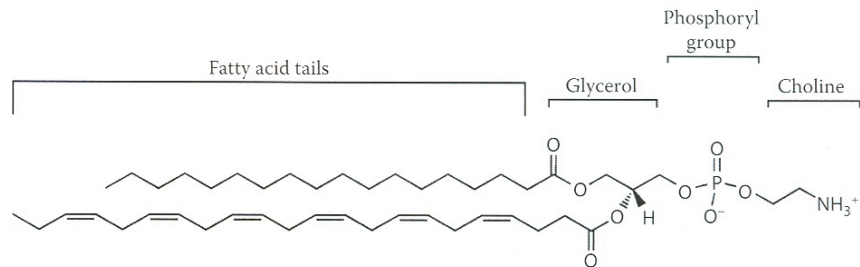


# Lipids [pln59]

Chemical structure of (zwitterionic) phospholipid:



[image from Hirst 2013]

Lyotropic phase behavior largely governed by shape of particular lipid (cone vs cylinder, see [psl14]). Thermotropic phase behavior in plane of bilayer somewhat akin to liquid crystals.

Sequence of common phases realized as  $T$  rises:

- Subgel phase  $L_{c'}$  is pseudo-crystalline with translational and rotational motion of lipid molecules severely restricted. Headgroups show hexagonal LRO.
- Gel phase  $L_{\beta'}$  allows for some rotational motion of lipid molecules. Headgroups show orthorhombic LRO. Tails may be tilted away from normal to plane of bilayer.
- Ripple phase  $P_{\beta'}$  features ripples perpendicular to plane of bilayer.
- Liquid crystal phase  $L_{\alpha}$  is fluid-like. Headgroups are further apart and have positional SRO, similar to smectic-A liquid crystals. Lipid molecules are free to diffuse.

Lipid bilayers at room temperature typically are in phase  $L_{\alpha}$ . Melting transition between  $L_{\beta'}$  and  $L_{\alpha}$  is of first order with measurable latent heat.

[gleaned from Hirst 2013]