

The Emerging Pathogens Institute

Presents

Mya Breitbart

Assistant Professor, College of Marine
Science, University of South Florida

Metagenomic Sequencing for Discovery of Novel Viruses

Wednesday, April 9, 2008

4:00pm - Room G-112, HPNP Building

Viruses are the most abundant biological entities on the planet and play important roles in biogeochemical cycling, horizontal gene transfer, and defining bacterial community composition. However, we are only beginning to understand the identity and diversity of viruses in the environment. Addressing this issue is difficult because there are no conserved genes that are shared in all viruses, and viruses must be cultured on hosts, many of which cannot be cultivated using standard techniques.

Viral purification and metagenomic sequencing has recently been used to examine the composition of viral communities in a variety of environments, including seawater, marine sediment, and terrestrial soil. These studies have provided insight into the identity, diversity, and geographical distribution of viruses. The majority of metagenomic sequences are not similar to those in the current databases, suggesting that environmental viruses are extremely novel and represent the largest reservoir of unknown sequence space on the planet. In addition, mathematical modeling based on the distribution of overlapping sequence fragments from shotgun libraries suggests that viral communities are incredibly diverse, with hundreds of thousands of viral genotypes in the world's oceans. Comparative analyses of viral communities from different environments suggest a shared global pool of viral diversity, with local environmental conditions enriching for certain viral types through selective pressure.

In addition to examining viruses in the environment, we have also used metagenomic sequencing to describe the viral communities present in human blood, marine animal tissues, human feces, and whiteflies. These studies have demonstrated the potential of virus purification and metagenomic sequencing to identify novel viruses in animals, including emerging infectious disease pathogens. The fields of environmental and organismal virology intersect when considering reservoirs and transmission mechanisms for viruses that infect animals and plants.

Emerging Pathogens Institute

Box 100009, Bldg. 62, Newell Drive
University of Florida Campus

Phone (352)273-7526
<http://epi.ufl.edu/>