Alaska Branch American Society for Microbiology Meeting
May 30-31, 2014
Denali Nat’l Park, Murie Science Center

Final Schedule

**Friday, May 30:**

5:30 pm: Meet at the Murie Science Center for light snacks.

6:00 pm: Meeting introduction by AK Branch President

Followed by a presentation by ASM Distinguished Lecturer, Dr. Joseph Petrosino (Baylor College of Medicine) – *The Human Microbiome: an underappreciated organ important for human health*

7:30 pm: Group dinner at 49th State Brewery (~20 min drive, 12.7 mi. north on Parks Highway towards Healy)

Note: The Brewery does not take reservations, but have been alerted that our party will be coming – the 7:30pm time is flexible...

**Saturday, May 31**

9:00 am: Branch Business Meeting

10:00 am: Light Breakfast available

10:30 am: Presentation by Branch Member

  **Long-term Effects of Phytoremediation on Diesel and Crude Oil Contaminated Soils at High Latitudes**  
  Mary-Catherine Lewis, University of Alaska, Fairbanks

11:00: Second presentation by ASM Distinguished Lecturer, Dr. Joseph Petrosino

  **The Human Microbiome: applications and future directions**
12:30 pm: Lunch and Poster Sessions

1:30 pm: Presentations by Branch Members

**Assessing the use of Salix alaxensis for the Rhizoremediation of Diesel-Contaminated Soil**  
Jessica Starsman, University of Alaska, Fairbanks

**White rot fungi and bioremediation of diesel-contaminated soils: a mesocosm experiment**  
Christin Anderson, University of Alaska, Fairbanks

**Biodegradation of crude oil in arctic seawater**  
Dr. Mary Beth Leigh, Microbiology, University of Alaska, Fairbanks

**Investigating approaches to mitigate biofilms in drinking water distribution systems**  
Dr. Srijan Aggarwal, Civil and Environmental Engineering, University of Alaska, Fairbanks

**Rabies derived peptides interact with neuronal nicotinic receptors and alter behavior in mice**  
Dr. Karsten Hueffer, Department of Veterinary Medicine, University of Alaska, Fairbanks

**Potential for sulfolane biodegradation in the state's largest contaminated site**  
Dr. Mary Beth Leigh, Microbiology, University of Alaska, Fairbanks

5:00 pm: Update on Branch Activities in 2013-14 and the future

5:15 pm: Award(s) for best student presentation & poster

5:30 pm: Adjourn

**Accommodations:**

Riley Creek Campsite in Denali NP (0.4 mi on left):  [www.reservedenali.com](http://www.reservedenali.com)

866-761-6629


907-683-2282

Other camping and cabin rentals around Denali are also available.
Posters:

**Detection of Pathogenic DNA Sequences in Clinical Samples Using Next-Generation Sequencing**  
Jayme Parker, Institute of Arctic Biology, University of Alaska, Fairbanks

**Genetic diversity of Hepatitis C virus within a chronically infected HCV patient**  
Shanann Hoyos, Institute of Arctic Biology, University of Alaska, Fairbanks

**Bacterial community analyses of Thai tropical soils contaminated with used lubricating oil**  
Naruemon Meeboon, Sireewan Kaewsuwan, Mary Beth Leigh and Suppasil Maneerat

supoose: Department of Industrial Biotechnology, Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, 90112, Thailand

suppose: Marine Natural Products Research Unit, Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Hat Yai, 90112, Thailand

supose: Institute of Arctic Biology, Department of Biology and Wildlife, University of Alaska Fairbanks 902 N. Koyukuk Dr. Fairbanks, AK 99775, USA

Posters will be on display throughout the duration of the meeting. Poster authors will be available to discuss their posters during lunch on Saturday, May 31.
Abstracts:

**Long-term Effects of Phytoremediation on Diesel and Crude Oil Contaminated Soils at High Latitudes**

Mary-Cathrine Leewis 1*, Charles M. Reynolds2, Mary Beth Leigh1

1: University of Alaska Fairbanks, Institute of Arctic Biology, Fairbanks, Alaska, U.S.
2: US Army Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire, US

Phytoremediation is a potentially inexpensive method of detoxifying contaminated soils using plants and associated soil microorganisms. The remote locations and cold climate of Alaska provide unique challenges associated with phytoremediation such as finding effective plant species that can achieve successful site clean-up despite the extreme environmental conditions and with minimal site management. A long-term assessment of phytoremediation was performed which capitalized on a study established in Fairbanks in 1995. The original study sought to determine how the introduction of plants (*Festuca rubra, Lolium multiflorum*), nutrients (fertilizer), or their combination would affect degradation of petroleum hydrocarbon (TPH) contaminated soils (crude oil or diesel) over time. Within the year following initial treatments, the plots subjected to both planting and/or fertilization showed greater overall decreases in TPH concentrations in both the diesel and crude oil contaminated soils relative to untreated plots. We re-examined this field site after 15 years with no active site management to assess the long-term effects of phytoremediation on colonization by native and non-native plants, their rhizosphere microbial communities and on petroleum removal from soil. Native and non-native vegetation had extensively colonized the site, with more abundant vegetation found on the diesel contaminated soils than the more nutrient-poor, more coarse, and acidic crude oil contaminated soils. TPH concentrations achieved regulatory clean up levels in all treatment groups, with lower TPH concentrations correlating with higher amounts of woody vegetation (trees & shrubs). In addition, original treatment type has affected vegetation recruitment to each plot with woody vegetation and more native plants in unfertilized plots. Bacterial community structure also varies according to the originally applied treatments. This study suggests that initial treatment with native tree species in combination with grasses could be an effective means for phytoremediating petroleum contaminated soils and promoting ecological recovery in cold regions.
Assessing the use of *Salix alaxensis* for the Rhizoremediation of Diesel-Contaminated Soil

Jessica Starsman*, Silke Schiewer* and Mary Beth Leigh**
University of Alaska Fairbanks
* Institute of Northern Engineering
** Institute of Arctic Biology

The Yukon Koyukuk Tank Farm was established in Kaltag, Alaska, in the early 1960’s, and since that time there have been multiple heating oil spills. The soil in the area is currently contaminated with diesel range organics and in certain locations 1-chlorooctadecane. Rhizoremediation using native plants is a potentially cost-effective method for remediating soils contaminated with organic contaminants, but has not yet been extensively tested in Alaska. Due to the presence of weathered diesel, the remote location and the costs of *ex-situ* remediation, the use of *Salix alaxensis* (felt leaf willow) for rhizoremediation of the site was studied. The willow *Salix alaxensis* is commonly found throughout interior Alaska and contains the compound salicylic acid, which may serve as an inducer or cometabolite that promotes microbial biodegradation of aromatic contaminants. Microcosm studies were performed with crushed *Salix alaxensis* root, mimicking root turnover, as well as salicylic acid and fertilizer on the biodegradation of fresh and weathered diesel and 1-chlorooctadecane in Kaltag soils. With cold weather dominating much of the year, half of the microcosms were incubated at 4°C as well as 20°C to simulate summer conditions. Diesel and 1-COD losses were quantified using GC-MS, respiration was monitored using respirometry, and populations of diesel-degraders were quantified using most probable number (MPN) methods. Community analyses using 16S rRNA sequencing are also planned. Preliminary results indicate that the soils possess substantial diesel-biodegradation abilities, and analyses of the effects of willows and other treatments are in progress. If found to be effective for biostimulation, the use of *Salix alaxensis* would be advantageous as cuttings could be taken directly from the local region. Future field-scale tests are planned in Kaltag to determine the effectiveness and costs of phytoremediation using native willows and other plants in relation to land farming methods.
White-rot fungi and bioremediation of diesel-contaminated soils: a mesocosm experiment

Christin Anderson

University of Alaska Fairbanks, Institute of Arctic Biology, Fairbanks, Alaska,

White-rot fungi are the only group of organisms known to completely mineralize lignin. Lignin, a phenolic hydrocarbon, is chemically similar to petroleum pollutants. Studies have shown that Pleurotus ostreatus, a gilled Basidiomycete, can effectively degrade petroleum using extracellular enzymes. There are technical hurdles to overcome with introducing any species to a new habitat, so I propose to test a mesocosm method of bioremediation with native and commercial strains of P. ostreatus at cold temperatures in diesel-contaminated soil collected from interior Alaska.

Bacterial community analyses of Thai tropical soils contaminated with used lubricating oil
Naruemon Meeboon\textsuperscript{a}, Sireewan Kaewsuwan\textsuperscript{b}, Mary Beth Leigh\textsuperscript{c} and Suppasil Maneerat\textsuperscript{a}
\textsuperscript{a}Department of Industrial Biotechnology, Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, 90112, Thailand
\textsuperscript{b}Marine Natural Products Research Unit, Department of Pharmacognosy and Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Prince of Songkla University, Hat Yai, 90112, Thailand
\textsuperscript{c}Institute of Arctic Biology, Department of Biology and Wildlife, University of Alaska Fairbanks 902 N. Koyukuk Dr. Fairbanks, AK 99775, USA

Abstract
Used lubricating oil (ULO) is generated from motorcycle mechanical work after servicing and subsequent draining from automobile. Currently, ULO-contaminated soils are becoming an environmental problem in Thailand. For successful in bioremediation of soils contaminated with ULO it is helpful to know environmental properties of the sites. This study investigates environmental factors in term of the physico-chemical properties of soil, the composition of ULO and the diversity of the bacterial community in ULO-contaminated soil from three motorcycle mechanic works around Prince of Songkla University, Thailand. Comparison between bacterial community structure in ULO-contaminated soils and in enrichment cultures were also performed. Culture-dependent and culture-independent approaches were used to compare the bacterial diversity present in three soils. Enrichment cultures approaches were used to optimize ULO-degrading bacteria in mineral salt medium containing ULO as a sole carbon and energy source. Genetic diversity was measured from total soil DNA, cell culture DNA and agar plate washe DNA by PCR-denaturing gradient gel electrophoresis. Gammaproteobacteria were the predominant bacteria in all ULO-contaminated soil and in all enrichment cultures. The bacterial community structures of each soil were different depending on the physico-chemical of soil and the composition of the ULO. This knowledge could provide a valuable resource for studies on bioremediation of ULO-contaminated soils.