ASTROVIROLOGY: VIRAL DIVERSITY AND ECOLOGY IN EXTREME ENVIRONMENTS. Geoffrey S. Diemer, Jennifer Kyle and Kenneth M. Stedman, Biology Department, Center for Life in Extreme Environments, Portland State University, P.O. Box 751, Portland, OR 97207-0751. kstedman@pdx.edu.

We are investigating virus-host relationships and virus diversity in extreme-environment microbial ecosystems to understand the importance of viruses on primordial Earth.

Boiling Springs Lake (BSL), located in Lassen Volcanic National Park, CA, U.S.A. is a large, acidic hotspring (pH 2.5, 55C-95C) supporting a microbial ecosystem comprised of Archaea, Bacteria and several species of unicellular Eukarya [1], [2]. BSL is thus an ideal environment for discovering viruses that infect extremophilic microorganisms from the major groups of cellular life. As no viruses of extremophilic eukaryotes have yet been identified, study of BSL offers a unique opportunity for their discovery.

BSL exhibits low pH and is predicted to precipitate the iron-bearing minerals jarosite and goethite. Both minerals have recently been detected in Martian soil by the Opportunity rover [3]. These minerals are positively correlated with increased virus precipitation and binding to inorganic substrates. Thus, virus biosignatures may be present in BSL sediments.

Recent bioinformatics research has identified so-called "virus hallmark genes" that are prevalent in large groups of viruses but have few, if any, cellular homologues. Analysis of this group of viral genes suggests that viruses have ancient, possibly pre-cellular origins [4]. In conjunction with the Broad Institute, we are generating a metavirome of *ca.* 100,000 sequences from BSL sediments to address virus diversity, prevalence and presense of hallmark genes in this primordial ecosystem. A preliminary analysis of this dataset will be presented.

References: [1] Wilson, M.S., et al. (2008) *Microb Ecol*., *56*(2), 292-305. [2] Brown, P.B., Wolfe, G.V. (2006) *J Eukaryot Microbiol*, *53*(6), 420-31. [3] Klingelhöfer, G. et al., (2004) *Science, 306*(5702), 1740 - 1745 [4] Koonin, E.V., Senkevich, T.G., Dolja, V.V., (2006) *Biol Direct, vol. 1*.