INTERNATIONAL RESEARCH INTERNSHIPS (TRONDBUSS PROGRAM)

Description: TRONDBUSS (for TRONDheim-ColumBUS and BUSS for bus in Norwegian), a bilateral US-Norway international education initiative between the Department of Molecular Genetics at OSU and NTNU (Norwegian University of Science and Technology, Trondheim, Norway) offers **two research internships with financial support** to OSU undergraduates. Research internships in the field of plant biology, ecology and neurosciences will take place in the Department of Biology and the Department of Clinical Medicine at NTNU. Host laboratories and a general description of the scientific activities (and possible research projects) are listed below. Internships last for 3 months and can start any time between Jan 1 and Oct 1, 2023. Dates of the internship will be finalized in consultation with the host laboratory at NTNU for each participant.

Eligibility: Students who are interested need to contact Dr. P. Hamel (hamel.16@osu.edu) to apply for this opportunity. Eligible students are undergraduates seeking a B.S. degree in the any of the Biological Sciences. Undergraduate students who have graduated are also eligible and need to enroll as a returning student at OSU for the entire duration of the research internship. While conducting research in Norway students will be enrolled in MolGen 5797 at OSU and as international students at NTNU. There are no fees at the host institution to enroll as an international student. Preference will be given to eligible students with significant laboratory experience. Support toward living expenses (NOK 45,000 ~ $4,500) will be provided to the student in the form of a monthly allowance (NOK 15,000) by NTNU while in Norway. The student is responsible for travel expenses and is required to purchase a supplemental insurance with the Office of International Affairs ($1.5/day ~ $135 for 3 months). Due to the Norwegian immigration laws, only applicants who hold a passport from a country that Norway has a visa exemption agreement with are eligible. Currently, applicants holding a passport from the US, the EU (European Union) or the EEA (European Economic Area) are eligible.

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Plants can sacrifice their own cells upon environmental stress through the activation of controlled signalling cascades that lead to cell death and stress adaptation. Despite having a significant impact on crop performance, the mechanisms that plants use to control cell death propagation are largely unknown. In the ´Cell Death and Communication Lab´ we investigate the role of cell-cell communication, mediated by molecules acting as 'death' or 'life' signals, during cell death of photosynthetic organisms under environmental stress. We want to understand how cells communicate during the activation and execution of cell death, and how this knowledge can be employed to improve adaptation of primary producers to a changing climate. We address the question of cell death and cell-cell communication in different photosynthetic organisms. Currently, we work in the plant model system *Arabidopsis* and the diatom model *Phaeodactylum tricornutum*. Furthermore, we have also started a collaboration with the Marine Science Section at the Department of Biology (Dr. Glaucia Moreira Fragoso) to study immune responses in brown algae. This is a new research line combining lab and field work. As a visiting student, you will be able to join on research in different projects undergoing in the lab, such as: *Plant cell death routes and their crosstalk in Arabidopsis, Plant death signals and their actions in Arabidopsis, Novel plant model systems to study cell-cell communication during cell death, Cell death and cell-cell communication in diatoms, Immune responses, and cell death in seaweed.*

THORSTEN HAMANN, Thorsten.hamann@ntnu.no hamannlab.org

Plant cell walls provide mechanical support for plant growth, form the first line of defense against biotic and abiotic stress and represent a major carbon sink in the context of climate change. Their roles in stress defense and growth mean that they on one hand influence food crop performance and on the other hand provide raw materials for production of clothes (cotton) and building materials. Despite their obvious importance to plants and humans our understanding of the processes enabling them to meet the different functional requirements is still limited. The Hamann lab is interested in understanding one of these processes, the cell wall integrity maintenance mechanism. It modifies cell wall and cellular metabolism to maintain functional integrity of the wall during plant growth, development, and interactions with the environment. Previous work has shown that the underlying molecular processes involve mechano-sensing and hormone-based signal transduction processes. Projects in the group focus on characterizing the mode of action of individual molecular components of the mechanism. Methods employed include confocal microscopy-based imaging, qRT-PCR-based gene expression analysis and LC-MS-based quantification of phytohormones.

MARTIJN VANDEGEHUCHTE, martijn.l.vandegehuchte@ntnu.no

Our research focuses on terrestrial ecosystems and is situated at the interface between community ecology and evolutionary biology. We study interactions among genotypes and species as well as the evolutionary consequences of these interactions. We also investigate how communities respond to environmental change, both via plasticity and evolution, and how they affect ecosystem functions and services. As plants form the basis of most terrestrial ecosystems, our research focuses on interactions among plants and their herbivores, pathogens, and mutualists. As of summer 2022, we will be setting up a series of experimental plots in the mountains of Dovre in the framework of the BugNet project, a globally replicated and full-factorial experiment investigating the effects of insects, mollusks, and fungi on plant biodiversity, community ecology, and evolution (for more detailed information, see: www.bug-

net.org). This project will involve a large amount of field work in alpine tundra focused on plant species identification and plant functional trait measurements, followed by lab work on collected plant material. An interest in working outdoors in a remote area with basic facilities is required for this project.

NATHALIE JURISCH-YAKSI, nathalie.jurisch-yaksi@ntnu.no

For the last decades, neurons have been at the center stage of brain research due to their major role in the control of animal behavior. However, there is now increasing evidence that other cell types or factors in the brain can also modulate brain activity. We are interested in how the extracellular fluid of the brain, known as cerebrospinal fluid (CSF), regulates brain development and physiology. CSF, which is produced by the choroid plexus and constantly circulated by various physiological processes, has been shown to modulate neuronal state e.g., sleep and fear. CSF has also been associated with several neurological and psychiatric conditions, including hydrocephalus, anxiety, schizophrenia, major depressive disorders, and autism spectrum disorders. Despite this evidence, we still poorly understand how CSF modulates brain activity. In my laboratory, we manipulate CSF-brain interaction by targeting either CSF movement or choroid plexus physiology using genetic tools. We then investigate the impact of these manipulations on brain development, neural activity, and animal behavior. To this end, we use a combination of genetics, molecular biology, live imaging, immunostaining, behavior analysis, and applied mathematics (Matlab) in the zebrafish model system. The long-term goal of the project is to shed light on poorly understood mechanisms regulating the healthy brain, but also identify how disturbed CSF dynamics and content lead to brain disorders.