

Undergraduate Research Symposium May 17, 2013 Mary Gates Hall

Online Proceedings

POSTER SESSION 1

Commons West, Easel 15

11:00 AM to 12:30 PM

Identification and Phylogenetic Relationships of *Cortinarius* Associated with Oregon Oak in the Columbia George

Julia Reed, Senior, Biology (Ecology, Evolution & Conservation)

Mentor: Joe Ammirati, Biology

Cortinarius is the largest genus of ectomycorrhizal fungi. Ectomycorrhizal fungi are extremely important to the function of forest ecosystems and plant communities as they form symbiotic relationships with over eighty percent of vascular plants by colonizing the feeder roots and increasing nutrient and water uptake. My research will focus on the identification and phylogenetic relationships of a subset of *Cortinarius* species associated with the Oregon oak in the Columbia George of southwest Washington. Identification of the species associated with Oregon oak will allow me to better understand their ecology and relationships to other *Cortinarius* species. I am extracting DNA from samples collected in the field over the past four years. Using PCR, the nuclear ribosomal DNA (rDNA) internal transcribed spacer region (ITS1-5.8S-ITS2) will be amplified with primers ITS1F and ITS4. DNA sequencing and analysis will be done using Finch TV and Basic Local Alignment Search Tool (BLAST) software. We expect that most of the species will be new to science, and that these analyses will provide insight into their ecology and relationships to other oak associated species in western North America and Europe.

SESSION 1J

INTERNATIONAL PERSPECTIVES ON COMMUNITY EMPOWERMENT: RIGHTS, RESOURCES AND POLITICAL ACTION

Session Moderator: Arista Cirtautas, Jackson School of International Studies

254 MGH

1:15 PM to 2:45 PM

* Note: Titles in order of presentation.

Arctic Security in the 21st Century: Emerging Issues and Challenges

Max Nathaniel Sugarman, Senior, Environmental Science & Resource Management, International Studies

Binh Y. (Binh) Vong, Senior, Chinese, International Studies, Political Science

Kevin Vincent Shaw, Senior, Law, Societies, & Justice, International Studies

Hannah Maryah Dolph, Senior, Law, Societies, & Justice, International Studies

Rachel M Tam, Senior, International Studies

Nicolas Joel Marie Elvire (Nicolas) Van Tulder, Senior, International Studies, Economics

Michael Cummins (Mike) Brown, Senior, Finnish, International Studies

Steven Bradley Moore, Senior, International Studies

Charlotte Chevalier (Charlotte) Guard, Junior, International Studies

Charlotte Maxine (Charlotte) Dubiel, Senior, Spanish, International Studies

Ngoc N. Ho Nguyen, Senior, International Studies, Political Science (Political Economy)

Zoe Cosford, Senior, International Studies

Mentor: Nadine Fabbri, Canadian Studies Center

Mentor: Joel Plouffe, Jackson School of International Studies

The Arctic is receiving global attention as climate change transforms the region. With increased interest in natural resources and sovereignty issues, the security discourse in the Arctic is also changing. This Taskforce report seeks to understand Arctic security as the capacity for communities and states to build sustainable and resilient systems and to assert a representative voice, in arenas of diplomacy and negotiating power. The Taskforce group spent one week in Quebec City and Ottawa, Canada gathering research with scholars, government officials, and Inuit leaders. This report combines relevant literature with these engagements to understand the evolution of Arctic security. Aspects of security discussed include: the Northwest Passage, devolution of resources, Quebec's Arctic policy, tourism, food security, biodiversity, homelessness, education, the Arctic Council, and China's role in the Arctic. Each chapter provides specific policy options that together form a model for building capacity for communities.

SESSION 2T

EVOLUTION, GENETICS, AND BIOCHEMISTRY OF PLANTS, ALGAE, AND FUNGI

*Session Moderator: Richard Olmstead, Biology, Burke
Museum
111 JHN*

3:45 PM to 5:15 PM

* Note: Titles in order of presentation.

Fungal Symbionts in Genus *Rhododendron*: Evaluation of Ericaceous Mycorrhizal Relationships

Katie L. (Kate) Jenks, Senior, Biology (Plant)

Mentor: Michelle Stitzer, Biology

Mentor: Benjamin Hall, Biology

Mentor: Joe Ammirati, Biology

The presence of fungal symbionts residing in the root tissue of plants is a well-documented occurrence, yet questions regarding the identification and comparison of fungal partners in mycorrhizal relationships have been largely unanswered. Ericoid mycorrhizae, an example of a mycorrhizal relationship, are found in host plants within the order Ericales. Ericales, which contains such familiar species as persimmon, blueberry and *Rhododendron*, are able to persist in edaphic conditions due to their fungal symbionts. These symbionts form hyphal coils inside plant cell membranes, and thereby exchange crucial nutrients with the host plant. This project aims to evaluate the specificity between fungal communities and their host *Rhododendron* species, with the expectation that differing communities may exist, even in closely related hosts. Using known techniques to extract fungal DNA from the root systems of *Rhododendron* species in varying conditions and proximity, this DNA is then used to generate species based communities within specific *Rhododendron* hosts. By using type-cultures and genomic sequencing, comparisons of the presence or absence of fungal species within host roots can be made. This will shed light on infection intensity, and specificity between roots and fungal symbionts. Anticipated results of high levels of specificity between host plant and fungus could prompt questions regarding the importance of fungal symbionts in genus *Rhododendron*, especially with regards to the speciation between individual host plants.

Preliminary Assessment of Particulate Matter and Nitrogen Oxides Air Pollutants in the Duwamish River Valley

*Hamza Rabi, Senior, Biology (General), Biochemistry,
Neurobiology*

Mentor: Joel Kaufman

*Mentor: Jill Schulte, Department of Environmental and
Occupational Health Sciences*

*Mentor: Julie Fox, Environmental & Occupational Health
Sciences*

There are a variety of air pollutants that can adversely impact health, including diesel exhaust from vehicles and other sources. In the Duwamish River valley of Seattle, WA, there are many sources of air pollution that emit diesel exhaust. Based on concerns of local residents, the overall objective of the Diesel Exhaust Exposure in the Duwamish Study, or DEEDS, was to measure exhaust levels throughout two Duwamish River valley neighborhoods: South Park and Georgetown. I assisted in nearly all aspects of this pilot study which included the deployment of nitrogen oxides (NOx) air samplers to nine sites throughout the two neighborhoods to perform passive sampling over a ten day period in the summer. During NOx sampling, fine and ultrafine particle measurements were also collected for ten minutes at each of the nine sites using direct reading instruments and a mobile setup. These pilot study results collected from this preliminary assessment were used to optimize location selection for measurement of NOx, NO₂, 1-nitropyrene, light absorbing carbon, and fine particulate matter during the DEEDS sampling campaigns taking place over the past year.

POSTER SESSION 3

MGH 241, Easel 167

2:30 PM to 4:00 PM