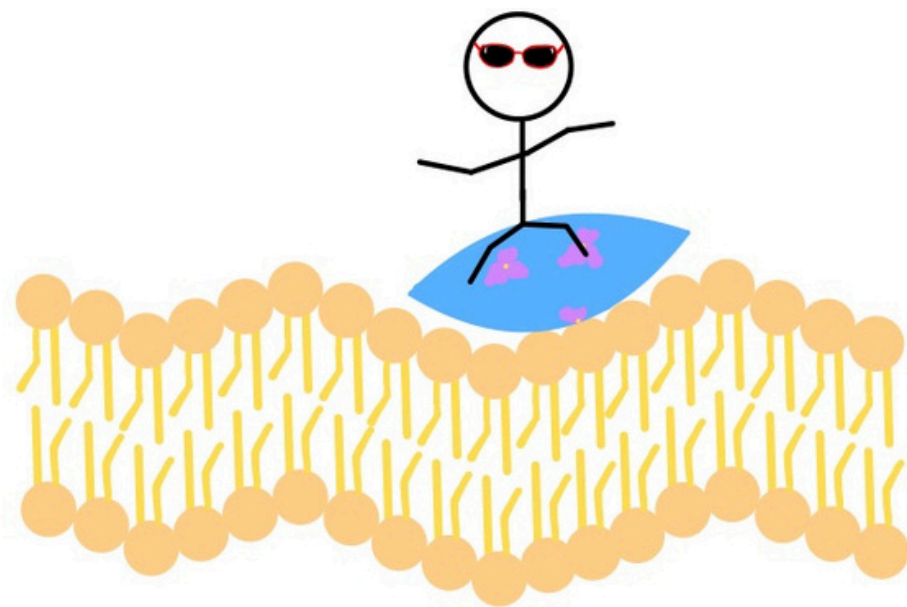


Lipid Membrane Fluidity Mini Lesson

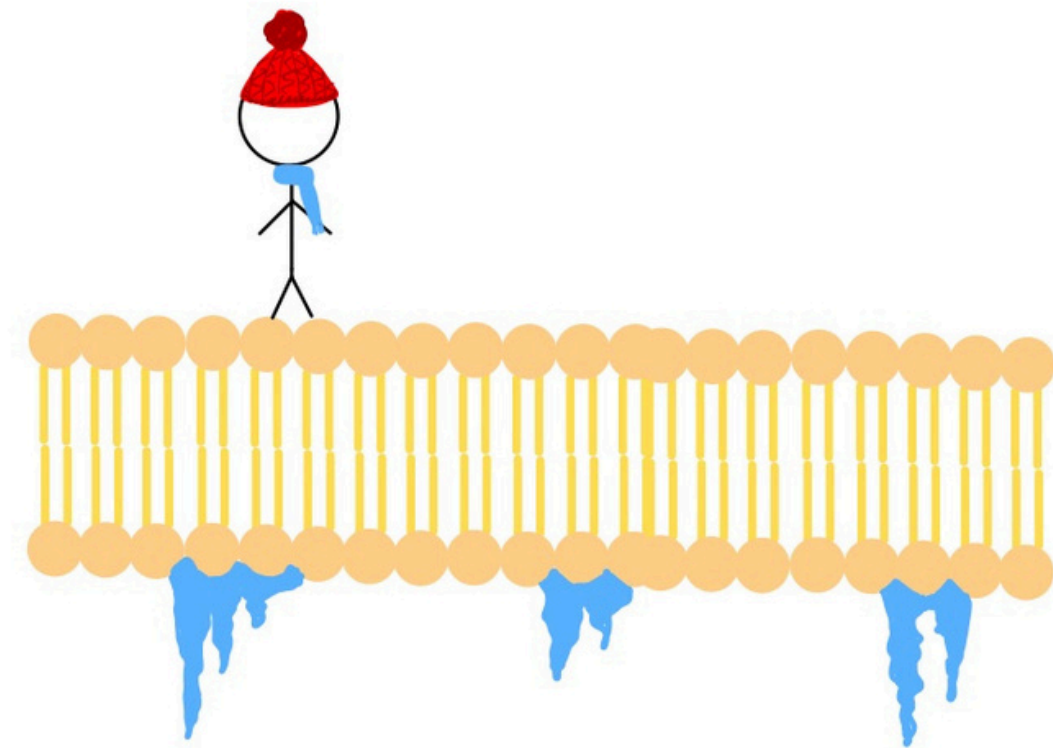
For: Undergraduate Biology Students

Time: ~ 15-20mins

The Question: How does lipid structure affect the fluidity of a lipid membrane?



VS



Student Activity

How does lipid structure affect the fluidity of a lipid membrane?

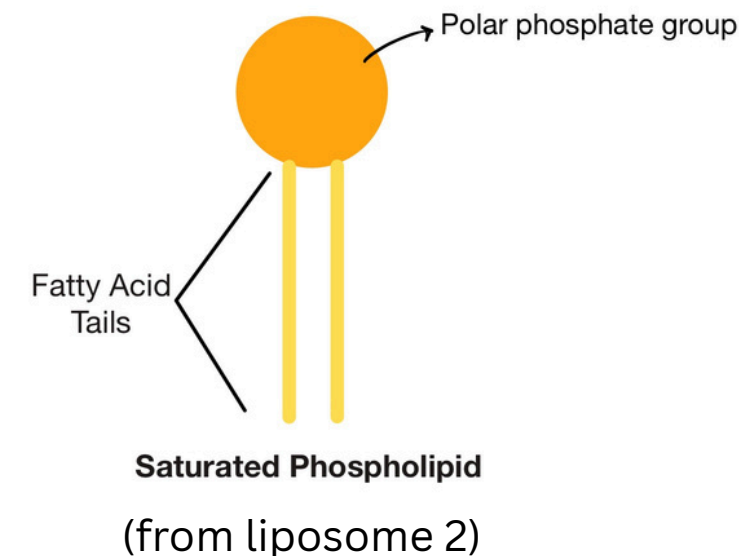
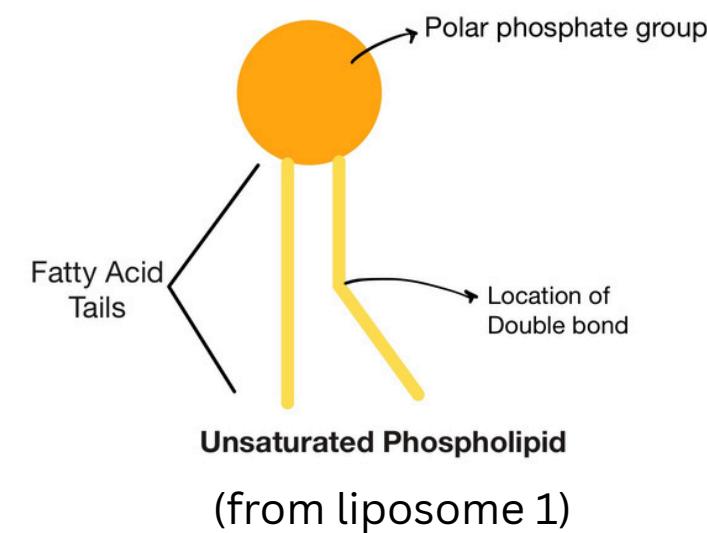
1. Read Me!

Scientists are observing synthetic lipid membranes called liposomes (Nsairat et al., 2022). While observing these membranes they notice that some liposomes have a more rigid structure at lower temperatures. They decide to compare two liposomes.

2. Predict

First, predict why one liposome might be more rigid at lower temperatures.

3. Examine



4. Explain

Using the provided images of the basic structure of a phospholipid; Determine which liposome (1 or 2) will be more stable at lower temperatures and why.

5. Reflect

This example used a model containing only phospholipids, however normal cell membranes contain other biomolecules such as proteins and cholesterol (Ramroop, 2023). How might observing a purely phospholipid membrane in varied temperatures differ from observing a typical cell membrane that includes proteins and cholesterol?

Teacher Guide

Main Goal

The main goal of this activity is to encourage students to think about structure and function in relation to biological membranes, using an easily visualizable example.

Materials

Provide students with the previous page

Facilitation Notes

- Use this mini lesson to check understanding of lipid membrane structure and function and encourage critical thinking of biological membranes.
- Give students 5 mins to read and predict, 5 mins to examine and explain, and 5 mins to reflect.
- Can add 5 mins of class discussion if desired.

Accessibility

- Provide enlarged images and text
- Allow for students to explain their answers verbally, visually, or in a written form.
- Encourage students to work together, but allow students to work individually.
- Print off the previous slide and provide students with paper to work on

Expected Conclusions

Students should conclude that liposome 1 will be more stable in lower temperatures due to decreased tight packing in unsaturated lipids membranes allowing for greater fluidity (Ramroop, 2023). Additionally, students should come up with the general conclusion that studying a purely phospholipid membrane does not account for the many proteins and cholesterol molecules true biological membranes contain and that the addition of these molecules have a further effect on lipid membrane function and fluidity (Ramroop, 2023).

UNSDG 4 Connection

By collaborating on ideas with peers, it invites active learning in a welcoming environment. Additionally, this lesson is low cost and does not require specific materials allowing for a sustainable lesson that can easily be used in subsequent years.

References

- Ramroop, N. (2023, February 24). 7.1 The plasma membrane components and structure. Pressbooks.Tru.Ca; Pressbooks. <https://openintrobiology.pressbooks.tru.ca/chapter/unit3-4-1/>
- Nsairat, H., Khater, D., Sayed, U., Odeh, F., Al Bawab, A., & Alshaer, W. (2022). Liposomes: Structure, composition, types, and clinical applications. *Heliyon*, 8(5), e09394. <https://doi.org/10.1016/j.heliyon.2022.e09394>