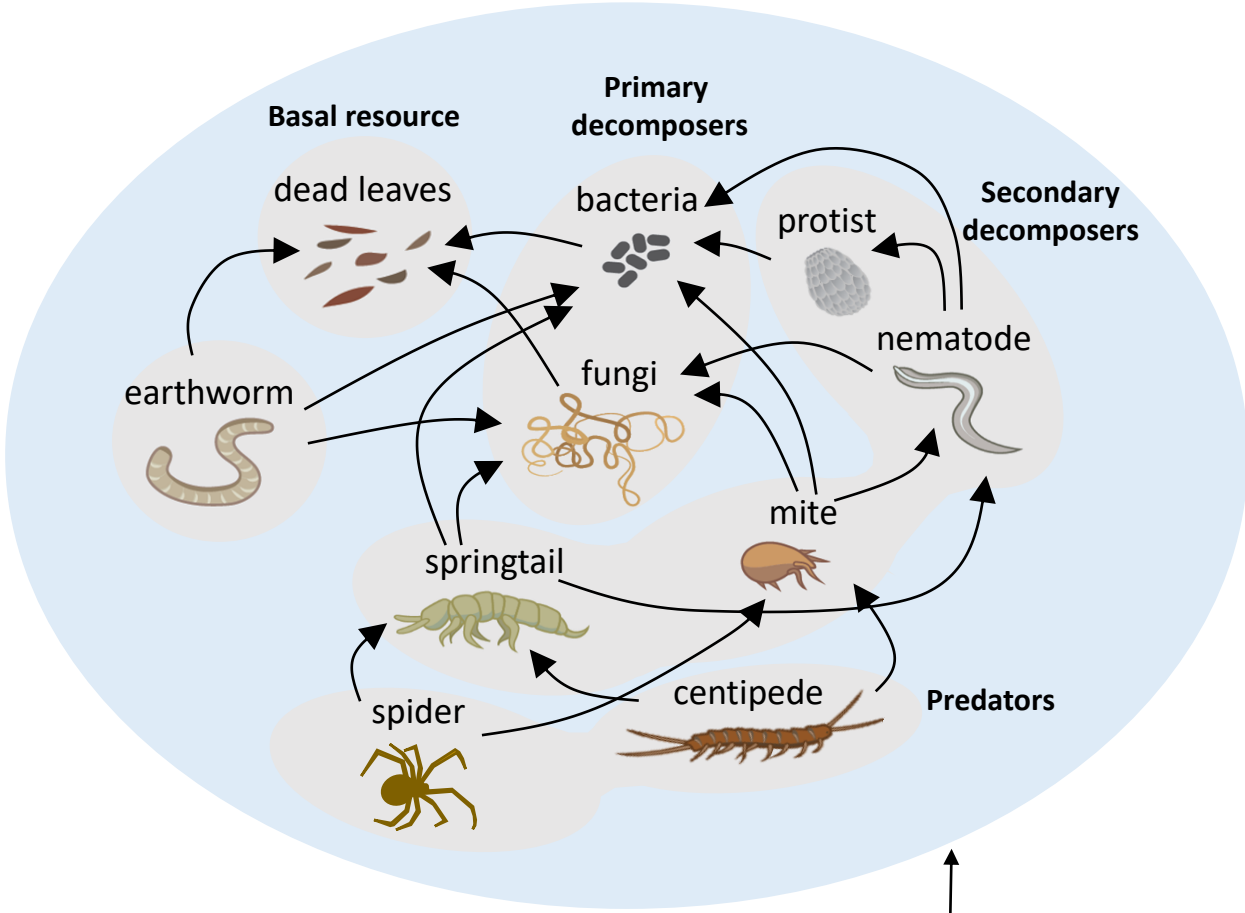
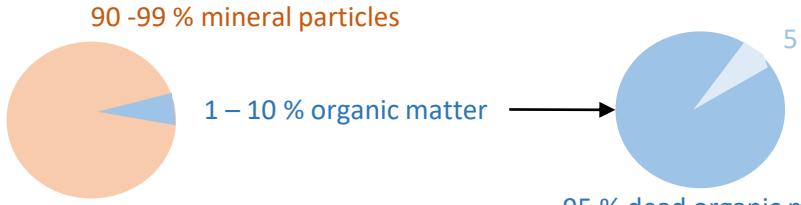
Into the soil labyrinth: soil physical structure as a driver of trophic interactions and soil biodiversity

Amandine Erktan[1], Dani Or[2], Stefan Scheu[1,3]

[1]J.F. Blumenbach Institute of Zoology and Anthropology, University of Göttingen, Germany
[2]ETHZ, Zürich, Switzerland
[3]Centre of Biodiversity and Sustainable Land Use, University of Göttingen, Germany

- Soil food webs play a crucial role in determining soil biodiversity, through bottom-up and top-down controls.
- Advances in the description of soil food webs are not yet matched by ecological theory that link primary drivers of trophic interactions taking place at the microscale.
- Hypothesis: Restrictions imposed on soil organisms' ability to sense and access food resources/prey by soil physical structure essentially shape trophic interactions in soil, while affecting soil biodiversity.
- Main goal: Reviewing mechanisms underlying the effect of soil physical structure on soil food webs. We mainly focus on soil organisms with limited ability to form pores themselves, notably protists, nematodes and microarthropods.





Proportions of soil mineral and organic materials

Scheme adapted from Basile-Doelsch et al. (2020)
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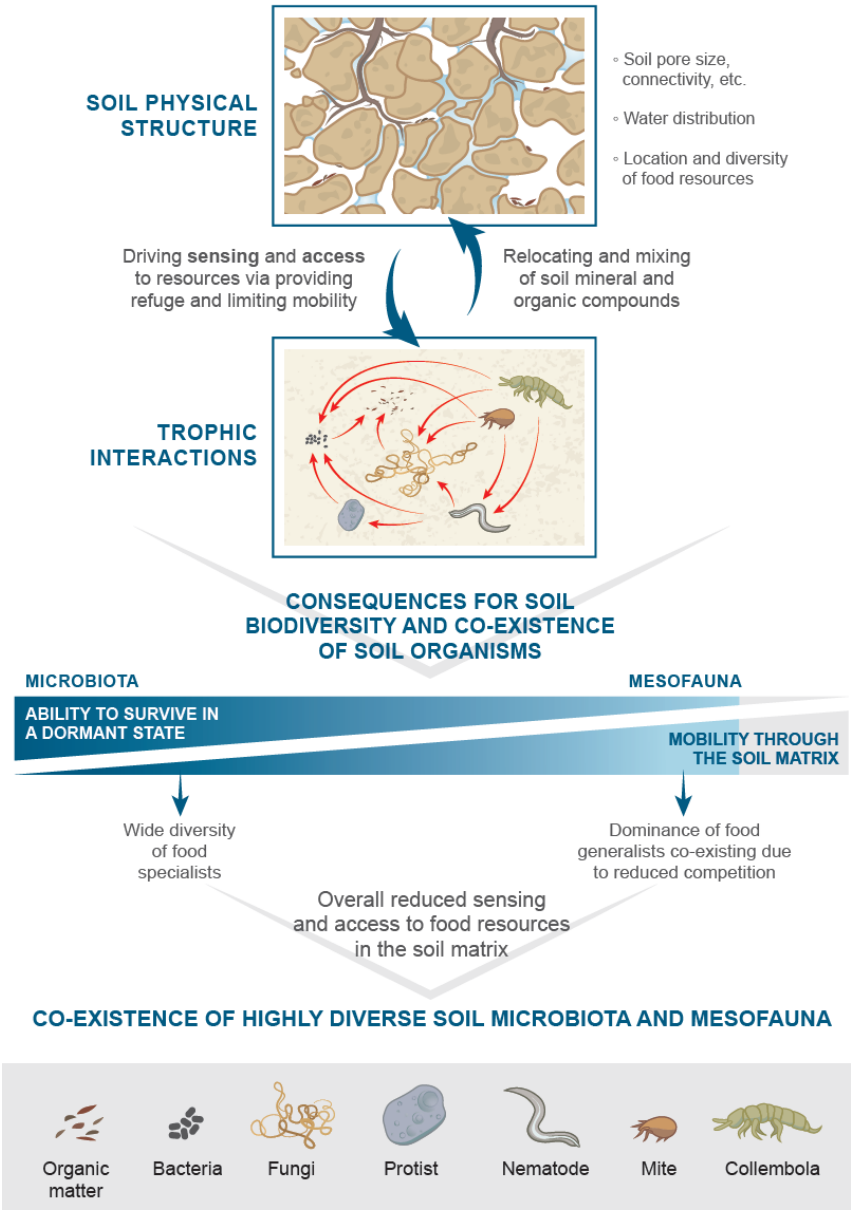
Main results

Soil physical structure influences trophic interactions by e.g.:

1. Limiting sensing of food sources (via restricting the transport of volatiles through soil pores)
2. Restricting the overall mobility of organisms and the accessibility of resources / prey in small pores

- These restrictions promote soil biodiversity and select for specific adaptations for feeding in the dark soil labyrinth while allowing survival of weak competitors by reducing the strength of biotic interactions.
- Quantitative incorporation of effects of physical structure on trophic interactions requires interdisciplinary efforts for merging food web ecology and soil physics.
- For details see: Erktan, Or and Scheu, 2020, The physical structure of soil: determinant and consequence of trophic interactions (in revision). Soil Biology and Biochemistry.



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