



## **Soil and the human intestine microbiome**

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Soil is one of the most diverse habitats on earth. Soil and the human gut contain approximately the same amount of active microorganisms, however, human gut microbiome diversity is only 10% of the soil biodiversity and has decreased with modern life-style. On the basis of recent findings in medical as well as soil sciences we track relationships between soil microbiome and human intestinal microbiome. We develop a novel altered environmental microbiome hypothesis, which implies that a close linkage between soil and the human intestinal microbiome has developed during evolution and is still developing. From hunter-gatherers to an urbanized society the human gut has lost alpha-diversity. Interestingly beta-diversity has increased, meaning that people in urban areas have more distinguished individual microbiomes. On top of little contact with soil and feces, hygienic measures, antibiotic medication and a low fibre diet of processed food have led to a loss of beneficial microbes. At the same time, loss of soil biodiversity is observed in many rural areas. Increasing use of agrochemicals, low plant-biodiversity and rigorous soil management practices have negative feedbacks on biodiversity of crop epiphytes and endophytes. These developments concur with a boost of lifestyle diseases related to the human microbiome. We point out the fractures in the microbial cycle of urban human environments versus pre-industrial rural environments. In order to mend these fractures it may be useful to adopt a different perspective and consider the human intestinal microbiome as well as the soil/root microbiome as “superorganisms” which by close contact replenish each other with inoculants, genes and growth-sustaining molecules.