Sep 19th, 4:00 PM - 5:00 PM

Using the Oxford Nanopore MinION (a portable DNA sequencer) for Microbial Ecology

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Rutgers University

MONTCLAIR STATE UNIVERSITY

The MSU Sustainability Seminar Series Presents:

Using the Oxford Nanopore MinION (a portable DNA sequencer) for Microbial Ecology

WHEN: Sept 19, 4:00 pm

WHERE: CELS 120 lecture hall

Dr. Lee Kerkhof

Rutgers University

Dr. Lee Kerkhof has been a Professor at Rutgers for over 20 years. His research has focused on elucidating the active microbial "players" in a variety of complex environments to understand the mechanisms driving diversity and biogeochemical processes. He uses a variety of nucleic acid based analyses to identify those microorganisms that are making ribosomes or incorporating C and N into their genomes. Recent efforts have focused on active bacteria in aeolian systems, in aquatic systems, in association with eukaryotic hosts, and in sediments/soils spanning a continuum from pure cultures, to engineered systems, to field measurements.

An approach utilizing the MinIon to sequence bacterial ribosomal operons within natural samples has been developed. Bacterial rRNA operons were amplified from 6 samples employing a mixture of farm soil and bioreactor DNA in known concentrations. Replicate extraction/amplifications (n=4) yielded over 10,000 2D sequences which were analyzed using a simplified data analysis pipeline based on NCBI Blast and assembly with Geneious software. The method could detect over 1000 operational taxonomic units in a quantitative manner. An iterative assembly scheme was developed to re- construct those rRNA operons with > 30x coverage from 30 OTUs among the Proteobacteria, Actinobacteria, Acidobacteria, Firmicutes, and Gemmatimonadetes. Phylogenetic analysis of the 16S rRNA and 23S rRNA genes from each operon demonstrated similar tree topologies with species/strain level resolution. Because the MinIon is small, portable, and runs on a laptop, the possibility of microbiome characterization in the field or on robotic platforms becomes realistic.