Proc. NIPR Symp. Polar Biol., **8**, 65, 1995

BACTERIAL AND VIRAL DYNAMICS IN ARCTIC SEA ICE DURING THE SPRING NEAR RESOLUTE, N. W. T. (ABSTRACT)

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High virus counts were found in Arctic sea ice samples taken during the spring ice algal bloom near Resolute, Northwest Territories, Canada. Viral abundances in the sea ice ranged from $4.6\times10^{11}\,m^{-2}$ (or $1.1\times10^{7}\,ml^{-1}$) to 5.9×10^{12} viruses m^{-2} (or 1.6×10^{8} viruses ml^{-1}) which is 10- to 100-fold greater than the concentration of viruses in the underlying water column (1.4×10^{6} viruses ml^{-1}). This increase in viral abundance corresponds with the 10- to 1000-fold increase in bacterial abundance in sea ice as compared with the water column. Bacterial abundances ranged from $6.1\times10^{9}\,m^{-2}$ (or $1.5\times10^{5}\,ml^{-1}$) to 4.2×10^{11} bacteria m^{-2} (1.0×10^{7} bacteria ml^{-1}) from early to late spring respectively. The virus-to-bacteria ratios (VBR) were among the highest observed in natural samples to date. The greatest viral abundances occurred in the 0.5–1.5 cm layer of the ice profile, where the bacteria were most active. The VBR generally decreased during the spring although viruses were increasing in abundance. The disequilibrium between phage and bacterial growth and abundance maxima during the spring bloom is suggested to be due to a) a change in the makeup of the bacterial community, such that phage-resistant bacteria proliferated later in the spring, or b) a dependence of viral lytic activity on bacterial cell-specific growth rates; both declined later in the spring as the bacterial population reached its peak. Viruses may play an important role in nutrient and carbon cycling within the ice, particularly in the early spring when the VBR is very high.

(Received July 28, 1994)