

# Walls vs. rocks – secondary and natural habitats

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## Introduction

Walls and rocks are often compared as habitats which presumably have a lot in common. Nevertheless, they differ from each other in many ecological features. In contrast to natural rock surfaces, walls are man-made habitats characterized by (1) smaller dimensions and more extreme fluctuations of microclimate, (2) great variety of building material and presence of a binding material (e.g. calcareous mortar or concrete), (3) poor soil deposition, (4) less heterogeneity in microhabitats, and (5) location in urban areas with strong anthropogenic pressure. On vertical wall surfaces vascular plants are bound to growth in fissures – similarly as on rock verticals. On the contrary, horizontal wall tops are slightly different microhabitats, characterized by higher soil accumulation; they are also more insolated and dry. Rather than rocks, the horizontal wall tops resemble natural habitats with shallow skeletal soil.



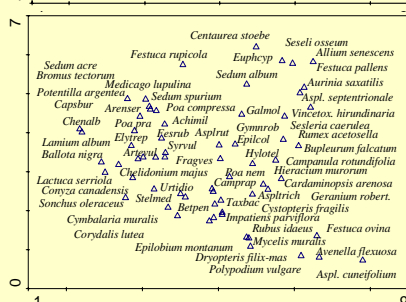
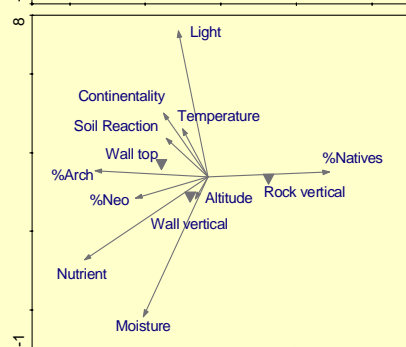
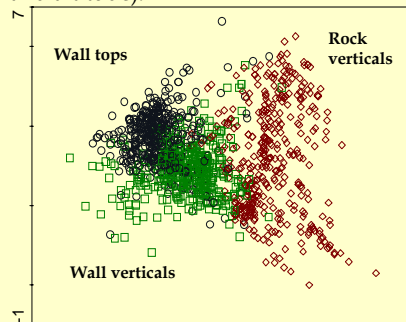
## Material

Large data set of relevés recorded on walls and rocks was extracted from the Czech National Phytosociological Database. Vegetation units of rock vegetation are shown in the table below. The original data set was divided into three parts : (1) vertical rock surfaces (381 relevés), (2) vertical wall surfaces (381 rels.), and (3) horizontal wall tops (443 rels.). As for vertical surfaces of both habitats, only those with slope above 75° were included.

<i>Asplenieta trichomanis</i>	
<i>Potentilla caulescens</i>	species-poor vegetation on dry limestones and dolomitic rocks
<i>Cystopteridion</i>	vegetation on moist and shaded calcareous rocks
<i>Asplenion serpentini</i>	vegetation of serpentinite rocks
<i>Androsacion vandellii</i>	species-poor vegetation of siliceous rocks
<i>Festuco-Brometea</i>	
<i>Alyso-Festucion pallentis</i>	thermophilous vegetation of acidic rocks and limestone

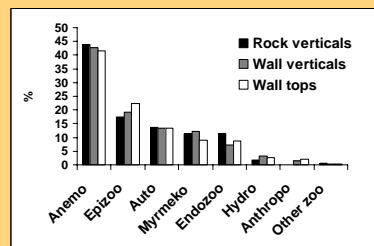
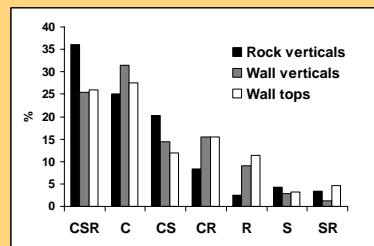
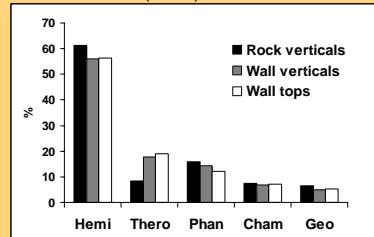
## Ecological differentiation

DCA ordination diagrams of relevés, species, and environmental variables (passively projected relevé means of Ellenberg indicator values, relative proportions of alien and native species, and altitude).



## Biological traits of species

Representation of life forms, life strategies, and dispersal strategies in wall and rock habitats is shown in pictures below. Relative proportions are inferred from the total number of vascular plants recorded in particular habitat type. Data on species traits obtained from Klotz et al. (2002) and Frank & Klotz (1988).

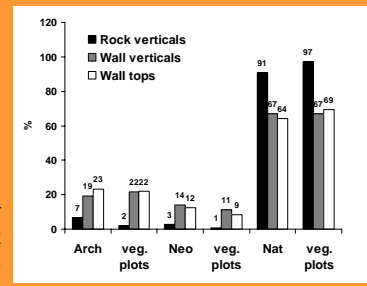


## Alien species with the highest frequency:

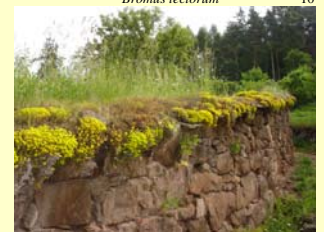
- **Rocks** – archaeophytes *Chelidonium majus*, *Echium vulgare*, and neophyte *Impatiens parviflora*
- **Wall verticals** – archaeophytes *Chelidonium majus*, *Cymbalaria muralis*, and neophytes *Conyza canadensis* and *Corydalis lutea*
- **Wall tops** – *Chelidonium majus* (arch), *Conyza canadensis* (neo), *Capsella bursa-pastoris* and *Medicago lupulina* (archaeophytes).



Representation of alien (archaeophytes, neophytes) and native species in different habitats. Relative proportions are calculated from the total number of species of vascular plants for particular habitats and average percentages in relevés.



Rock verticals	%	Wall verticals	%	Wall tops	%
<i>Asplenium trichomanes</i>	40	<i>Asplenium ruta-muraria</i>	43	<i>Taraxacum sect. Ruderalia</i>	69
<i>Asplenium ruta-muraria</i>	32	<i>Taraxacum sect. Ruderalia</i>	40	<i>Poa compressa</i>	55
<i>Polypodium vulgare</i> s.lat.	29	<i>Chelidonium majus</i>	38	<i>Artemisia vulgaris</i>	26
<i>Festuca pallens</i>	29	<i>Poa compressa</i>	26	<i>Achillea millefolium</i> agg.	25
<i>Hylotelephium telephium</i> agg.	28	<i>Cystopteris fragilis</i>	22	<i>Sedum acre</i>	23
<i>Aurinia saxatilis</i> ssp. arduini	28	<i>Cymbalaria muralis</i>	20	<i>Poa pratensis</i> s.lat.	22
<i>Campanula rotundifolia</i> agg.	22	<i>Asplenium trichomanes</i>	17	<i>Potentilla argentea</i>	21
<i>Asplenion septentrionale</i>	20	<i>Urtica dioica</i>	17	<i>Chelidonium majus</i>	19
<i>Geranium robertianum</i>	20	<i>Artemisia vulgaris</i>	15	<i>Conyza canadensis</i>	18
<i>Sedum album</i>	20	<i>Campanula rapunculoides</i>	14	<i>Arenaria serpyllifolia</i> agg.	18
<i>Sesleria caerulea</i>	18	<i>Poa nemoralis</i>	13	<i>Capsella bursa-pastoris</i>	17
<i>Hieracium murorum</i>	18	<i>Hylotelephium telephium</i> agg.	11	<i>Medicago lupulina</i>	14
<i>Cardaminopsis arenosa</i>	17	<i>Conyza canadensis</i>	11	<i>Chenopodium album</i> agg.	13
<i>Campanula rapunculoides</i>	16	<i>Geranium robertianum</i>	10	<i>Poa nemoralis</i>	12
<i>Festuca ovina</i>	15	<i>Corydalis lutea</i>	10	<i>Elytrigia repens</i>	11
<i>Poa nemoralis</i>	15			<i>Ballota nigra</i>	10
<i>Rumex acetosella</i>	14			<i>Lactuca serriola</i>	10
<i>Allium senescens</i> sp. montanum	13			<i>Bromus tectorum</i>	10
<i>Euphorbia cyparissias</i>	13				
<i>Myricis muralis</i>	13				
<i>Seseli osseum</i>	12				
<i>Cystopteris fragilis</i>	12				
<i>Bupleurum falcatum</i>	12				
<i>Avenella flexuosa</i>	11				
<i>Vincetoxicum hircundinaria</i>	11				
<i>Hieracium schmidtii</i>	11				
<i>Poa compressa</i>	10				
<i>Biscutella laevigata</i> sp. varia	10				
<i>Gymnocarpium robertianum</i>	10				



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The most common species of vascular plants in rocks and walls