7. (15 pts) ***Tetrahymena*** is a free-living, unicellular, ciliated organism that normally lives and thrives at 18-22ºC. If these creatures are suddenly transferred to an environmental temperature of 8ºC, they die. However, if the temperature is lowered gradually to 8ºC over a period of several days, most survive and continue to grow, albeit at a slower rate.

Many changes characterize the gradual adaptation of these organisms to lower temperatures. In particular, their amphipathic lipids are found to contain fatty acids with shorter hydrocarbon chains and more unsaturated hydrocarbon bonds than found in cells frowing at 18ºC.

A. (10 pts) Discuss specifically **how** these changes in lipid composition most likely contribute to survival at the lower temperature.

B. (5 pts) If you were to extract the amphipathic lipids from *Tetrahymena* grown under the 2 temperature regimes and spread them out in a monolayer, how would you expect the average surface areas occupied by each lipid to compare?