3 postdoc positions to study root communication with the (a)biotic environment

The Department of Plant-Microbe Interactions at the The Max Planck Institute for Plant Breeding Research (MPIPZ) in Cologne, Germany, invite applications for three positions to investigate plant-environment communication in a newly established Max Planck Research group led by Dr. Tonni Grube Andersen.

Background
In nature, the roots of healthy plants are intimately communicating with their surroundings. This is necessary to integrate (a)biotic input into stress responses or growth, and thus allocate resources optimally. While we understand some aspects of this, our current models are lacking sufficient resolution to explain how individual cells of different tissues partake in these decisions. Understanding this is highly relevant for agriculture, as knowledge of the underground plant-associated (a)biotic environment will lead to more efficient nutrient use schemes and increased yields in a future where artificial fertilizers are likely to be scarce.

In the group we aim to utilize the recently described xylem pole-associated endodermal passage cells in Arabidopsis thaliana (Andersen et al. 2018, Nature) as a model to address root communication. Passage cells are developmentally controlled and nutrient-responsive, but intriguingly their presence in the endodermis give rise to expression of a sub-set of nutrient transporters in associated cortex and epidermal cells in a “funnel-like” manner. This is a completely novel insight into root cell specialization, and suggests that passage cells serve as organizing “hubs” that facilitate trans-cellular (a)biotic communication between the inner root tissues and the rhizosphere.

Objectives
To investigate this, we have several aims in the group. We identify candidate genes involved in establishment, development and function of the endodermal xylem pole and passage cells using transcriptional analysis (single-cell RNAseq and translating ribosomal affinity purification). We characterize candidates in a near-native (a)biotic compatible platform for simultaneous long-term imaging, physiological and metabolic analysis using microfluidics and a state-of-the-art vertically orientated stage confocal microscopy. Moreover, we use in-house established plant microbe culture collections and reconstitution experiments to test the impact of different microbial communities on mutants affected in passage cell formation und abiotic stresses.
An additional aspect of our work is to characterize the xylem pole-associated passage cells in the roots of a nitrogen-fixing model (*Lotus japonicus*). This work is similarly with respect to abiotic conditions in the rhizosphere, but with a focus on the role of the ground-tissue-derived xylem pole cells in establishment of biotic associations such as nodule formation.

**Requirements**
We seek highly motivated applicants with an PhD degree (or equivalent) in molecular biology, plant physiology, microbiology, bioinformatics or other relevant fields. Candidates will be expected to demonstrate strong interest in the cross-over between plant development and physiology. Prior knowledge on plant-microbe interactions, bioinformatics, advanced light microscopy and metabolomics is appreciated, while profiles that include experience with nitrogen-fixing plant species will be advantageous.

**Payment/Position**
Successful candidates would be expected to start at in January 2020. Funding is provided for an initial period of two years with a possible additional extension to a total of five years. Salary and benefits are commensurate with public service organization rules (TVöD). The Max-Planck Society is committed to increasing the number of individuals with disabilities in its workforce and therefore encourages applications from such qualified individuals. Furthermore, the Max Planck Society seeks to increase the number of women in those areas where they are underrepresented and therefore explicitly encourages women to apply.

**Application**
For specific questions concerning respective projects please contact tandersen@mpipz.mpg.de

For application please use the online application platform: https://lotus2.gwdg.de/mpg/mkzf/andersen_postdoc_2.nsf/Bewerbungen

clearly stating which position you are applying for, and include a curriculum vitae, list of publications, a statement of research interests, references and letters of recommendation by September 30, 2019.

Shortlisted candidates will be invited for interview in the autumn of 2019.