70a Force Interactions Profiles between Cryptosporidium Parvum Oocysts and Silica Surfaces

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The interaction force profile between single Cryptosporidium parvum oocysts and silica particles were measured in aqueous solutions using an atomic force microscope. The oocysts were immobilized during the measurements by entrapment in a Millipore polycarbonate membrane with 3 μm pore size. Experiments were performed in both NaCl and CaCl2 solutions at ionic strengths ranging from 1 to 100 to mM. For both electrolytes, the decay length of the repulsive force profile, obtained via the slope of a plot of the logarithm of the interaction force versus oocyst/substrate separation, was found to be essentially independent of the ionic strength and always much larger than the expected Debye length of the system. In addition, the magnitude of the force was found to be essentially the same for both electrolytes, suggesting that the long-range repulsive forces are strictly steric in nature. The only apparent difference between experiments in the two electrolytes was that strong adhesive forces were frequently observed in the calcium solutions. Comparisons of these results with recent particle deposition studies will also be made.