Effects of cholesterol and unsaturated DOPC lipid on chain packing of saturated gel-phase DPPC bilayers. JOHN NAGLE, THALIA MILLS, Carnegie Mellon University, JUYANG HUANG, Texas Tech University, GERALD FEIGENSON, Cornell University — Wide angle x-ray scattering (WAXS) from oriented lipid multilayers was used to study the effect of adding cholesterol (Chol) or DOPC to gel-phase DPPC bilayers. Small quantities ($X < 0.10$ mole fraction) of both molecules disrupt the tight packing of tilted chains of pure gel-phase DPPC, forming a more disordered, untitled phase. The addition of larger quantities of DOPC causes the sample to phase-separate into a gel phase, characterized by a narrow WAXS peak, and liquid disordered phase, characterized by wide, diffuse WAXS scattering. In contrast, two WAXS peaks indicative of two coexisting phases were not observed in Chol/DPPC mixtures ($X_{Chol} = 0.07$ to 0.40). Instead, Chol caused a gradual increase in the width of the WAXS peak, consistent with a gradual change from a more gel-like to a more liquid-like state rather than passing through a region of two phase coexistence. Our WAXS data include a huge amount of information. A new method of analysis suggests that WAXS data may provide definitive results relating to the disagreements between previously published phase diagrams for Chol/DPPC.

1Supported by NIH GM 44976 (JFN) and NSF MCB-0315330 (GWF).