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**Hydrophobic Mismatch and Phase Transition in a Membrane Composed by a Mixture of Linear and Bola Phospholipids** GABRIEL LONGO, IGAL SZLEIFER, Department of Chemistry, Purdue University — Archeobacteria are microorganisms that can survive and proliferate in extreme habitats, such as high salt concentration environments, anaerobic conditions, and high or low temperatures. A membrane composed of bolaform phospholipids is what gives these unique survival qualities to the bacteria. The nature and composition of this membrane has not yet been elucidated. In this work, a membrane composed by a mixture of linear and bola phospholipids is studied using a molecular theory. The effect of changing the fraction of bolaform phospholipids, as well as the length of the hydrocarbon chain of the linear lipid are studied. A phase separation in the mixture between a thin bola rich membrane and a thick linear rich membrane is found. The thin membrane is mainly composed by “spanning” bola molecules whose polar heads are in opposed hydrophilic regions of the membrane. The phase separation is only present when the hydrocarbon chains of both molecular species have comparable sizes. The driving force for the phase separation is the size matching between the hydrophobic chains of the linear phospholipid and the spanning bola lipid.

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