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Cholesterol Effect on Phase Behavior in Ternary Lipid Membrane—X-ray Diffraction and AFM.[1] JING YUAN, ALEX KISS, YOHANES PRAMUDYA, LAM NGUYEN, LINDA HIRST — There is growing evidence that lipid membranes are not uniform, but contain lipid microdomains or "rafts", which are enriched in cholesterol, saturated long-chained lipids, and particular proteins. The effects of cholesterol on lipid ordering and phase separation in lipid-rafts-contained model membrane systems have been investigated by Synchrotron X-ray Diffraction and Atomic Force Microscope (AFM). We have measured bilayer d-spacings in two ternary lipid mixtures: DOPC/eSM/Cholesterol and DOPC/DPPC/Cholesterol, as cholesterol content is varied. Mixtures containing intermediate amounts of cholesterol exhibited two phases, and for DOPC/eSM/Cholesterol with 10% and 12% cholesterol, three d-spacings were observed, indicating the possible coexistence of three different phases: liquid disordered (ld) phase, liquid ordered (Lo) phase, and gel phase. AFM images of supported lipid bilayers on mica substrates contained clearly visible raft-like micro-domains in the similar cholesterol amount range.

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