; psychological and social disorder.

Practical Application: To investigate the value of edible horticultural therapy (EHT) for long-term-hospitalized (LTH) female patients who suffered from schizophrenia.



It's time to
ask nature.

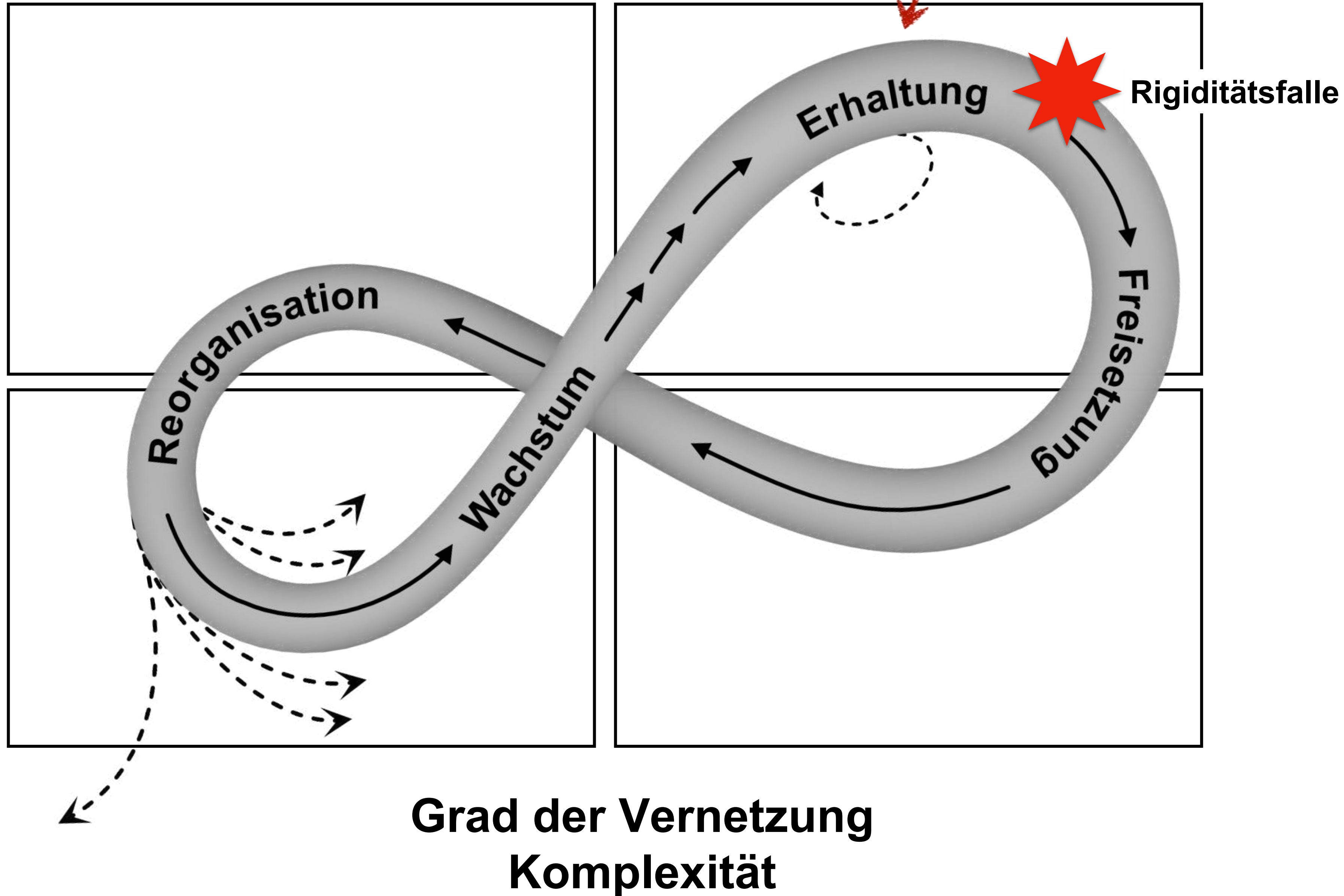
Robustheit & Resilienz



Der adaptive Zyklus

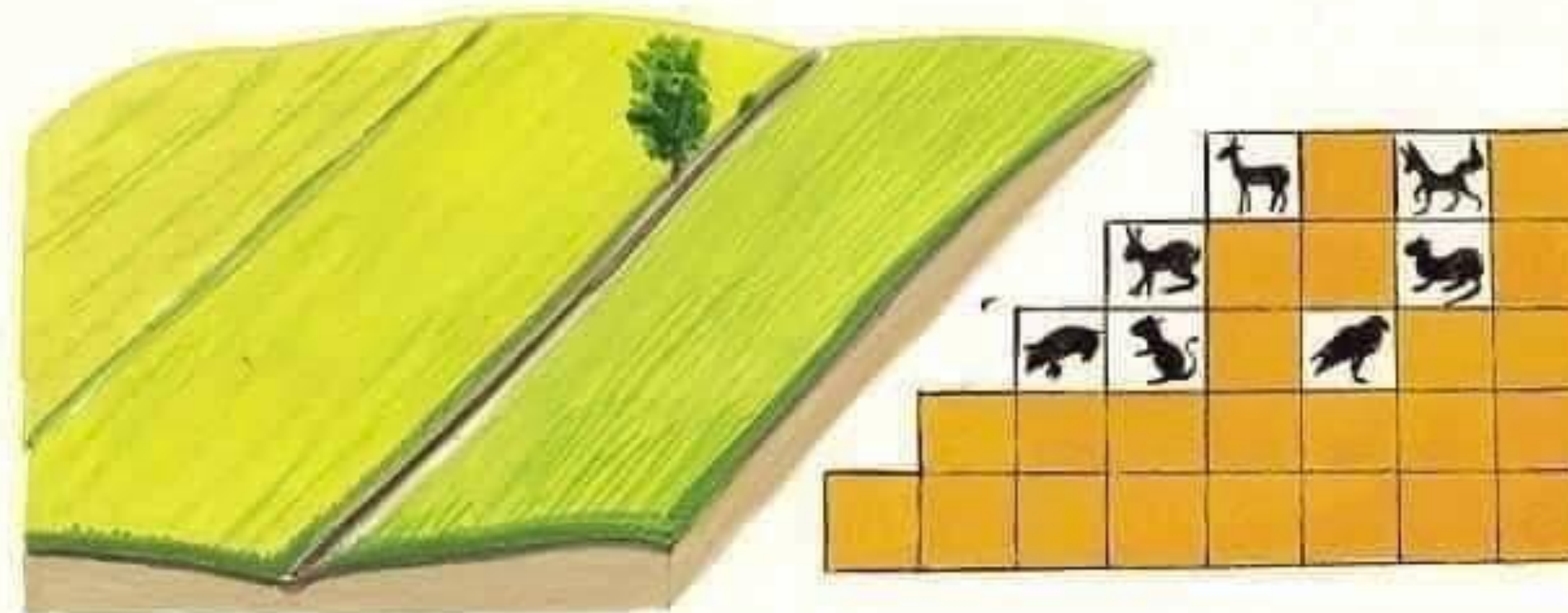
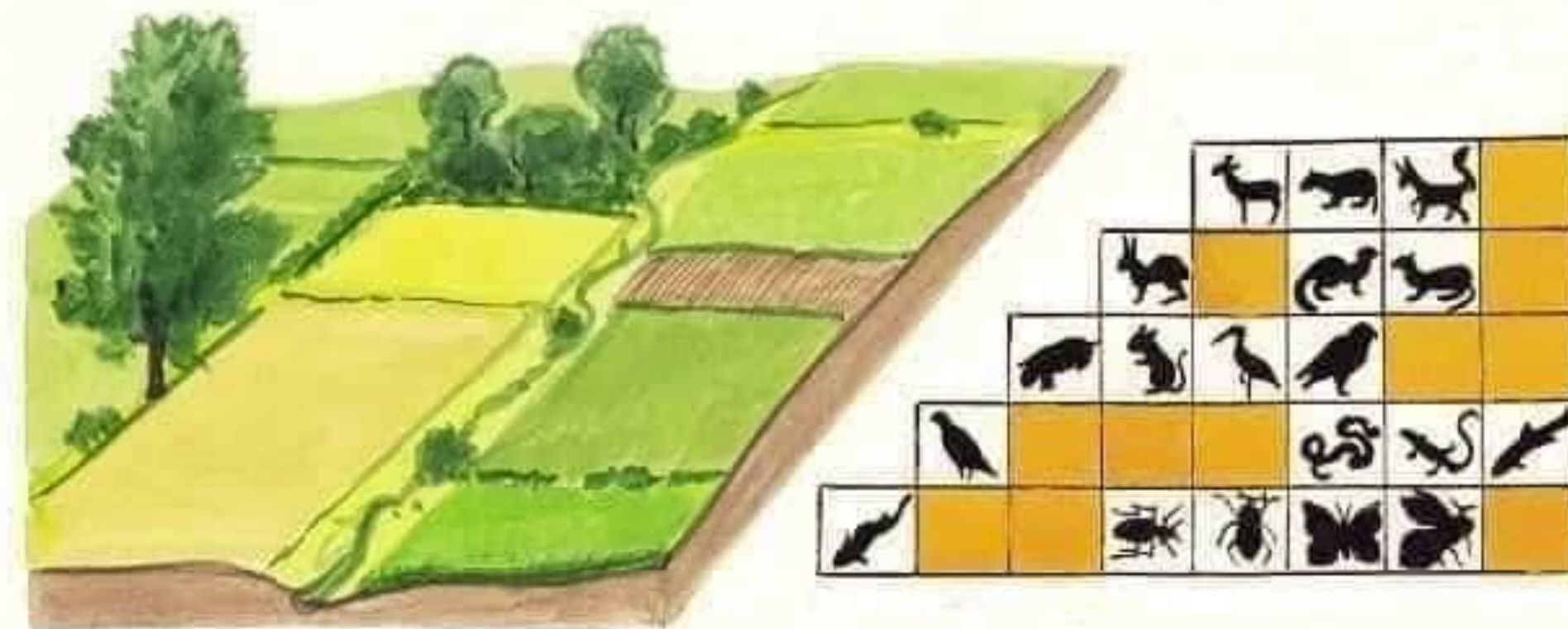
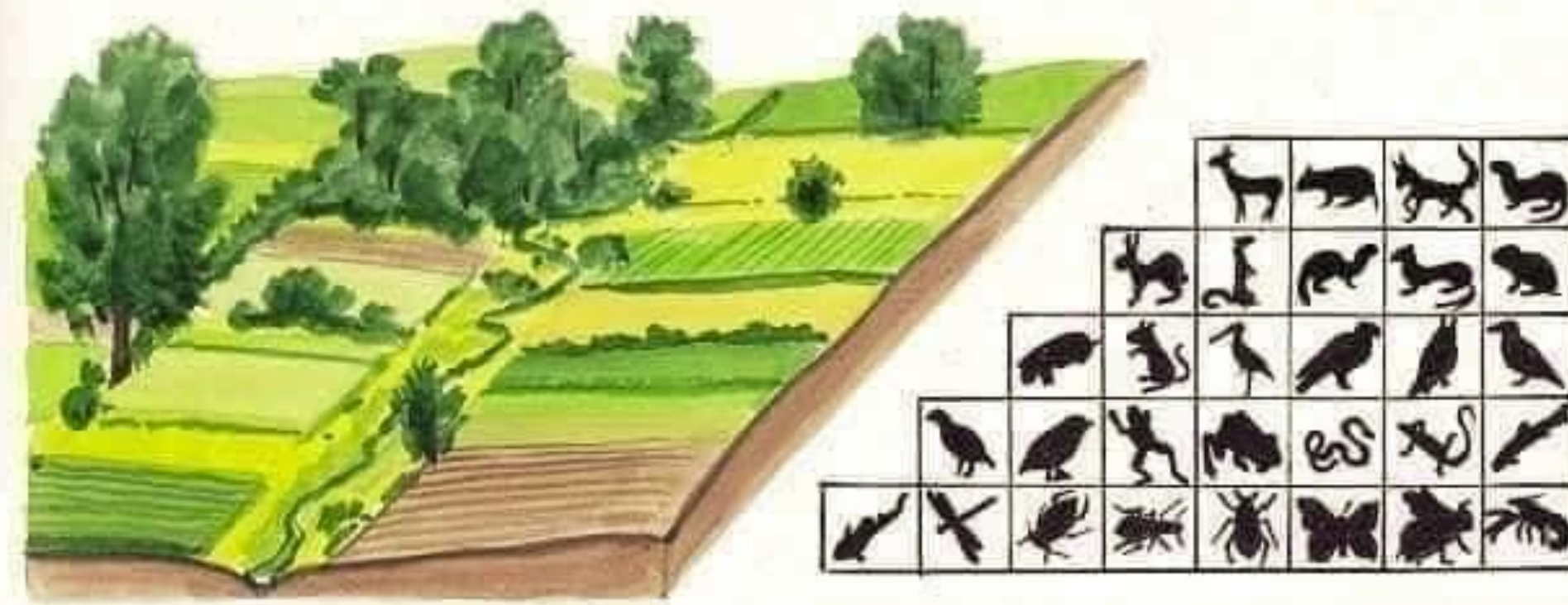
Nach Gunderson u. Holling

Potenzial / gespeicherte Energie



← Biodiversität!

- Genetische Vielfalt
- Artenvielfalt
- Funktionale Vielfalt
- Ökosystemvielfalt
- Populationsvielfalt



nature
COMMUNICATIONS

NATURE COMMUNICATIONS | (2019)10:4841 | <https://doi.org/10.1038/s41467-019-12798-y> | www.nature.com/naturecommunications

ARTICLE

<https://doi.org/10.1038/s41467-019-12798-y>

OPEN

Fungal-bacterial diversity and microbiome complexity predict ecosystem functioning

Cameron W.
Marcel G.A.

Review

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A healthy gastrointestinal microbiome is dependent on dietary diversity

Mark L. Heiman^{1,*}, Frank L. Greenway²

ABSTRACT

Background: Like all healthy ecosystems, richness of microbiota species characterizes the GI microbiome in healthy individuals. Conversely, a loss in species diversity is a common finding in several disease states. This biome is flooded with energy in the form of undigested and partially digested foods, and in some cases drugs and dietary supplements. Each microbiotic species in the biome transforms that energy into new molecules, which may signal messages to physiological systems of the host.

Scope of review: Dietary choices select substrates for species, providing a competitive advantage over other GI microbiota. The more diverse the diet, the more diverse the microbiome and the more adaptable it will be to perturbations. Unfortunately, dietary diversity has been lost during the past 50 years and dietary choices that exclude food products from animals or plants will narrow the GI microbiome further.

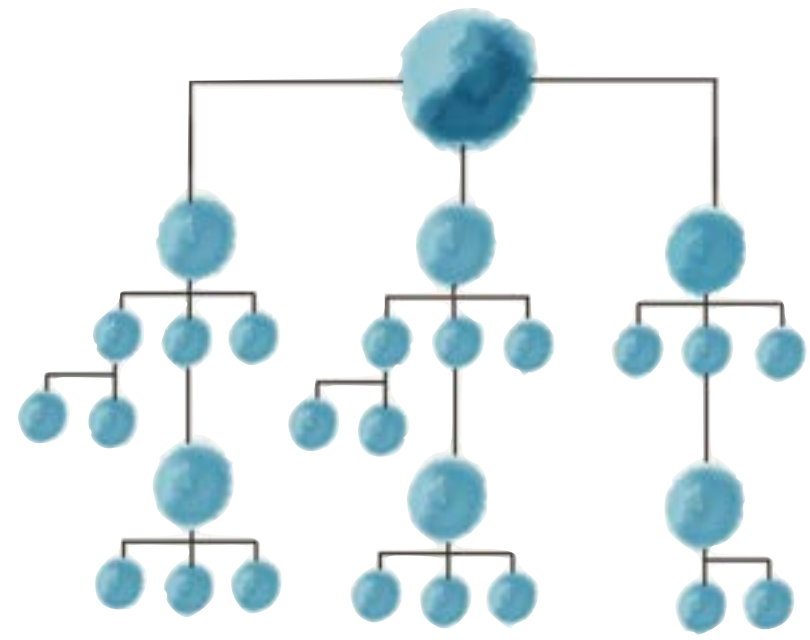
Major conclusion: Additional research into expanding gut microbial richness by dietary diversity is likely to expand concepts in healthy nutrition, stimulate discovery of new diagnostics, and open up novel therapeutic possibilities.

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Keywords Microbiome; Microbiota; Gastrointestinal; Dietary diversity; Agrobiodiversity; Microbiota richness

MM
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METABOLISM

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https://www.planet-wissen.de/natur/landschaften/deutscher_wald/index.html



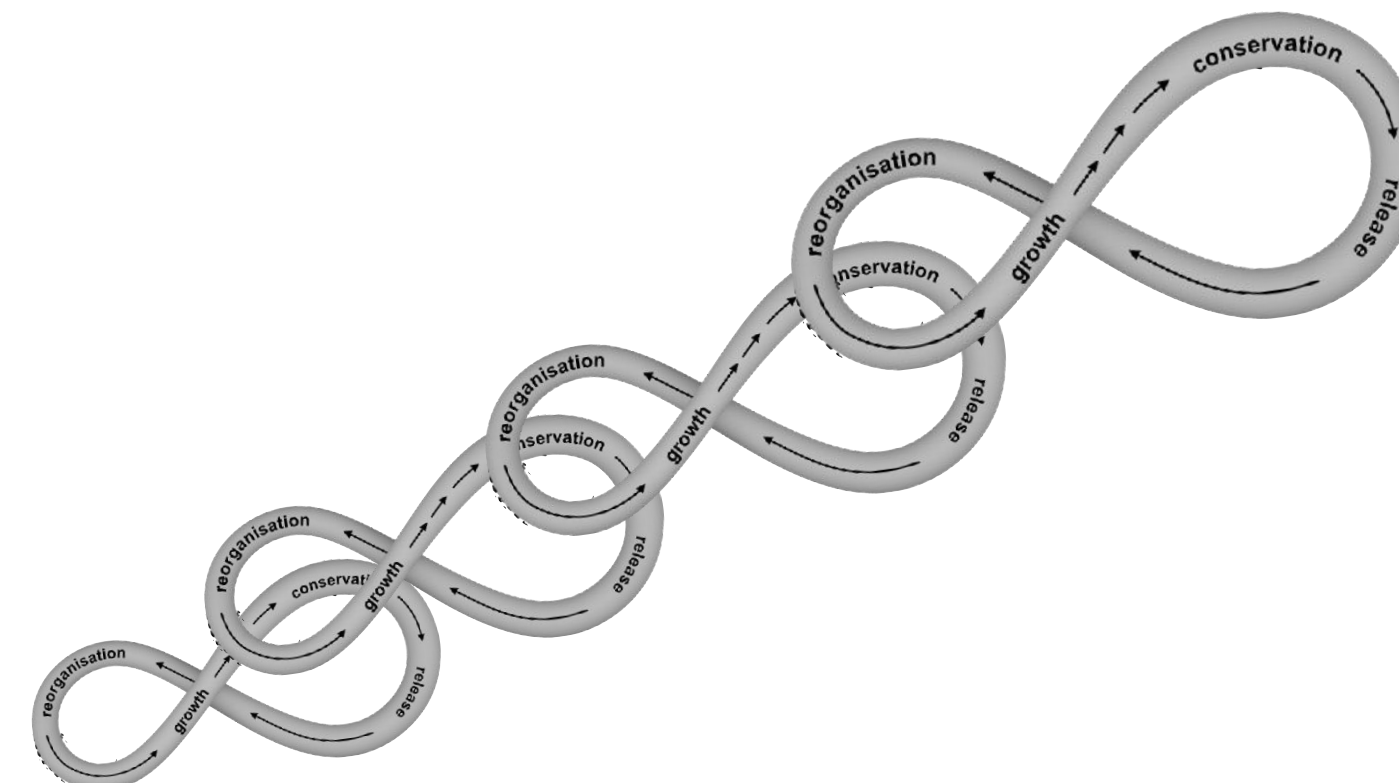
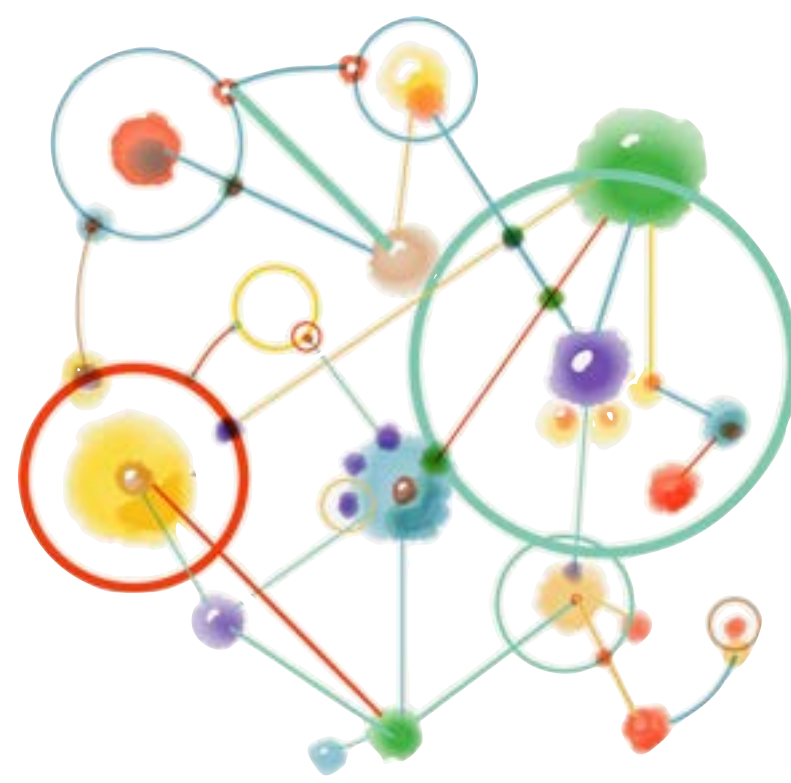
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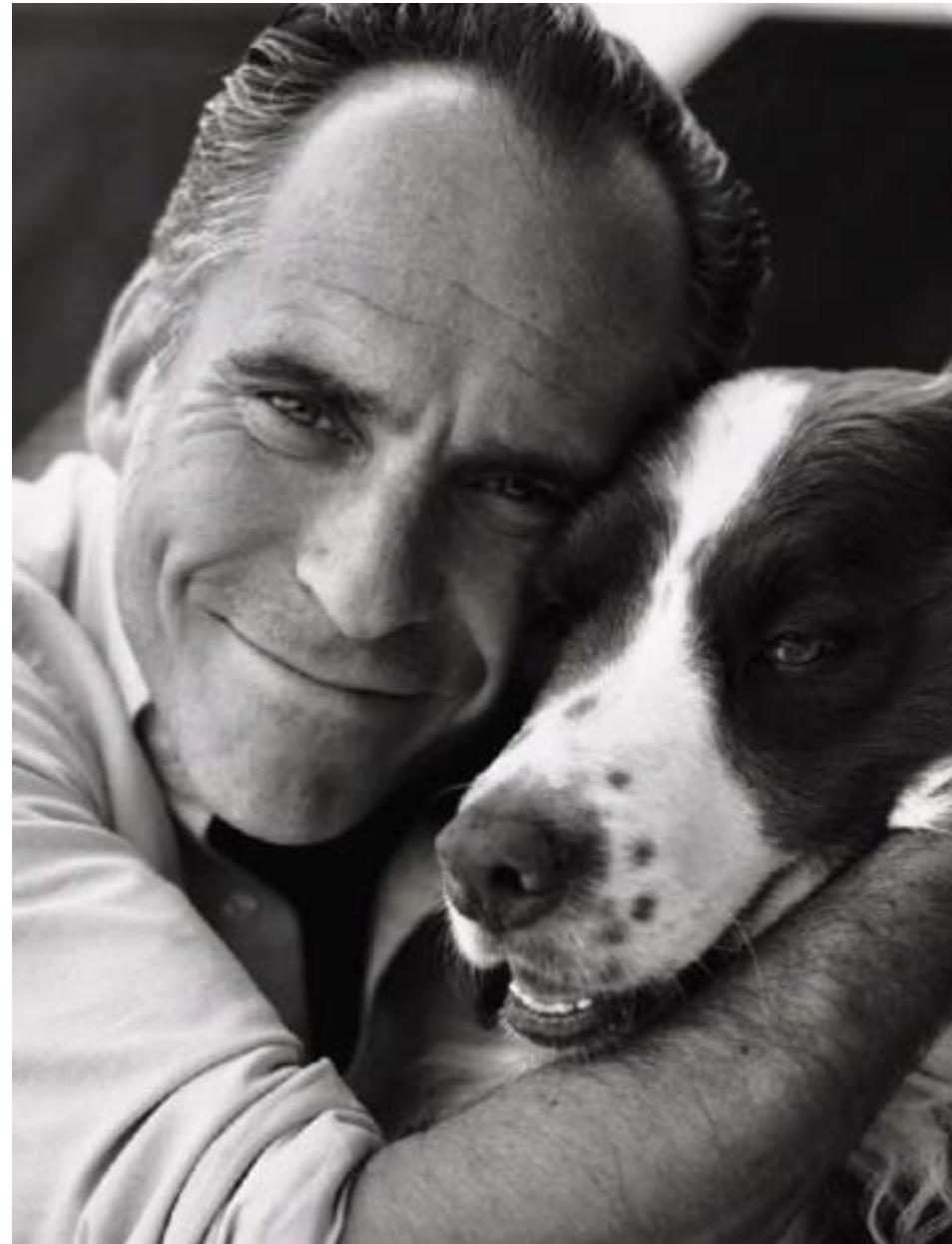
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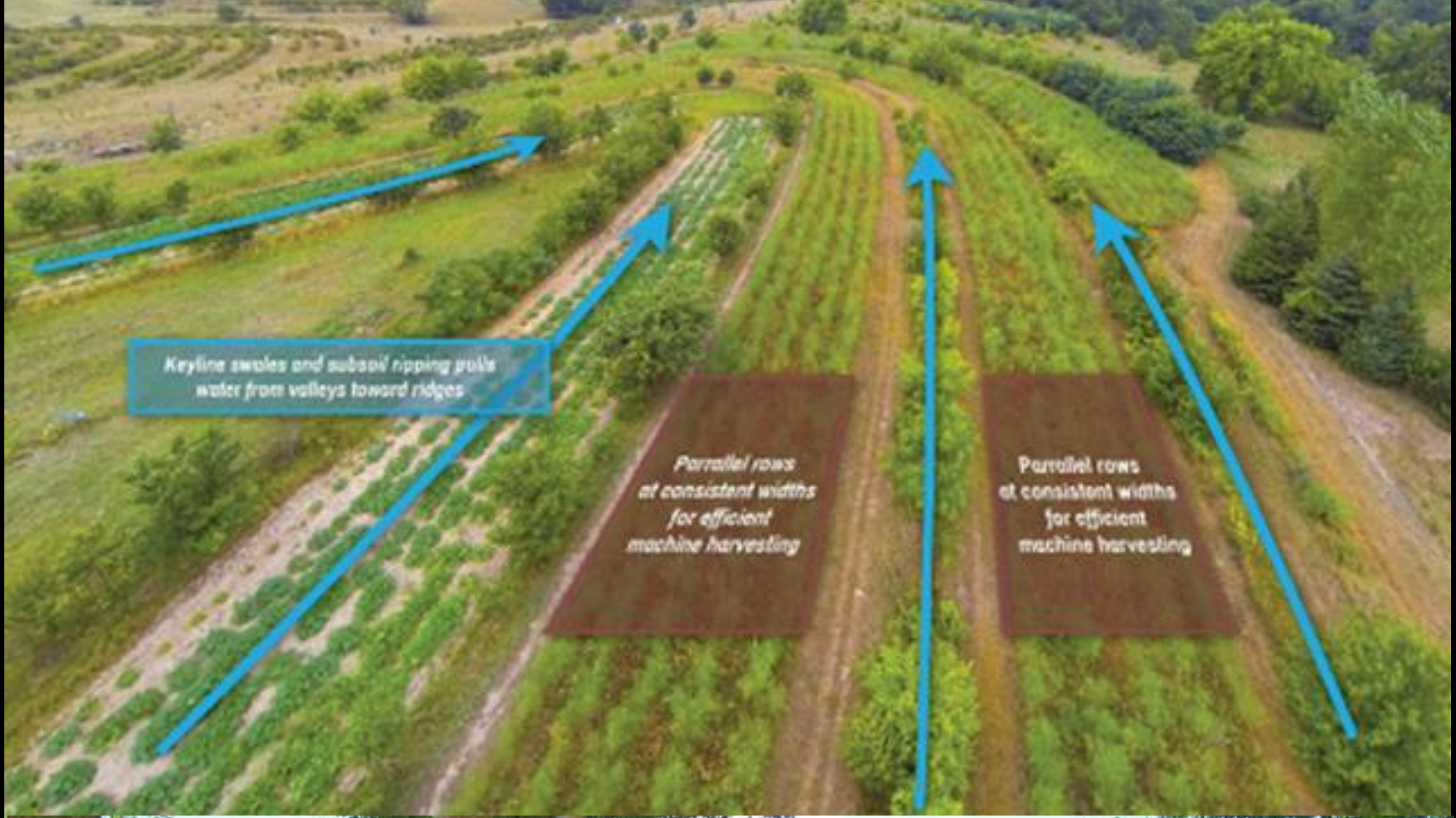
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<https://www.klimaanpassung-wald.de/hintergrund>

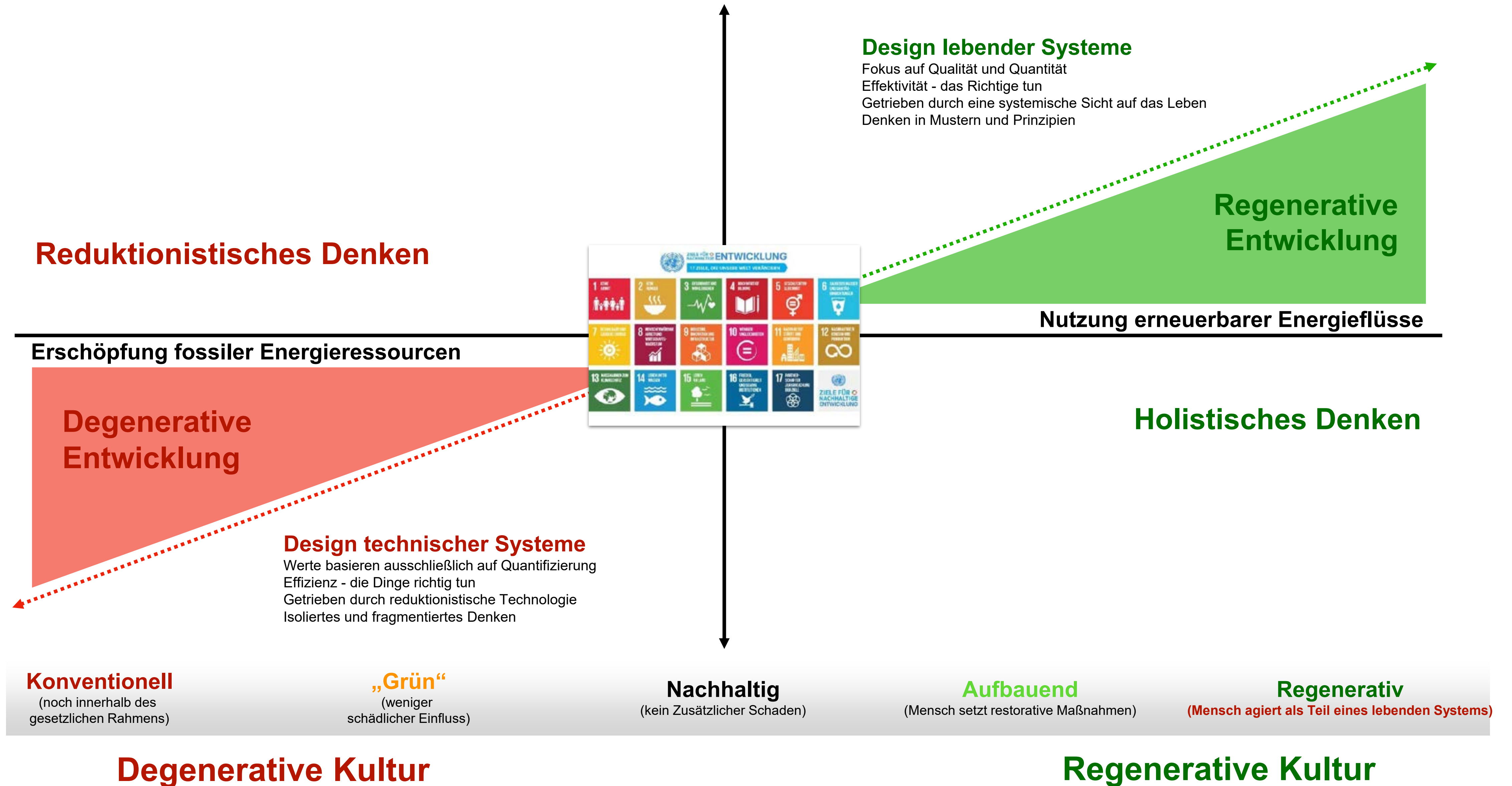


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Regenerativ - Eine Zukunft jenseits von Nachhaltigkeit





Environment

Human connection to nature has declined 60% in 200 years, study finds

Prof Miles Richardson says people risk 'extinction of experience' in the natural world without new policies

Article

Modelling Nature Connectedness Within Environmental Systems: Human-Nature Relationships from 1800 to 2020 and Beyond

Miles Richardson

Received: 3 May 2022

Accepted: 12 January 2023

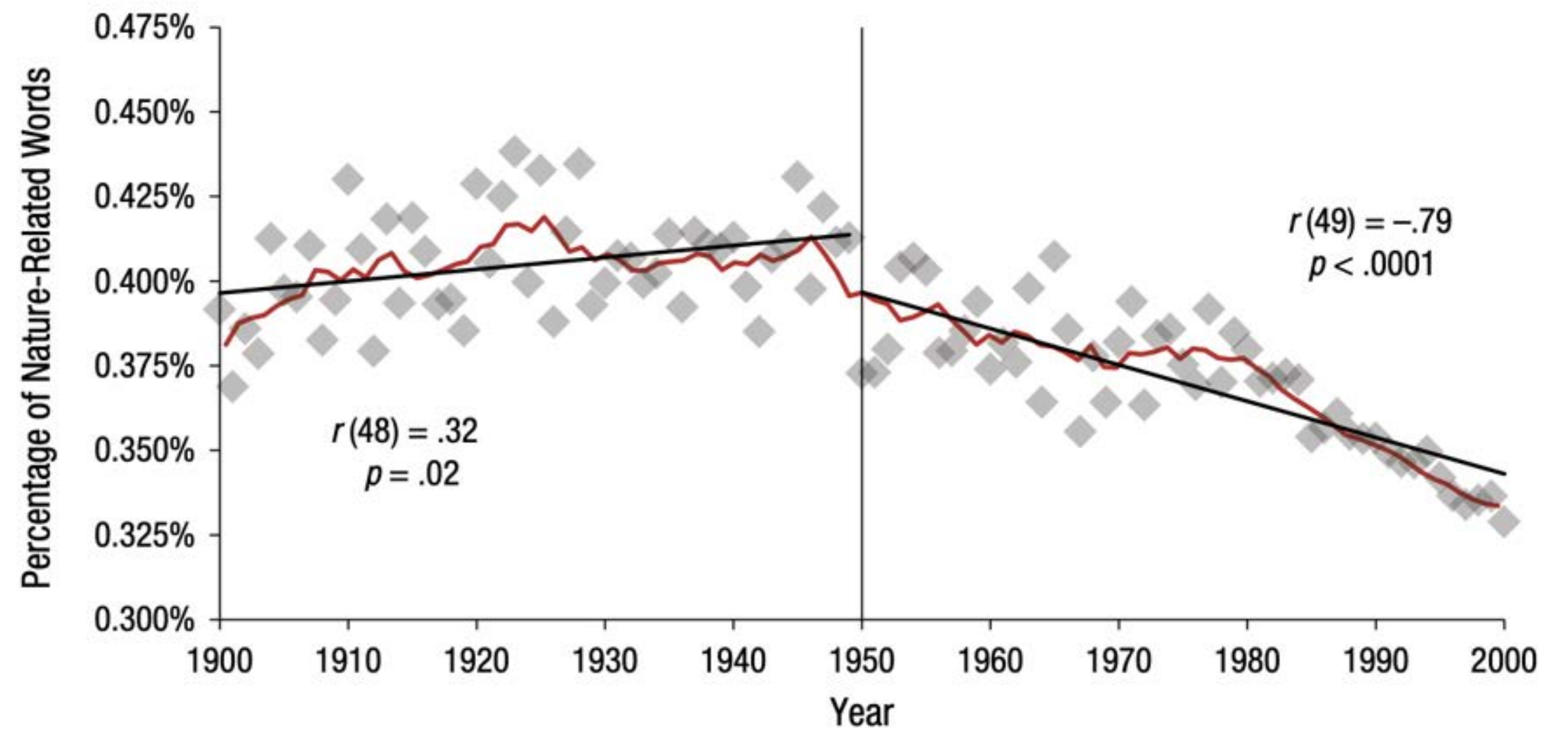
DOI: 10.1002/pan3.10451

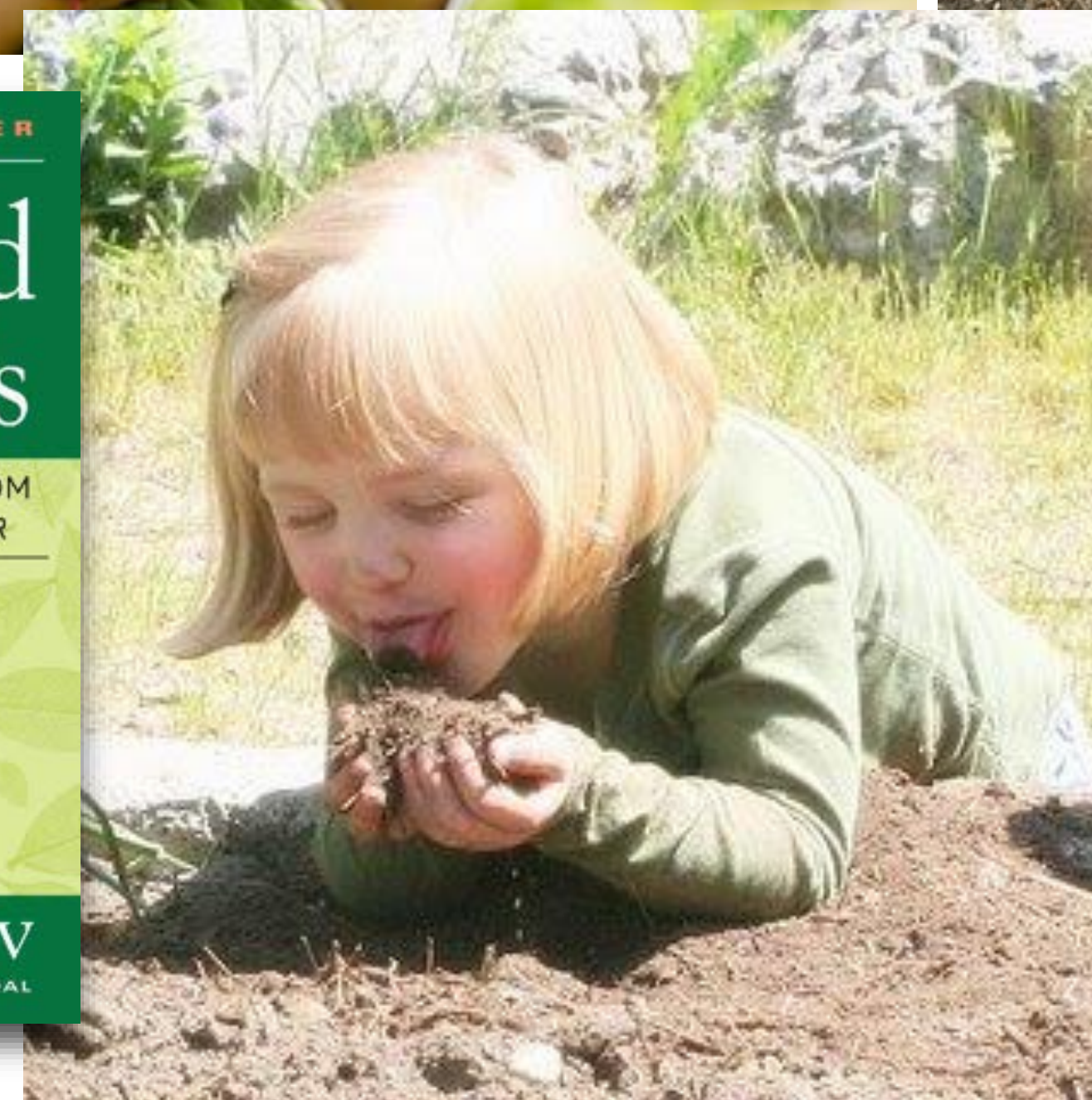
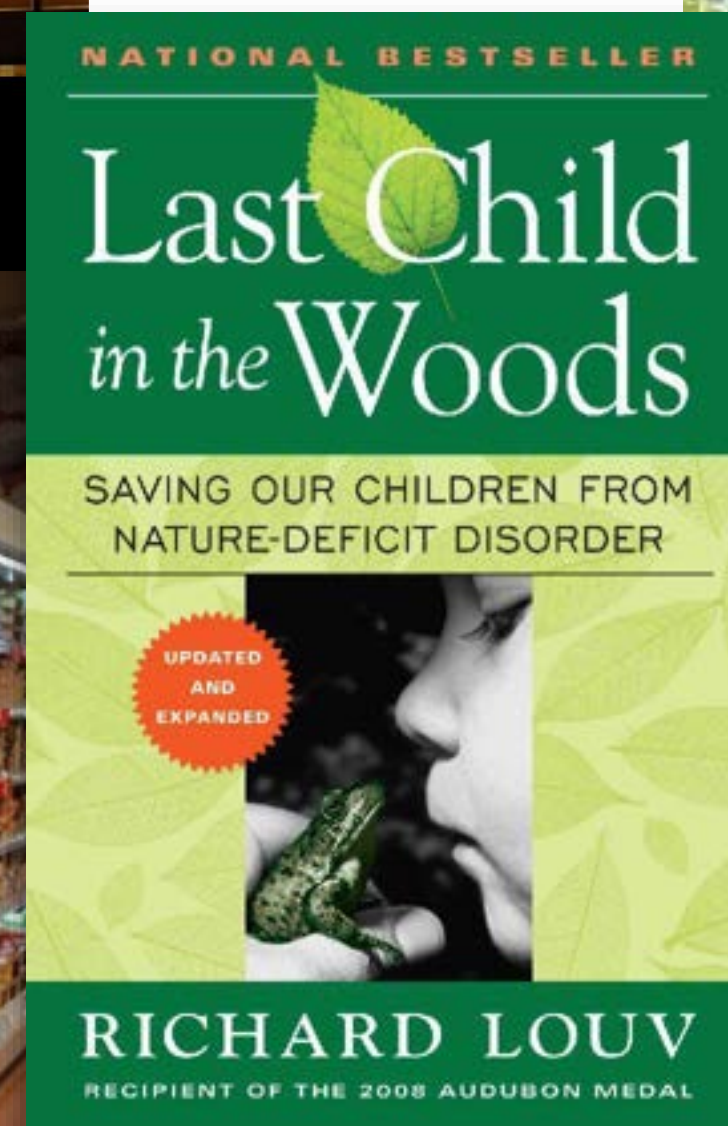
PERSPECTIVE

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SOCIETY

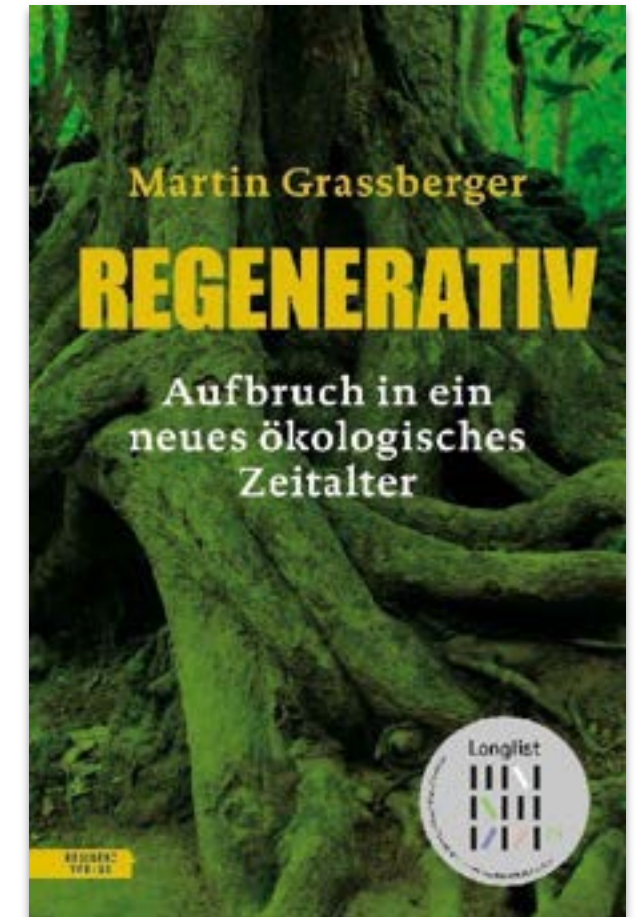
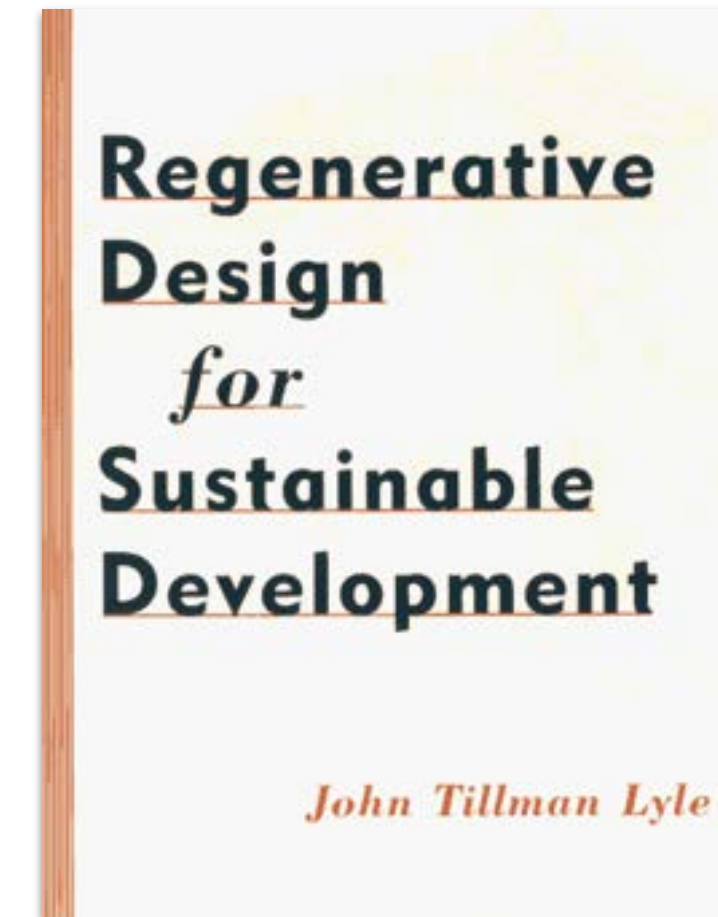
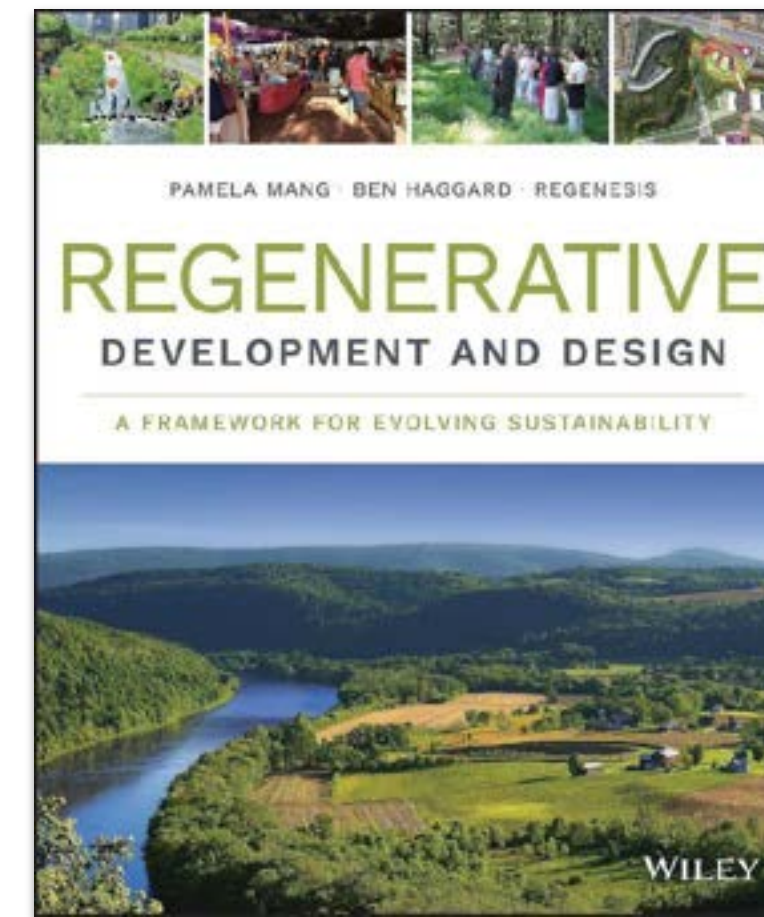
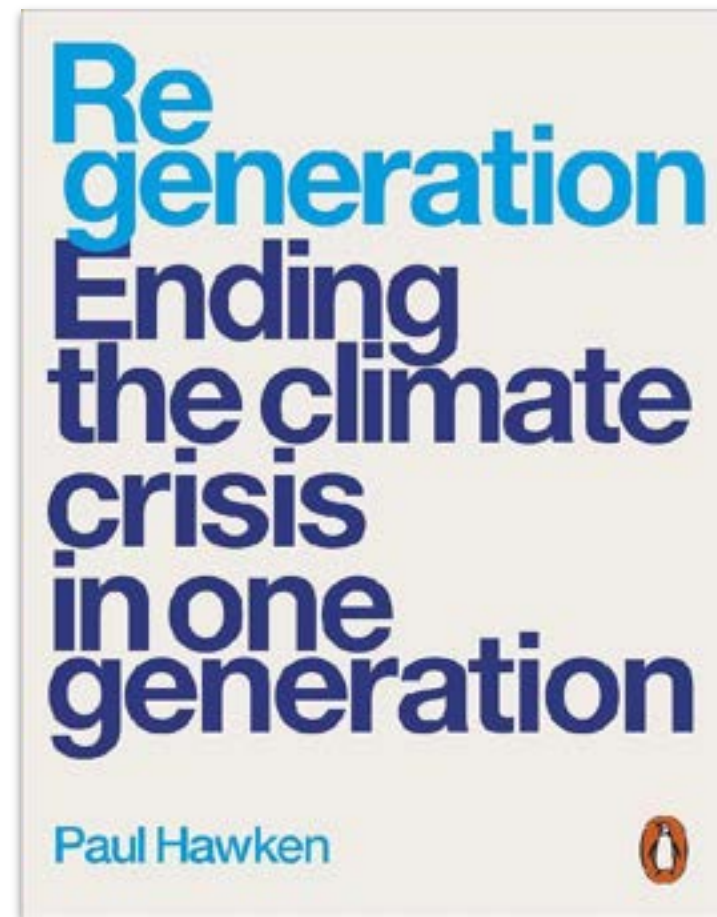
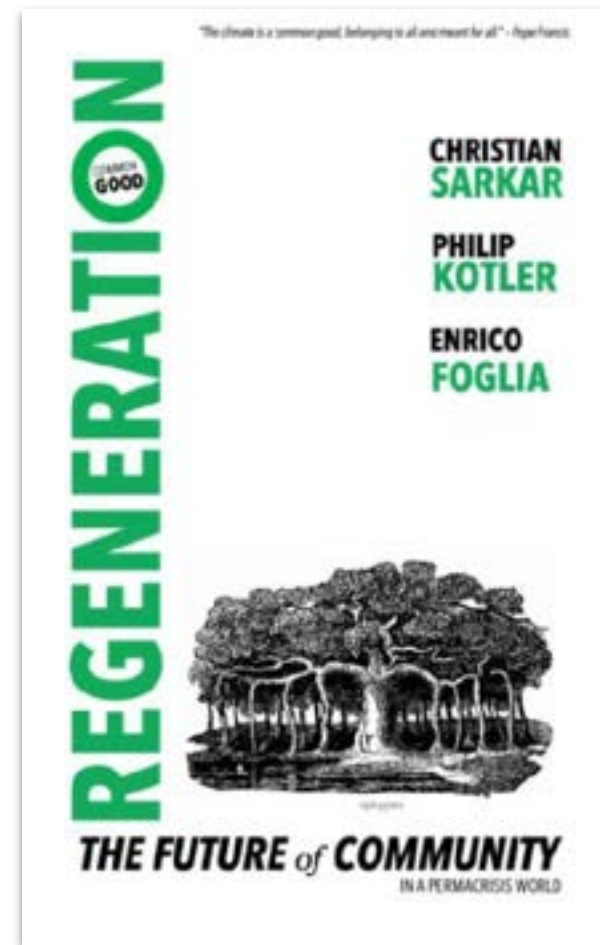
Disconnection from nature: Expanding our understanding of human-nature relations





„Nature-Deficit Disorder“

Re-Generation



„Regeneration bedeutet, das Leben in den Mittelpunkt jeder Handlung und Entscheidung zu stellen. Es gilt für die gesamte Schöpfungen - Wiesen, Bauernhöfe, Menschen, Wälder, Fische, Feuchtgebiete, Küstengebiete und Ozeane - es gilt gleichermaßen für Familien, Gemeinden, Städte, Schulen, Religionen, Kulturen, Handel und Regierungen. (...) **Bei Regeneration geht es nicht nur darum, die Welt wieder zum Leben zu erwecken; es geht darum, jeden von uns wieder zum Leben zu erwecken.“**

– Paul Hawken



MartinGrassberger.com



vergriffen

