Bettarel, Y., T. Bouvier, and M. Bouvy (2009), Viral persistence in water as evaluated from a tropical/temperate cross-incubation, *J. Plankton Res.*, *31*(8), 909-916.

In an effort to determine whether native viral assemblages are adapted to local conditions of sunlight and temperature the authors conduct transplant experiments. Viruses (fresh and seawater) from Senegal and France were exposed to natural light conditions in both environments (after 0.2 um filtration). Virus particles were enumerated by epifluorescent direct counts.

Native viruses displayed higher persistence in their native environment than exotic viruses. Surprisingly very little difference was found in persistence for virus populations (from all locations at all locations) between light and dark treatments. This suggests that some mechanism other than exposure to UV-B light is responsible for the majority of viral decay in these samples. The authors cite temperature as the likely cause, temperature sensitivity of proteases/nucleases in the media is an unaddressed possibility.

Furuta, M., J. O. Schrader, H. S. Schrader, T. A. Kokjohn, S. Nyaga, A. K. McCullough, R. S. Lloyd, D. E. Burbank, D. Landstein, L. Lane, and J. L. Van Etten (1997), Chlorella virus PBCV-1 encodes a homolog of the bacteriophage T4 UV damage repair gene denV, *Appl. Environ. Microbiol.*, *63*(4), 1551-1556.

Using analysis of the complete phage genome the authors report that PBCV-1, which attacks the unicellular marine algae *Chlorella*, contains a homolog of denV (*A50L*). This gene (*denV*) codes for endonuclease V. Endonuclease V is the first protein in a light independent, error free repair mechanism. Since *Chlorella* contains a photolyase gene, A50L allows PBCV-1 access to two repair mechanisms.

An *A50L* deficient mutant of PBCV-1 was used to demonstrate enhanced persistence in the wild type strain under UV damaging conditions. Persistence of the wild type was significantly enhanced, this is attributed to access to the second UV damage repair mechanism.

Sano, E., S. Carlson, L. Wegley, and F. Rohwer (2004), Movement of viruses between biomes, *Appl. Environ. Microbiol.*, *70*(10), 5842-5846.

This study investigates whether viruses from one environment can find hosts in another. Virus concentrates were prepared from seawater, freshwater, and soil, and cross incubated into media containing hosts from other environments. Controls against prophages and indigenous viruses consisted of host cells cultured in dialyzed media.

The authors found wide variability among replicates from each site, however in almost all cases phages appeared to find suitable hosts. The single exception involved a seawater to seawater cross incubation, the authors attribute this negative result to a low number of phage particles in the inoculate. The results of this study suggest that phage diversity is controlled by more than just host diversity, ie that phage particles have at least some ability to infect across widely differing microbial communities.

Wilhelm, S. W., M. G. Weinbauer, C. A. Suttle, R. J. Pledger, and D. L. Mitchell (1998), Measurements of DNA damage and photoreactivation imply that most viruses in marine surface waters are infective, *Aquatic Microbial Ecology*, *14*(3), 215-222.

UV-B is the most damaging light for virus particles in the sunlight marine environment. The most mutagenic and lethal effects of UV light on phage particles are alteration of the viral genome through

production of cyclobutane dimers and pyrimidine-pyrimidone photoproducts. Blue light mediated photoreactivation can restore infectivity to damaged phages. Photoreactivation involves the error free repair of DNA, this is superior to the error prone RecA mediated repair processes.

Phage isolates of marine Vibrios were exposed to UV-C light and the abundance of cyclobutane pyrimidine dimers and the loss of infectivity were measured. DNA photodamage was also assessed within an environmental sample. This data was used to model infectivity of the natural viral assemblage throughout a solar day.

The authors found that 50% of viruses in natural communities should be infective despite high rates of DNA damage. In addition the authors demonstrate a correlation between mixing depth and the accumulation of cyclobutane dimers.

Wommack, K. E., R. T. Hill, T. A. Muller, and R. R. Colwell (1996), Effects of sunlight on bacteriophage viability and structure, *Appl. Environ. Microbiol.*, *62*(4), 1336-1341.

Viruses are often enumerated either through measurements of infectivity (tieters) or via direct counts. Specific applications of the results of these enumerations might call for a different technique if direct counts and tieters do not agree. For example understanding viral effects on biogeochemistry might require a quantitative analysis of capsids, while understanding ecological effects might require an estimate of infective particles. The authors enumerated phage isolates by both methods as the particles degraded under natural light.

The authors found that the two isolates degraded (as PFUs) under natural light, though at different rates. Direct counts exceeded viable counts in all cases under surface light conditions. In treatments where the isolates were not exposed to natural light differences between viable and direct counts were statistically insignificant.