

Parallel evolution of clonality in angiosperms

supervised by Tomáš Herben or Jitka Klimešová, advised by Karol Krak and Tomáš Fér

The PhD project will be a part of the wider quest of our group to understand the role of plant clonality for plant fitness and ecosystem functioning. Clonality (ability to produce several independent rooting units from one parental plant) occurs in about half of all plant species and is evolutionarily fairly flexible. This is likely to be driven by costs and benefits of clonal multiplication under different environmental gradients, but the forces behind this pattern are poorly understood compared to plant traits of similar importance. In the project now supported by the Czech Science Foundation we aim to study evolution of clonal plant strategies and the potentially correlated evolution of clonality and habitat preference. As clonality repeatedly appeared and disappeared in the angiosperm evolution, we aim to concentrate on the drivers of this parallel evolution, concentrating on four major angiosperm families (to be decided upon, but Brassicaceae and Lamiaceae will be included for sure). The whole project covers data collection part (species in the field), phylogenetic comparative methods, modelling costs and benefits of clonal strategies under different environmental (habitat) conditions, and searching for molecular mechanisms behind the evolution of clonality.

This PhD project will part of this project and will involve two major tasks (the proportion between them could vary partly depending on the student's preferences, but output is expected in both of them). The work will be conducted partly at the Department of Botany, Charles University in Prague and partly at the Institute of Botany CAS in Pruhonice (essentially a suburb of Prague).

(*) construct comprehensive phylogenies for four angiosperm families by integrating phylogenomic (Hyb-Seq) data with widely available sequencing data. Using these phylogenies, the student will investigate the parallel evolution of clonality by modelling appearance and loss of clonal growth and their links to woodiness using advanced phylogenetic comparative methods. The project will further explore how clonality and clonal traits are associated with habitat and environmental niche shifts through ancestral state niche reconstruction. This part of the project will provide new insights into the evolutionary flexibility of clonality and its ecological drivers across major flowering plant lineages.

(*) conduct comparative genomic and transcriptomic analyses to identify and characterize the LAZY gene family, testing how gene copy number and sequence variation differ between clonal and non-clonal lineages. This will be done by combining newly produced NGS sequencing data with existing public datasets across several Brassicaceae genera. Building on these results, selected species pairs will be grown under controlled conditions to compare transcriptomes across developmental stages preceding clonal organ formation. This part of the project will uncover the genetic background of the mechanisms of clonal growth in flowering plants.

We are looking for a motivated student with an MSc in botany or ecology. The work will involve both extensive data-analytical part (including bioinformatic analysis in the second subproject), experimental work with plants and wet work in the molecular lab. The candidate should therefore be experienced in experimental work and experiment design, have good knowledge of plants, and good knowledge of biostatistics, ideally including experience with phylogenetic data analysis and phylogenetic comparative methods. Previous experience in molecular laboratory, experience with pot experiments and field work are a plus. The student further may (based on their interest) take part in plant collecting trips to the Mediterranean. Good knowledge of English, writing skills and ability to collaborate within a larger group is required.

Your application should comprise a letter of motivation, CV, and contact details of two references

Submission of applications: 15th March 2026. The applications should be submitted to: recruitment@ibot.cas.cz

Start of the project: 1st Oct 2026 (earlier start, e.g. in July, possible)

Duration of the project: four years, i.e. till Sep 2030