

## **Postdoctoral scholar in using spectral reflectance to understand plant GxE interactions, biodiversity, community dynamics, and ecosystem function**

The U.S. National Science Foundation has recently established four Biology Integration Institutes (BII) with teams of researchers considering interdisciplinary questions that help integrate across scales of biological organization. BII's will broaden the participation of future scientists and train researchers in these integrated approaches.

The BII ASCEND (Advancing Spectral Biology in Changing ENvironments to understand diversity, <https://www.spectralbiology.org>) seeks to understand the causes and consequences of plant biodiversity across scales in an era of rapid global change. We use spectral biology and predictive models to understand how variation at one biological scale interacts with environmental change to give rise to emergent properties at the next biological scale, ultimately influencing biodiversity from organisms to the tree of life in ecological communities and across the biosphere.

ASCEND is looking to hire two or three postdoctoral scholars who will perform research using spectral reflectance and predictive models to understand 1) plant GxE interactions, 2) plant evolution across the tree of life and community assembly and/or 3) the consequences of species interactions for ecosystem function.

The positions will be collaboratively supervised by multiple PIs, depending on expertise and interest. Applications are encouraged from prospective postdoctoral researchers who are interested in leading investigations on:

1) that address the genetic and environmental basis of functional and spectral variation within species. The candidate will investigate the mechanistic basis of spectral variation in several types of experiments including a) abiotic stress experiments and b) sampling from established plant GxE experimental plots. Within each experiment we will collect transcriptomic, metabolomic, and hyperspectral imaging data in order to investigate the functional relevance of spectral variation. The focal plant species include crops (corn, soybean), trees (pine, oak), and potentially the candidate's species of interest.

2) that use remote sensing and measurements of plants and soils to test theoretical predictions, such as from resource competition theory, regarding how global changes disrupt species coexistence, leading to predictable changes in plant diversity, dominance, composition, and productivity. This work may involve quantifying the strengths of biodiversity effects on productivity, and determining the underlying mechanisms, across multiple spatial scales. It may also involve testing theoretical predictions, such as from metacommunity theory, regarding how dispersal regulates biodiversity and productivity at landscape scales. The position will include field research in experimental platforms at Cedar Creek Ecosystem Science Reserve, such as the BioCON experiment, which is led by Peter Reich and Sarah Hobbie and which includes manipulations of grassland plant diversity, elevated carbon dioxide, and nitrogen enrichment; the Forests and Biodiversity (FAB) experiment, which is led by Jeannine Cavender-Bares and

which includes manipulation of several dimensions of tree diversity (i.e., taxonomic, functional trait, and phylogenetic diversity); the RESCUE experiment, which is led by Forest Isbell and which includes manipulations of habitat fragmentation and plant dispersal at landscape scales in grasslands; or the BACD experiment, which is led by Forest Isbell and Dave Tilman and which crosses treatments of grassland plant diversity, warming, and drought

Each postdoctoral scholar will work closely with two or more PIs, including Forest Isbell ([isbell@umn.edu](mailto:isbell@umn.edu); species coexistence theory, biodiversity effects on ecosystems), Ya Yang ([yangya@umn.edu](mailto:yangya@umn.edu); phylogenetics and transcriptome in non-model plants), Nathan Springer ([springer@umn.edu](mailto:springer@umn.edu); GxE), Dudu Meireles ([jose.meireles@maine.edu](mailto:jose.meireles@maine.edu)), Jeannine Cavender-Bares ([cavender@umn.edu](mailto:cavender@umn.edu); ecophysiology), and/or other members of the Science Team (<https://www.spectralbiology.org/team>).

The PI team will provide training in data collection, analyses, manuscript preparation; guidance in career development; and opportunities for outreach. The postdoc will also have the opportunity to visit collaborating labs in Wisconsin and a network of collaborators through the Institution and one position will be available at the University of Maine. Funding is guaranteed for one year with renewal for up to three years following satisfactory performance.

Desirable, but not required, qualifications variously include molecular wet bench skills, genomic data analysis, trait evolution modeling, phylogenetic analysis, statistical methods, quantitative and programming skills, field research experience in plant community and ecosystem ecology, and experience working with spectroscopic and remote sensing data (e.g., visual, hyperspectral, lidar or other point cloud data).

The University of Minnesota has many resources to support plant biology research including Cedar Creek Ecosystem Science Reserve, Itasca Biological Station and Laboratories, state-of-the-art plant growth facilities, the Minnesota Supercomputing Institute, the University of Minnesota Genomics Center, the Biological Imaging Centers, and the College of Biological Sciences Conservatory and the Bell Museum that provide platforms for outreach. The campus is located in the heart of the Minneapolis-St. Paul metropolitan area, which is rich in cultural and natural attractions with extensive parks and trails systems.

Please contact Jeannine Cavender-Bares ([cavender@umn.edu](mailto:cavender@umn.edu)), Nathan Springer ([springer@umn.edu](mailto:springer@umn.edu)), Ya Yang ([yangya@umn.edu](mailto:yangya@umn.edu)), Forest Isbell ([isbell@umn.edu](mailto:isbell@umn.edu)) or Dudu Meireles ([jose.meireles@maine.edu](mailto:jose.meireles@maine.edu)) if you are interested in one of these positions. In your initial inquiry, please include a copy of your CV, at least two names of reference, at least one of your publications, and a one-page description of your research experience, interests, and future career goals.

BII ASCEND is dedicated to improving the representational diversity, inclusion, and advancement of researchers from groups that have been marginalized in science and society. Researchers from minoritized groups are especially encouraged to apply.