Central European fen mollusc and plant assemblages in modern and quaternary perspective

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INTRODUCTION

Fens are nutrient-limited wetlands fed by mineral-rich groundwater, with a tight response of species richness and composition to the water chemistry. Fen habitats support species-rich assemblages of both plants and molluscs, including many globally threatened habitat specialists and glacial relicts.

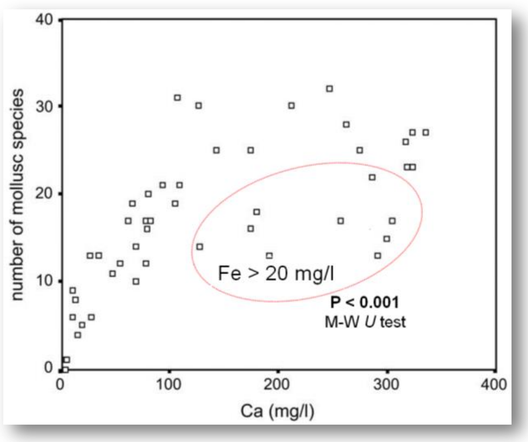
Pupilla alpicola (shell height 3.4 mm) is an exclusive inhabitant of treeless calcareous fens. It is a relict from the Late-Glacial period and it was more widely distributed across Eurasia during cold periods of the Pleistocene.

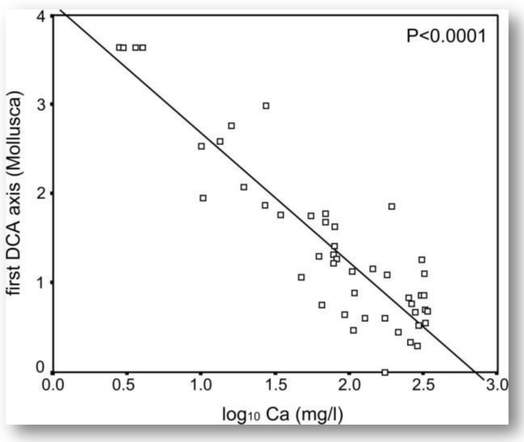
Triglochin maritimum is a species significantly linked to old fens; with a direct evidence on its Glacial and Late-Glacial occurrences known from the Carpathian lowlands.

PATTERNS OF SPECIES RICHNESS AND COMPOSITION

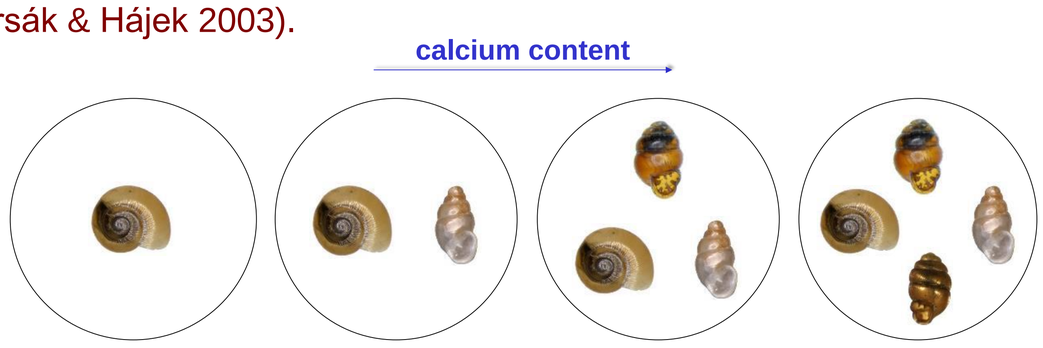
Species richness generally increases towards alkaline fens and rather weak geographic signal can be found in species composition. While a clear species turnover is characteristic for plants, molluscs express the nested subsets along the calcium gradient.

The main ecological gradient at fens correlates with the changes in groundwater calcium content from acidic fens to highly calcareous fens.





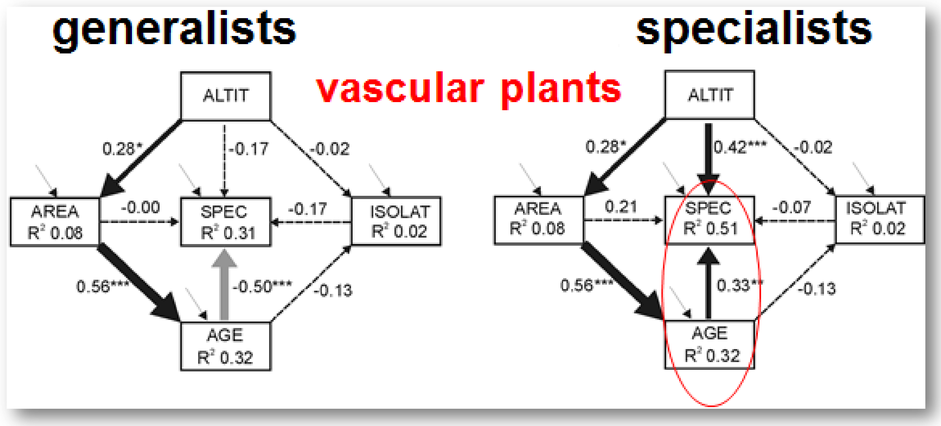
Relationship between calcium content and the number of recorded mollusc species (left) and the main variation of their assemblage composition (right) (Horsák & Hájek 2003).



Mollusc assemblages at fen sites with less calcium are subsets of those at sites with more calcium (Horsák & Cernohorsky 2008).

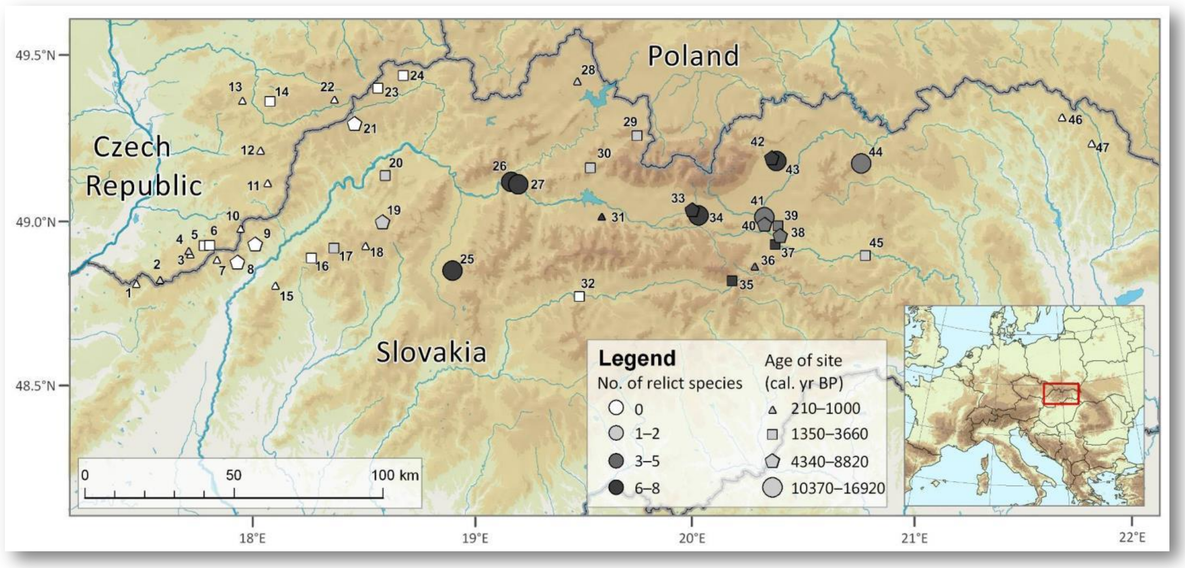
FENS AS TERRESTRIAL ISLAND-LIKE HABITATS

The number of habitat specialists in these insular systems increases with habitat age (at the Holocene scale) and/or area, with habitat age becoming more important as species dispersal ability decreases (Horsák *et al.* 2012).



FENS IN PALAEOECOLOGY

As fens accumulate organic sediments with a rich fossil material, an exact dating and the reconstruction of their development are easily possible. The Late-Glacial origin of the oldest temperate fens maintains the existence of many glacial relicts, surviving there in isolated populations. The occurrence and number of these relicts was found to be associated with the age of fens and/or a continuous presence of suitable fens during the Holocene.



The fen sites studied in the Western Carpathian Mts. The number of possible relict plant and land-snail species linked to older fens than would be expected by chance was identified (Hájek *et al.* 2011). The effect of the various transformations of fen area in the null model was considered.

			Area not considered	Area transformation in the null model				
				log	$\sqrt[5]{x}$	$\sqrt[4]{x}$	$\sqrt[3]{x}$	$\sqrt[2]{x}$
Significant pure effect of age	Frequency	Median	*P*	*P*	*P*	*P*	*P*	*P*
Vascular plant species								
Triglochin maritimum	11	8168	0.007	0.008	0.015	0.022	0.034	n.s.
Primula farinosa	15	7692	0.002	0.002	0.005	0.009	0.018	n.s.
Salix rosmarinifolia	15	7449	0.002	0.008	0.014	0.024	0.044	n.s.
Trichophorum pumilum	4	9926	0.024	0.025	0.037	0.042	n.s.	n.s.
Carex hostiana	13	7449	0.015	0.016	0.027	0.043	n.s.	n.s.
Pinguicula vulgaris	22	4733	0.007	0.007	0.020	0.029	n.s.	n.s.
Carex dioica	11	4779	0.027	0.028	0.049	n.s.	n.s.	n.s.
Land snail species								
Pupilla alpicola	14	6670	0.004	0.012	0.025	0.036	n.s.	n.s.
Vertigo geyeri	12	6670	0.006	0.025	0.042	n.s.	n.s.	n.s.

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Currently supported by the grant No. P504-11-0429.