



Chiral enrichment in a protocell model system with multiple enantioselective lamellae

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Abstract: Modern living organisms are organized into cells. Indeed, life can be regarded as a property that emerges when a replicating genome is encapsulated in a semi-permeable membrane that undergoes spontaneous growth and replication. Since compartmentalization seems to be a stepping-stone toward the origin of life, it is of special interest to study mechanisms that favor one substrate over another in protocell systems.

It was recently found that chiral membranes are more permeable for one enantiomer than the other for prebiotically plausible amino acids. Does a vesicle having multiple enantioselective lamellae receive amplified enrichment? If so, under what conditions is enrichment amplified and sustained over time?

To answer these questions, we modeled the effect of multiple lamellae on permeability differences across a protocell membrane using partial differential equations and numerical simulations.

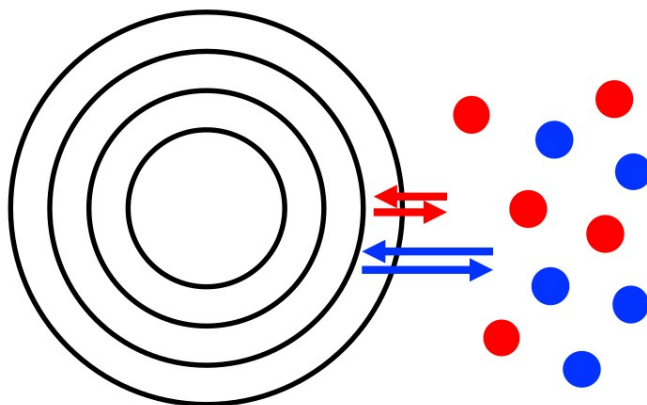


Figure 1. Representation of a protocell model system with multiple enantioselective lamellae.