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*Adverse events should also be reported to Orion Pharma (UK) Ltd on 01635 520300*

*Prescribing information is available in this meeting.*

# Green Way to Respiratory Health

Prof. Emeritus, Tari Haahtela  
Finland



# Conflicts of interest

- Prof. Haahtela has received lecturing fees from GSK, Orion Pharma, and Sanofi.

# The most influential environmental photograph ever taken!

## ***Earthrise 1968***

is a photo taken from lunar orbit by astronaut *Bill Anders* during the Apollo 8 mission

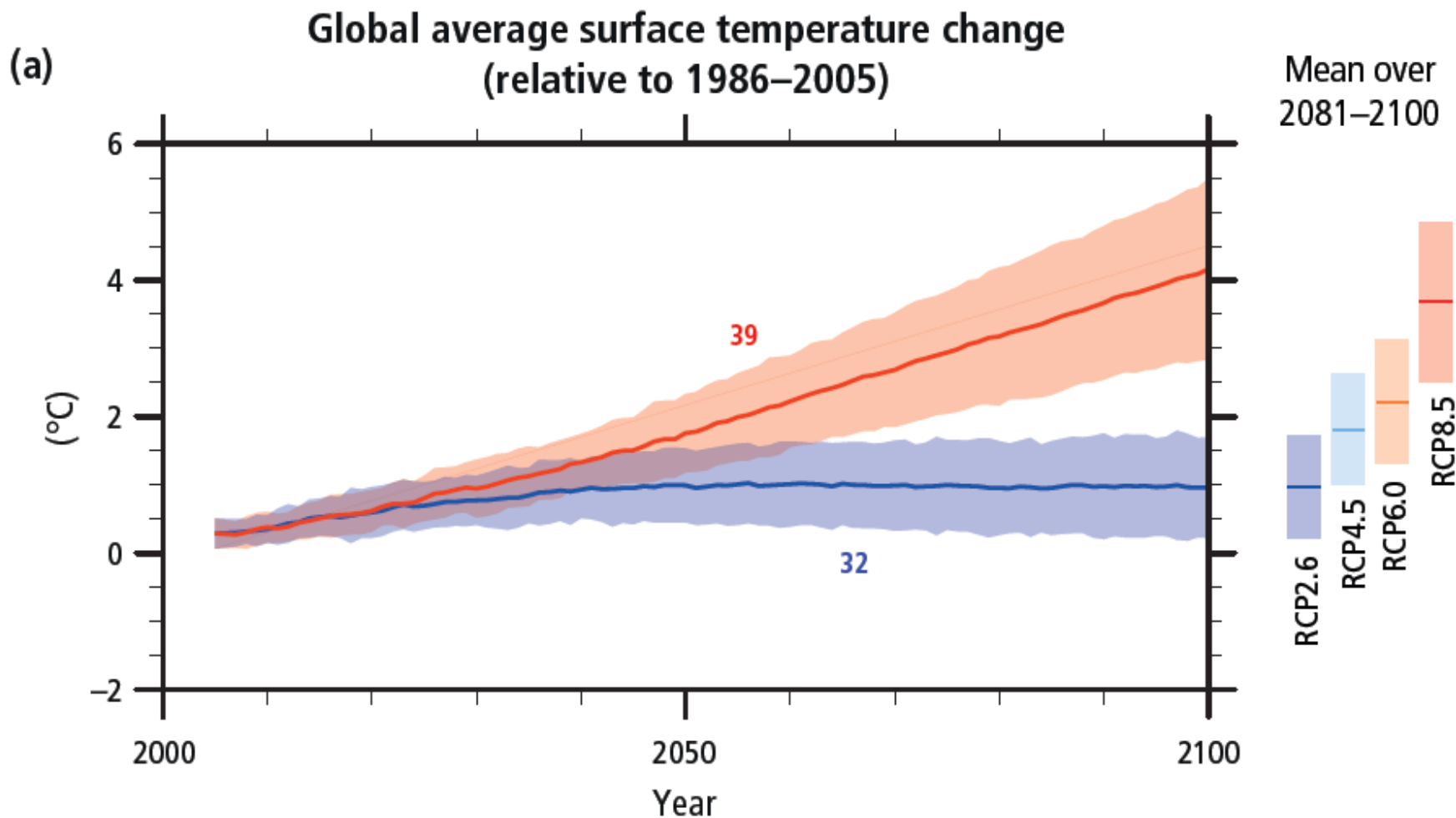


## ***Lancet Commission 2015***

**Planetary Health** is the health of human civilization, and the state of the natural systems on which it depends (Whitmee et al. Lancet 2015).

Lunar orbit

# GLOBAL WARMING: Surface temperature rises over the 21<sup>st</sup> century under all emissions scenarios



# Global warming is a health risk for everyone everywhere



- Drought, floods and heat waves increase
- Hunger and famine increase as food production is destabilised by drought
- Vector-borne diseases like malaria and dengue fever increase with humidity and heat
- Pollution increases and pollen seasons prolong leading to more respiratory and allergic symptoms
- Warmer waters and flooding increase exposure to diseases, in drinking and recreational waters

# Greenhouse gas emissions depend much on our actions!

Annual global greenhouse gas emissions  
in gigatonnes of carbon dioxide-equivalents

150 Gt

100 Gt

50 Gt

0

Greenhouse gas emissions  
up to the present

1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100

No climate policies

4.1 – 4.8 °C

→ expected emissions in a baseline scenario  
if countries had not implemented climate  
reduction policies.

Current policies

2.7 – 3.1 °C

→ emissions with current climate policies in  
place result in warming of 2.7 to 3.1°C by 2100.

Pledges & targets (2.4 °C)

→ emissions if all countries delivered on reduction  
pledges result in warming of 2.4°C by 2100.

2°C pathways

1.5°C pathways

Data source: Climate Action Tracker (based on national policies and pledges as of May 2021).  
OurWorldinData.org – Research and data to make progress against the world’s largest problems.

Last updated: July 2021.  
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**Paris Agreement 2015:** to limit global warming below 2 degrees Celsius, compared to pre-industrial levels

# BIODIVERSITY

## Fundamental to human life on Earth

- ▶ Variety of life on Earth. It includes the **genes** found in all living things, as well as, all **species** and the **ecosystems** these species comprise (1992).



# Sixth mass extinction

Human activity has accelerated the rate of natural extinction of species 100-1000 times

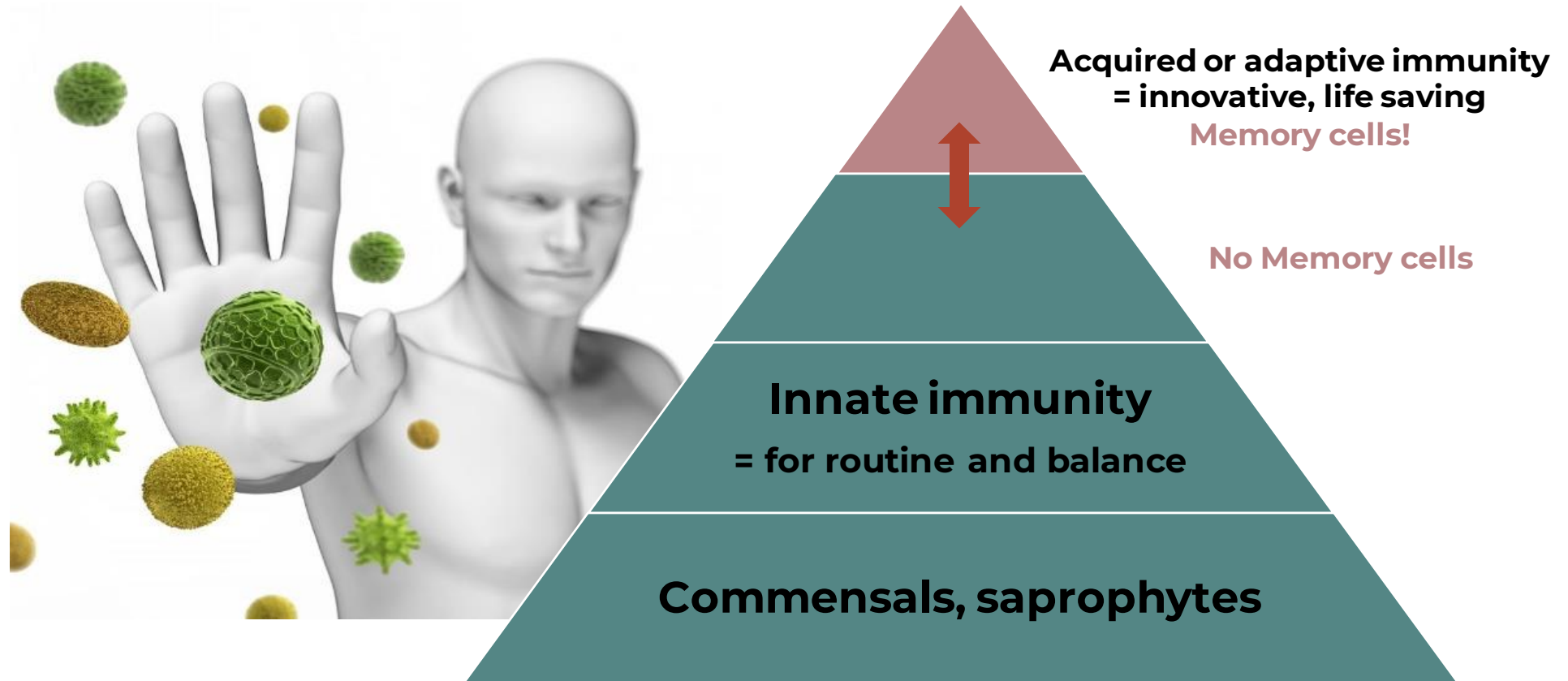
**Biodiversity (nature) loss concerns the macroworld – but also the microworld in and on us!**

Chivian E, Bernstein A. How our health depends on biodiversity. Center for health and the global environment. Harvard Medical School 2010.



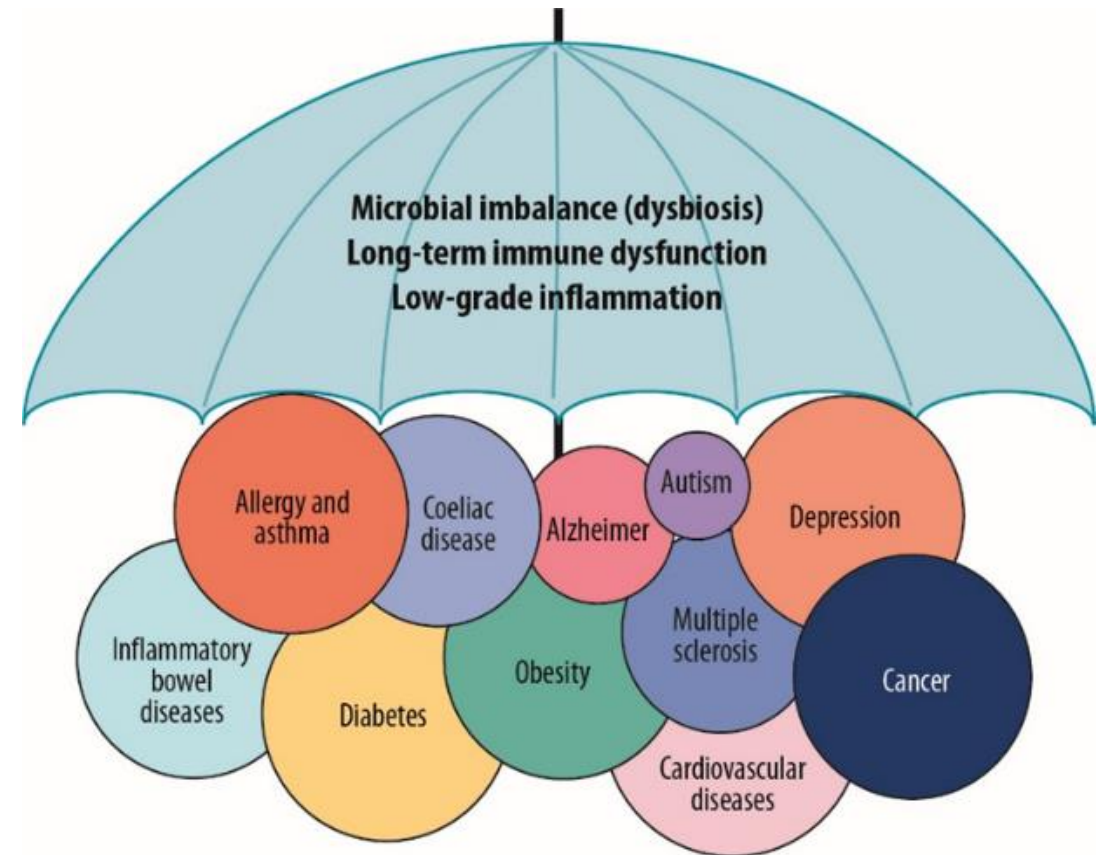
# Human body is an **ecosystem**: immune defence is a response to **biodiverse environment**

Biodiverse signals guide to differ danger from non-danger, and self from non-self



# Non-Communicable Diseases (NCDs) are on the rise in all urbanizing societies

- NCDs share common features
- We are losing protective factors
- Biodiversity hypothesis:  
contact with natural environments enriches the microbiome, promotes immune balance and protects from allergy and inflammatory disorders



Tiuruniemi Sanatorium, South Karelia, Finland



Breathing fresh air for lung health:



Davos Waldsanatorium, Switzerland



# POORLY KNOWN!

The effect of biogenic chemicals  
More than 1000 Volatile Organic compounds, VOCs!

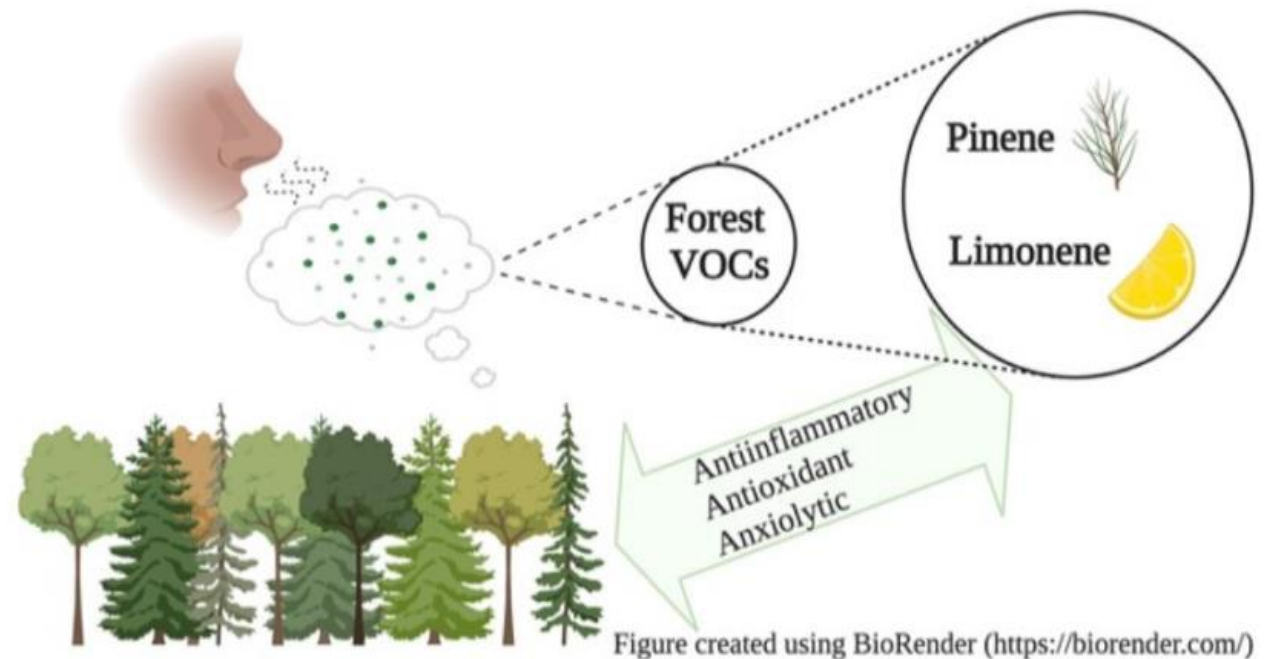
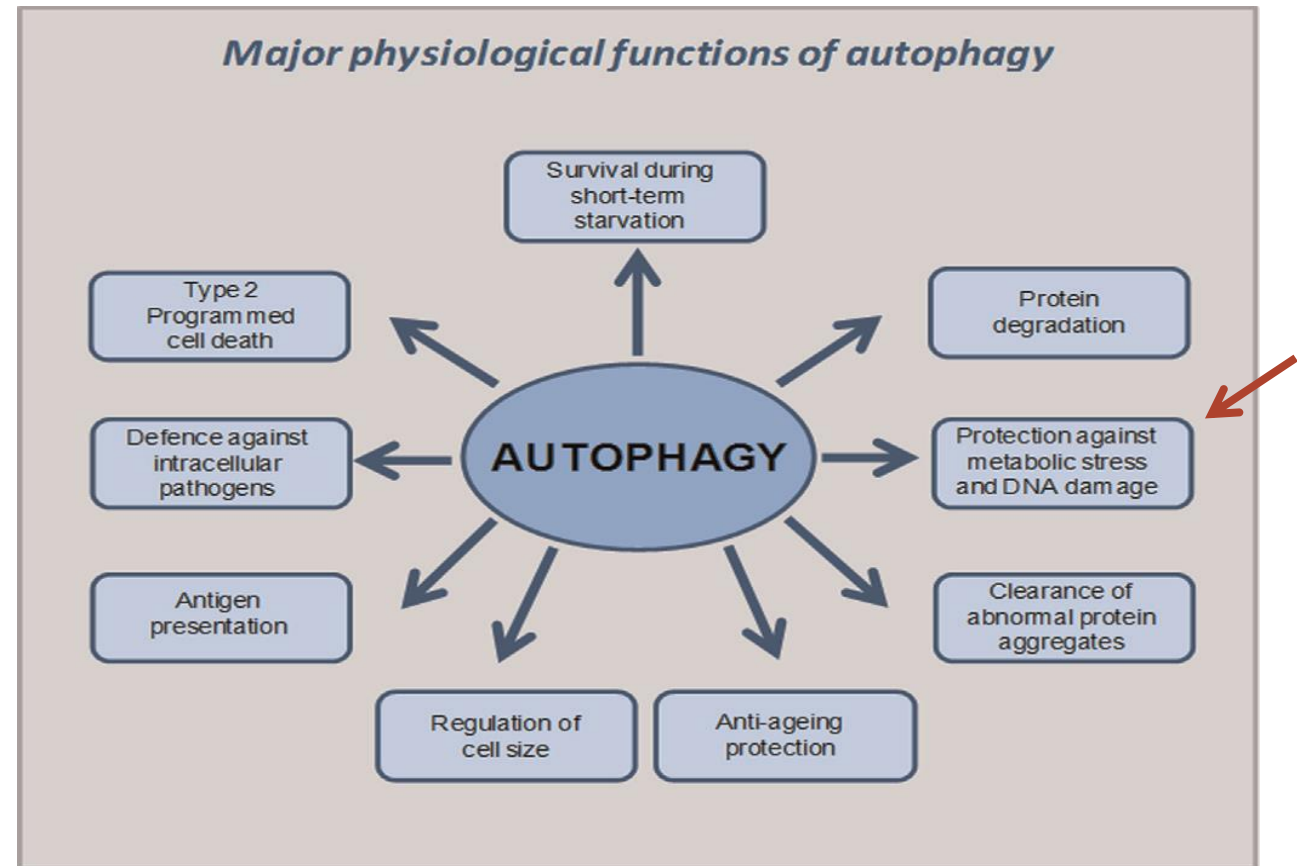


Figure created using BioRender (<https://biorender.com/>)

# In 2016, Yoshinori Ohsumi won Nobel Prize in medicine for work on autophagy

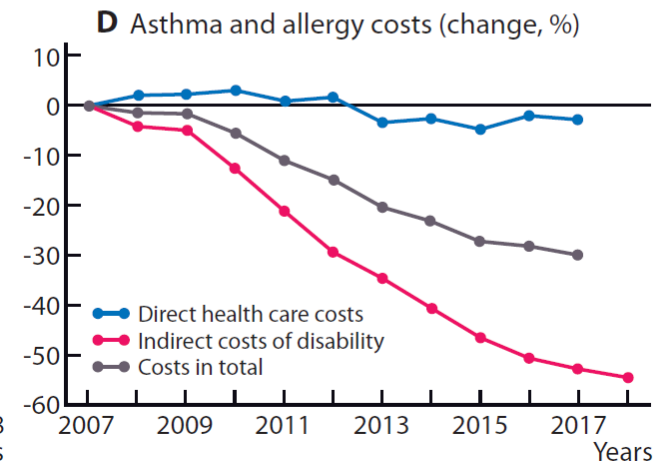
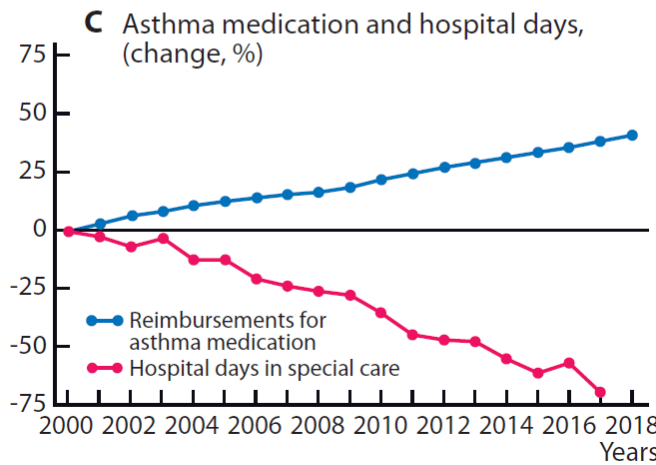
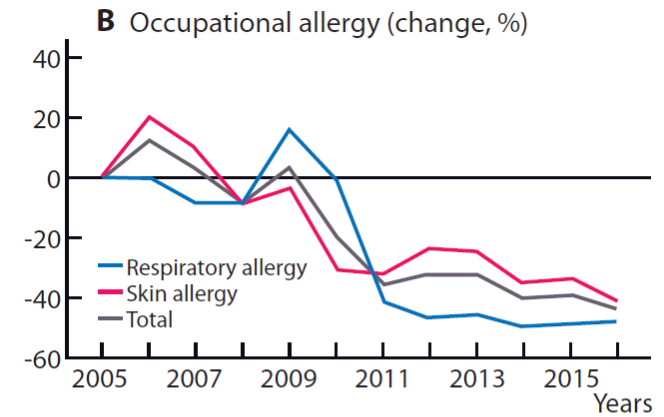
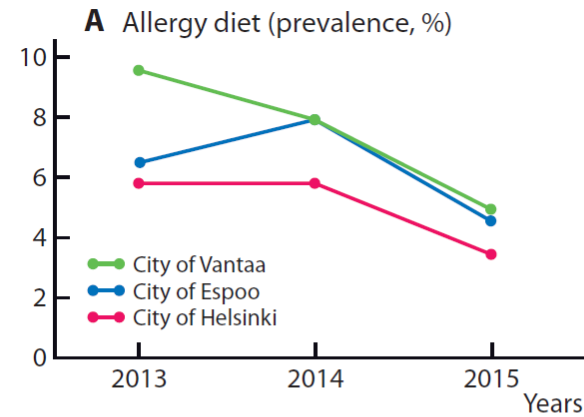
**Autophagy = degradation and recycling of cellular components**

**In natural environment  
we breathe airborne  
biogenic chemicals with  
protective cellular  
functions**





**The Finnish Allergy Programme (2008-2018) reduced the burden of allergy & asthma, both to society and patients**



# Good News!

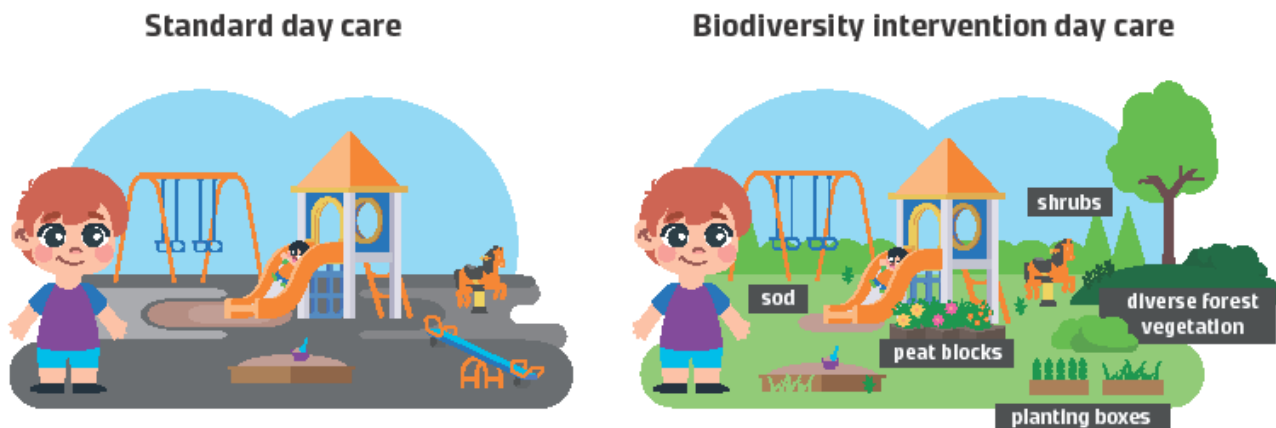
Only in 4 weeks *Gammaproteobacterial* diversity increased and immune response changed

SCIENCE ADVANCES | RESEARCH ARTICLE

ENVIRONMENTAL STUDIES

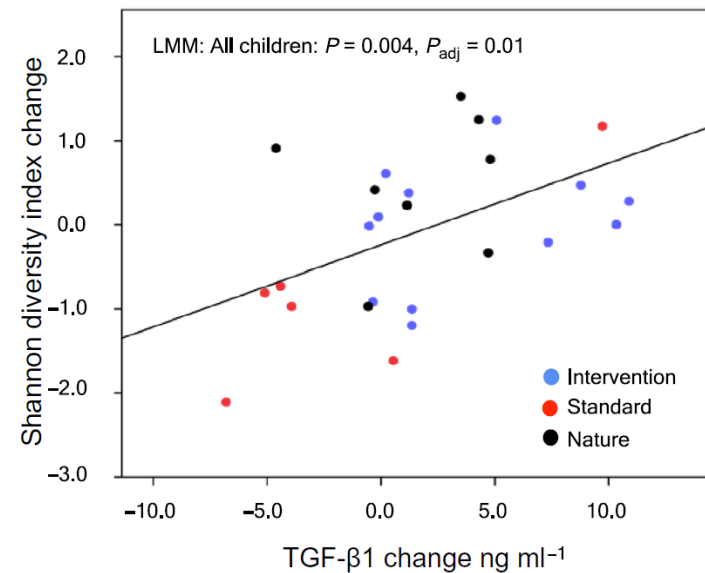
## Biodiversity intervention enhances immune regulation and health-associated commensal microbiota among daycare children

Marja I. Roslund<sup>1</sup>, Riikka Puhakka<sup>1</sup>, Mira Grönroos<sup>1</sup>, Noora Nurminen<sup>2</sup>, Sami Oikarinen<sup>2</sup>, Ahmad M. Gazali<sup>3\*</sup>, Ondřej Cinek<sup>4</sup>, Lenka Kramná<sup>4</sup>, Nathan Siter<sup>5</sup>, Heli K. Vari<sup>1</sup>, Laura Soininen<sup>1</sup>, Anirudra Parajuli<sup>1</sup>, Juho Rajaniemi<sup>5</sup>, Tuure Kinnunen<sup>3,6</sup>, Olli H. Laitinen<sup>2</sup>, Heikki Hyöty<sup>2</sup>, Aki Sinkkonen<sup>1,7†</sup>, ADELE research group<sup>‡</sup>



4 week controlled intervention in daycare, children 3-5 years of age

**A** Change in skin Gammaproteobacterial diversity vs. TGF- $\beta$ 1 change





# City of Lahti – European Green Capital 2021

## NATURAL STEP TO HEALTH

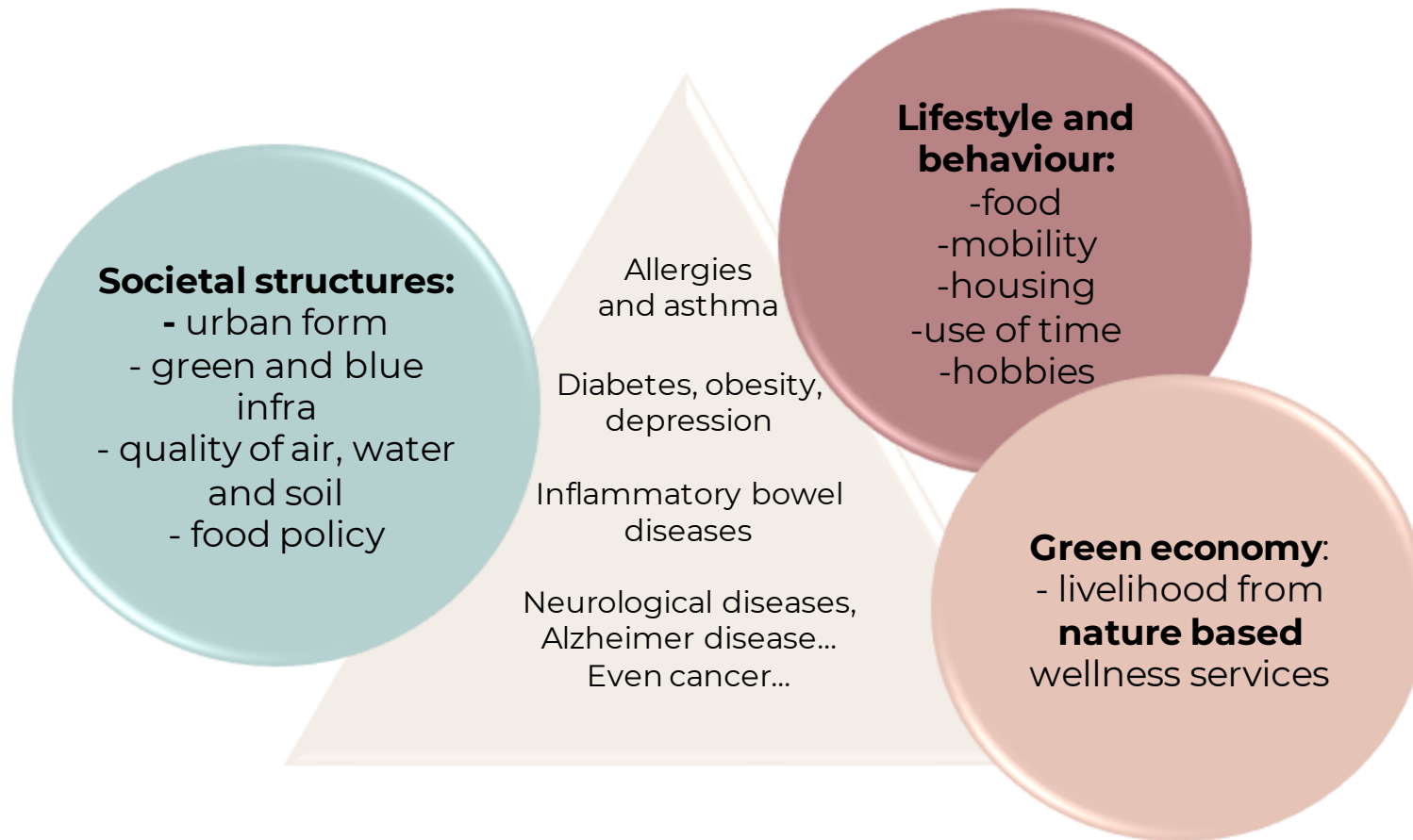
### Lahti Regional Health and Environment Programme 2022-2023

1. Improve public health (e.g. asthma, diabetes, obesity, depression)
2. Stop nature loss
3. Mitigate climate warming
4. Combine health and environmental sciences for education, research and communication
5. Make the change economically sustainable





# “No go back to nature but nature back to everyday life!”





# Respiratory Health and Planetary Health must go together

