



## Department of Botany

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## RESEARCH AREA & EXCELLENCE

**Ecosystem dynamics on long-term scales; studying processes beyond observation leading to an understanding of climate and human interactions with Earth's systems**

- Quaternary ecosystem dynamics driven by climate change
- Archaeobotany of cultural systems
- Fire dynamics and disturbance in postglacial ecosystems
- Past land cover changes affected by anthropogenic disturbance

### Mission

Our aim is to apply the reconstruction of past ecosystems, vegetation and flora to understand their long-term dynamics and to link these with present-day processes. Moreover, we aim to study past disturbances such as fire triggering successional processes responsible for long-term changes in the community assembly.

Knowledge gained in this field should: inform nature conservation; disentangle human-induced interactions with ecosystems; be valuable for predictions of future climate and land cover changes; and have consequences for applied science in determining directions in ecosystem restoration and services.

## KNOW-HOW & TECHNOLOGIES

### Content of Research

- Holocene land-cover reconstruction: effect of climate, human impact, origin of natural vegetation
- Long-term perspective of forest fires within temperate landscape
- Post-glacial migration legacies of plant species
- Holocene land-use changes

### Main Capabilities

- Analysis of plant remains (pollen, macrofossils, charcoal, phytoliths) in natural and anthropogenic sedimentary environments
- Pollen-based quantitative vegetation reconstruction using models of pollen dispersal and sedimentation
- Quaternary ecology and macroecology of forest species
- Administration and development of large palaeoecological databases, analysis of large datasets in order to answer ecological questions
- Species distribution modelling
- Description of fire regimes using charcoal record in soil and sedimentary sequences

### Fields of Research

Biodiversity conservation | Botany | Ecology | Climate change | Evolutionary biology | Geosciences multidisciplinary | Quaternary paleoecology

## EXPECTATIONS & OFFERS

We are looking for a wide spectrum of collaboration with academic partners as well as applied research, industry, and state and non-profit organisations.

### Offers

- Experience in the field of European and North African palaeoecology
- Palaeoecological analyses of sedimentary material
- Numerical analysis and interpretation of data, quantitative land cover reconstructions

### Requirements

- Quaternary sedimentary sequences containing preserved biological remains
- Novel methods in ancient DNA, fossil analysis
- Access to palaeoecological data inaccessible in public databases

## KEY RESEARCH EQUIPMENT

- Coring equipment for lakes and bogs
- Fully equipped laboratory for treatment of palaeoecological samples (pollen, plant macrofossils, charcoal, phytoliths)
- Microscopic facility

## PARTNERSHIPS & COLLABORATIONS

**Academic partners:** Institute of Botany of the Czech Academy of Sciences (Průhonice and Brno, Czech Republic) | Institute of Archaeology of the Czech Academy of Sciences, Prague | Czech University of Life Sciences, Prague | Department of Geoscience, Aarhus University, Denmark | Department of Physical and Applied Geo-

logy, Eötvös University, Hungary | School of Natural Sciences, Linnaeus University, Kalmar, Sweden | Institute of Ecology, Tallinn University, Estonia | CNRS GEODE UMR, Toulouse University Le Mirail, France

### Main Projects

- 2012–2015: Pollen-based land-cover reconstruction – model testing and its implications for Holocene environmental change studies (The Czech Science Foundation, grant No. P504/12/0649)
- 2007–2011: Long-term development of cultural landscape of Central Bohemia as a co-evolution of human impacts and natural processes (Grant Agency of the Academy of Sciences of the Czech Republic, IAX00020701)
- 2009–2011: Forest wildfire dynamics in Czech sandstone areas and its effect on recent vegetation (Grant Agency of Charles University no. 97609)
- 2007–2009: Pollen Database of the Czech Republic (Grant Agency of Charles University no. 29407)
- 2003–2005: Reconstruction of the natural vegetation of sandstone rocks in the Bohemian Switzerland National Park and the surrounding sandstone area by the mean of pollen analysis of profiles (Ministry of the Environment CR, SE/620/7/03)
- 2003–2005: Vegetation and landscape during the Early Postglacial as an environment for hunter-gatherer populations (Grant Agency of the Academy of Sciences of the Czech Republic, KJB6111305)
- Participation in one project funded by the European Research Council.

## ACHIEVEMENTS

Publications in respected international journals with high impact factors: *Global Change Biology*, *Quaternary Science Reviews*, *Journal of Biogeography*, *The Holocene*, *Climate of the Past*, *Journal of Vegetation Science*

