Faculty Excellence Speaker Series

UCF

Geobiology: Finding those microbes that make a living from the geosphere – on Earth and perhaps elsewhere!

Presented by Dr. Kenneth Nealson

DATE
Monday,
January 30, 2017

TIME
10 – 11 a.m.

LOCATION
Harris Corporation Engineering Center (HEC), Room 101

HOSTED BY
Faculty Excellence, the Office of the Provost, Genomics and Bioinformatics Cluster, and the Department of Computer Science

Geobiology is the study of the interactions between the geosphere and the biosphere, which, in the microbial world, are accomplished primarily via redox chemistry. One area where this is easily demonstrated is in the high pH springs of The Cedars, in northern California, where water emerges from the subsurface at pH 12, with low salinity, and virtually no oxygen or other electron acceptors: life shouldn't be there! However, as will be discussed, life (unusual life) is abundant there!

Studies of such extreme environments on Earth have altered our view of where and how life might exist in the universe, and the extremophilic microbes that inhabit these niches have shown us many new metabolic abilities, some of which were quite unsuspected. A repeating theme in almost every extreme environment is the interaction of microbes with solid substrates (metal oxides, minerals, charged surfaces) via a process called extracellular electron transport, or EET. EET-capable organisms are able to interact, via redox chemistry, with the insoluble part of the subsurface geosphere, harvesting energy where there was previously thought to be "none available".

These microbes are almost always involved with mineral surfaces, posing major challenges for their study – challenges that have been met with the development of a new type of microscopy, using deep ultraviolet (DUV) light. Time permitting, a brief overview of the DUV instrument (SHERLOC), which is now being prepared for the next (2020) Mars rover mission will end the seminar, and hopefully begin some discussion.

FOR MORE INFORMATION ABOUT THE SPEAKER SERIES, CLICK HERE.

Kenneth Nealson, Ph.D.
Wrigley Professor of Environmental Sciences at the University of Southern California

Kenneth Nealson, Ph.D., has done pioneering work in microbiology and geobiology. Together with Dr. JW Hastings, Dr. Nealson's work on bioluminescence in bacteria led to the discovery of bacterial quorum sensing. Dr. Nealson's work in the area of metal cycling and biogeochemistry led to the development of the field of electromicrobiology. He has published nearly 400 peer-reviewed papers, edited 3 published books, and submitted 15 patents. He has also won numerous honors and awards for his contributions to science, and has been on the advisory boards of several research organizations.