Master Thesis Project

Detecting patterns in leaf size from herbar specimen

We are currently searching for a highly motivated student who is interested in exploring trends in leaf size over the last century on a global scale based on scanned herbar specimen and image recognition.

Plant traits like leaf size are a key to understanding how plants adjust to changes in environmental conditions and in turn influence them. Leaf size varies between species from less than 1 mm² to greater than 1 m² across the plant Kingdom. A variation of leaf size within species due to changing environmental conditions represents an adaptation to these conditions. Usually adaptations are studied along spatial gradients assuming that spatial gradients can mimic temporal gradients and trend analysis over longer time periods are missing due to a lack of data.

In this thesis we will study leaf size from scanned herbar specimen using image recognition techniques, which will generate a unique data-set on leaf size covering a large number of species, a large numbers of individuals within a species, large spatial gradients, and most importantly a large temporal gradient. This approach will for the first time offer the unique opportunity to study trends in leaf size over the last century. There are several interesting research questions, and the topic of the thesis can be adapted to the time frame and the interests of the potential candidate.

Your tasks:

• Handling of large datasets
• Extracting leaf area from digital herbar specimen using image recognition
• Statistical analysis depending on research question

Your profile:

• Background in Botany, Ecology, Geoeconomy, Biology, Biogeosciences, Bioinformatics or a related field
• Interest and motivation to work in the field of functional plant trait ecology
• Willingness to learn working with scientific computing (R or Python) and advanced statistical methods

You will have the interesting opportunity to work in an international multidisciplinary team covering botany plant ecology, biogeochemistry, and computer science. Working at the Max Planck Institute for Biogeochemistry means to become part of a world-renowned multidisciplinary research community with the ability to attend weekly talks and colloquia with scientists from across the globe.

We are also offering internships on the above topic.

In case of interest please contact Susanne Tautenhahn (staut@bge-jena.mpg.de) or Jens Kattge (jkattge@bge-jena.mpg.de) with a full CV.
Illustration 1: Record density of scanned herbar specimen available via IdigBio
Illustration 2: Extracting leaf area from digital herbar specimen using image recognition