Description of bacterial community inhabiting deadwood of different age in natural temperate forests

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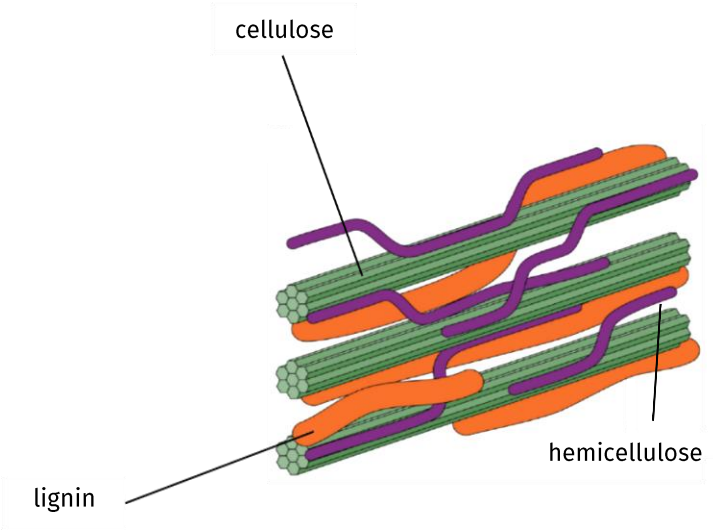
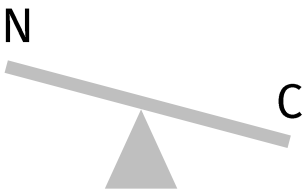
MBÚ

Habitat of deadwood

- Recalcitrant plant polymers

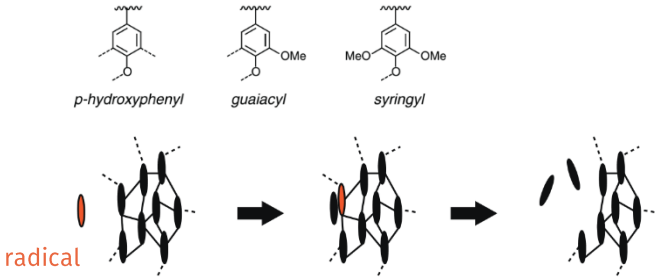


- High C:N ratio



- Presence of fungi

  and extracellular enzymes



(adapted from Xie et al. (2007), Brown et al. (2014), Rytioja et al. (2014)

Natural forest experiment

MIDDLE-EUROPIAN NATURAL FOREST

- Zofin Natural Reserve
- *Abies alba* × *Fagus sylvatica* × *Picea abies*
- Comprehensive historical deadwood database

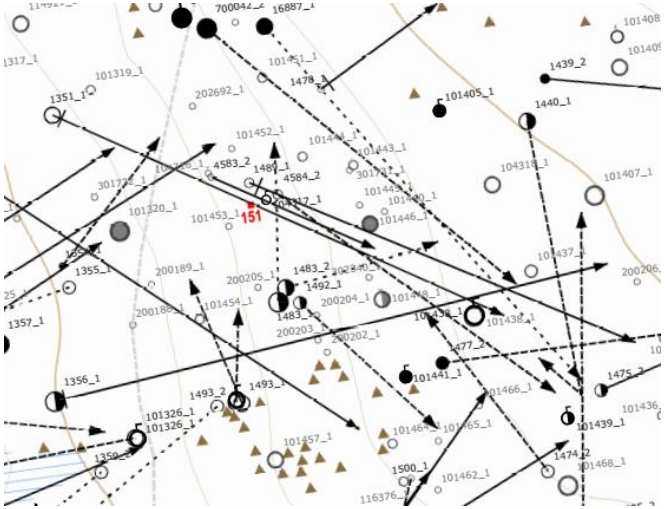
Age classes (years):

> 38

38-16

16-5

< 5



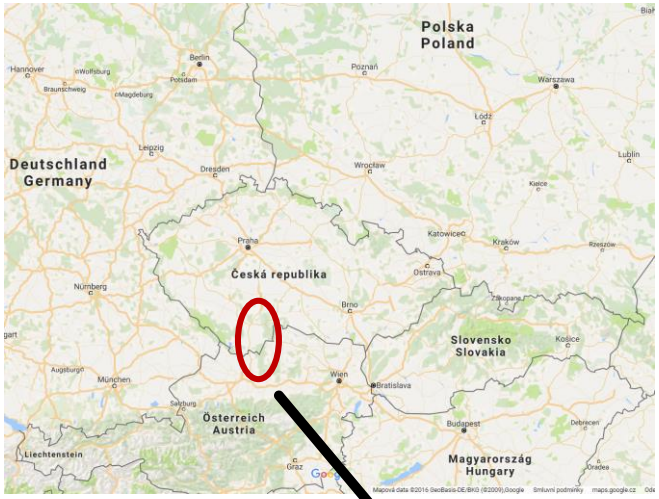
Hypotheses

- experiment Zofin -

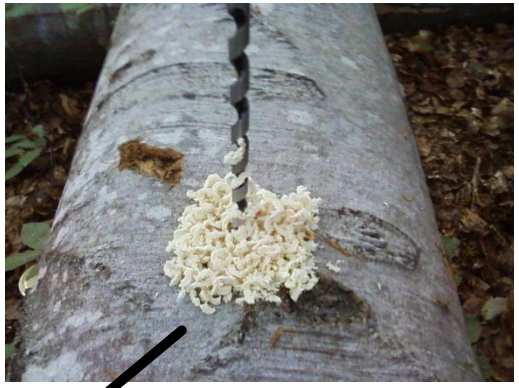
- Microbial community is driven more by log age than tree species.
- Bacterial community is generalistic and is not specific for deadwood type.
- Bacteria are not primary wood decomposers and rather posses metabolic pathways based on comensalism, cheating or mycophagy.
- Metabolic tricks like N-fixation, degradation of oxalic acid or glycerol can be traced in members of bacterial community.

Methods

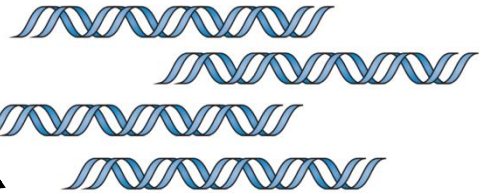
- experiment Zofin -

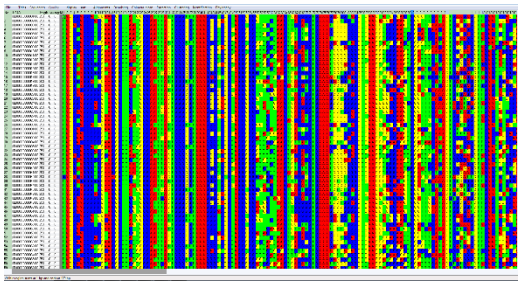


sample obtaining

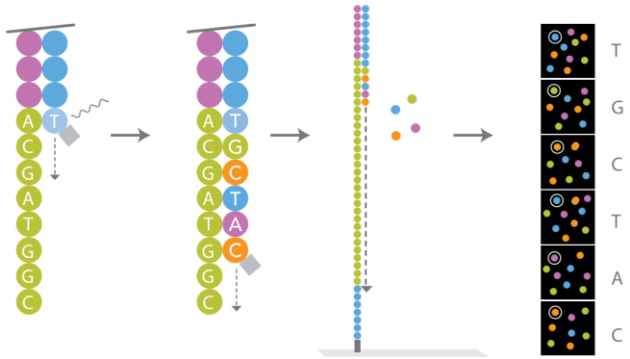


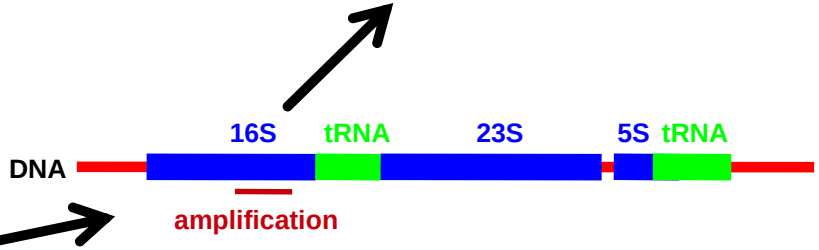
eDNA isolation





16S rRNA sequencing
and analysis

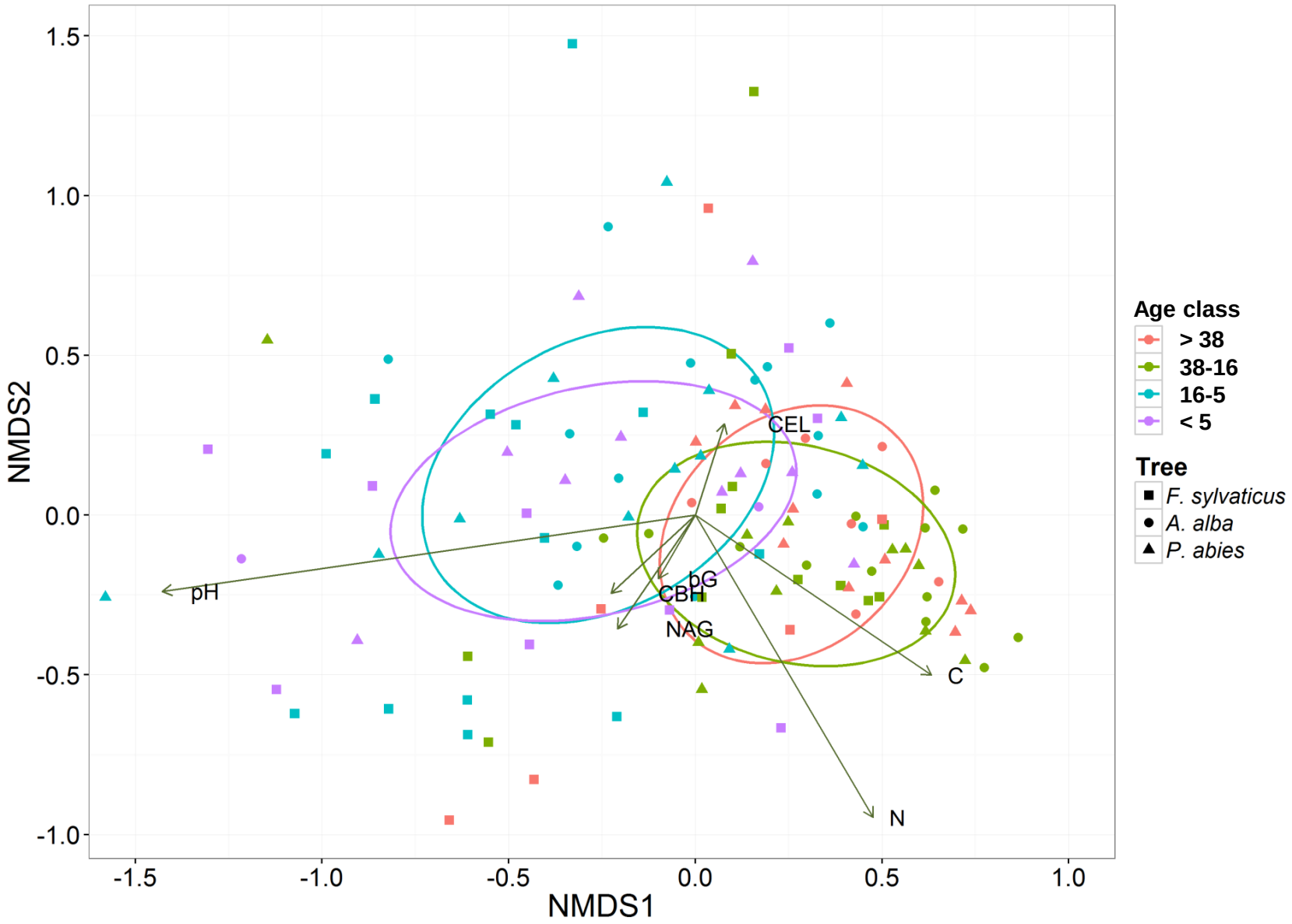




(adapted from: Prosser (2015)

Bacteria during wood decay

- experiment Zofin -



Explained variability in composition

- experiment Zofin -

RDA analysis

Factor	Adj. R^2
Year	**0.014**
Tree	**0.007**
pH	**0.023**
N	**0.010**
C	0.003
All	**0.163**

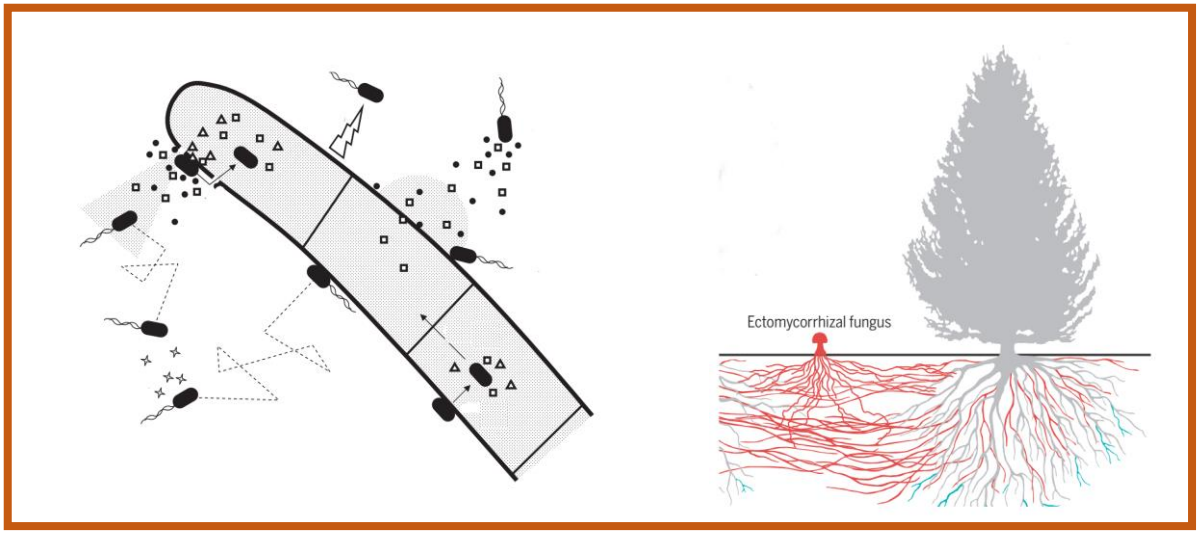
Members of community

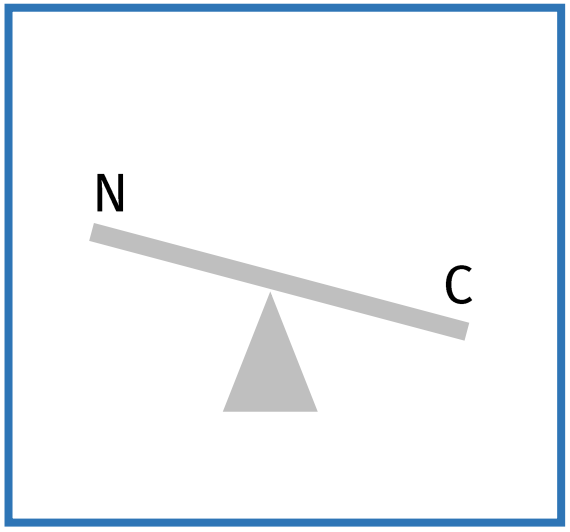
- experiment Zofin -

Alpha-, *Beta-*, *Gammaproteobacteria*, *Actinobacteria*, *Acidobacteria*

Indicator species analysis

Age class	Genus
> 38	*Steroidobacter*, *Rhodoplanes*
38-16	*Opitutus*
16-5	*Methylosinus*
< 5	*Rubrivirax*, *Yersinia*

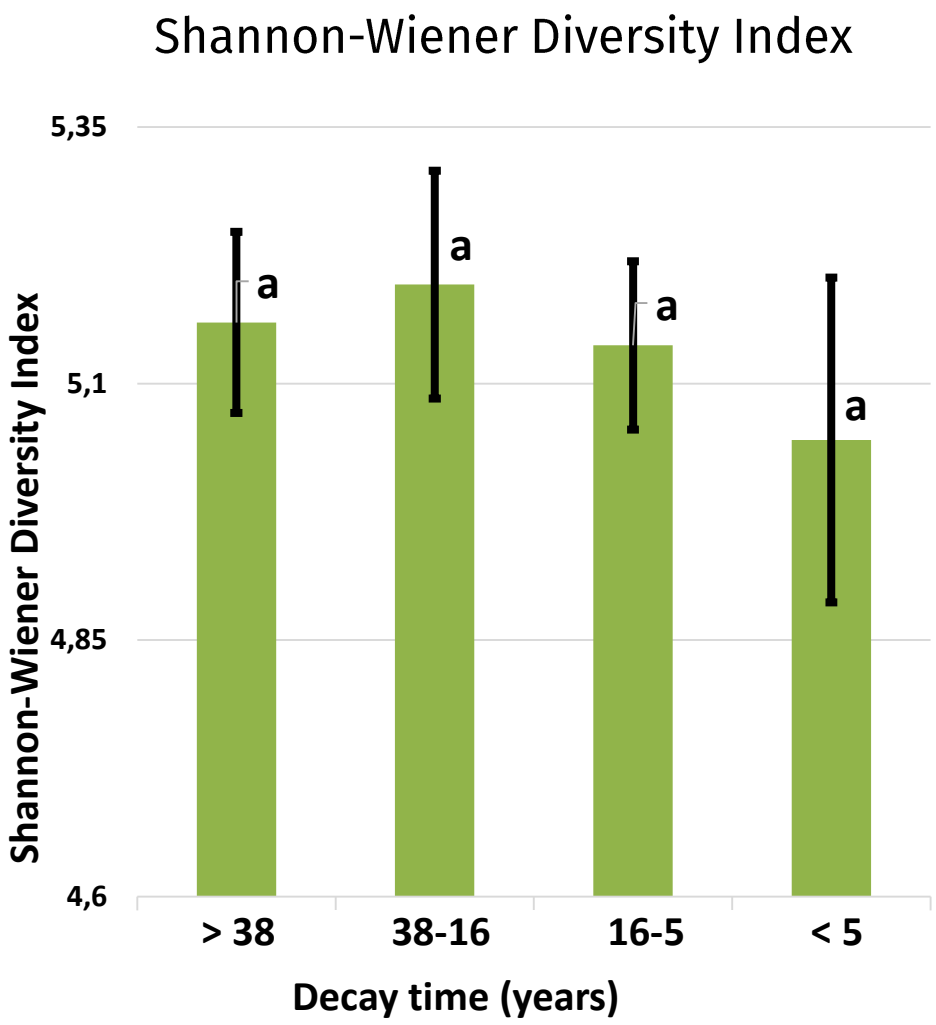


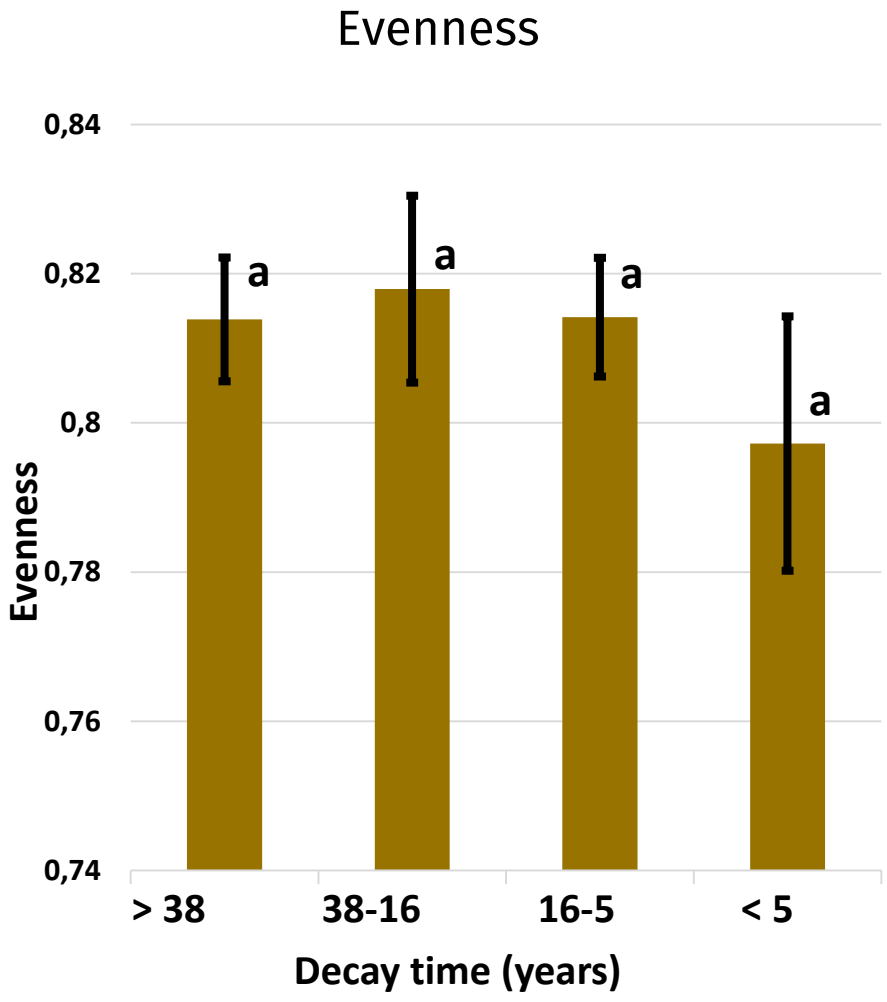


(adapted from Leveau et al. (2008), Whitfield (2007)

Bacterial diversity

- experiment Zofin -





Spatial relationships in the forest – future aim

Zofin Natural Reserve again

- complex sampling in a circle with diameter 80m

- lying / standing stems
- CWD / FWD
- soil
- senescent leaves

Conclusion

- Community structure is driven by the age of deadwood more than by the tree species.
- Bacterial diversity through decomposition remains similar.
- Age classes of deadwood show differences in bacterial community composition (i.e. succession pattern).

– thank you –

supervisor RNDr. Petr Baldrian Ph.D.

The Silva Tarouca Research Institute for Landscape and Ornamental Gardening, Brno

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