

Chem 452 - Lecture 8

Lipids and Cell Membranes

Part 2

Question of the Day: How are phospholipids and sphingolipids similar and how are they different?

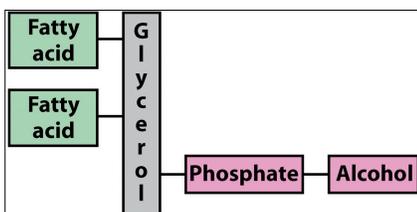
Membrane Lipids

- + Phospholipids
- + Sphingolipids
- + Sterols

Chem 452, Lecture 8 - Lipids and Cell Membranes 2

Membrane Lipids

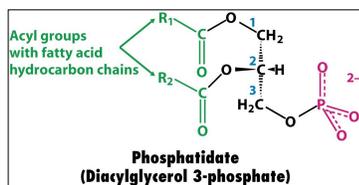
- + Phospholipids
- + Sphingolipids
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Chem 452, Lecture 8 - Lipids and Cell Membranes 3

Phospholipids

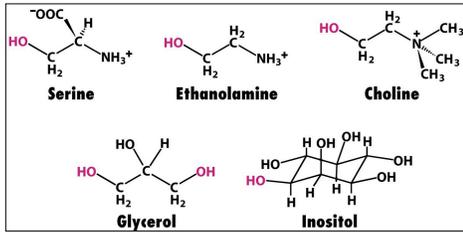
- + Core structure of a phospholipid



Chem 452, Lecture 8 - Lipids and Cell Membranes 4

Phospholipids

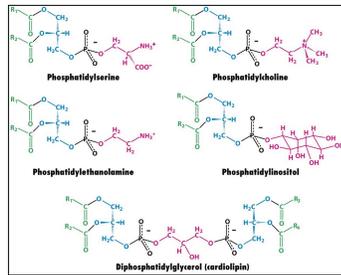
† The phosphate usually forms a phosphate ester with an alcohol.



Chem 452, Lecture 8 - Lipids and Cell Membranes 5

Phospholipids

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Phospholipids

Question:

Draw the structure for the phospholipid phosphatidylethanolamine with a palmitoyl (16:0) acyl group at position 1 and an oleoyl (18:1 cis- Δ 9) acyl group at position 2.

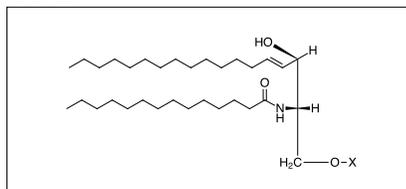
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Membrane Lipids

† Phospholipids

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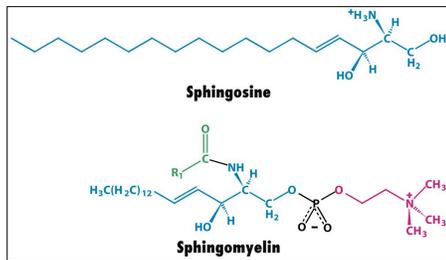
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Sphingolipids

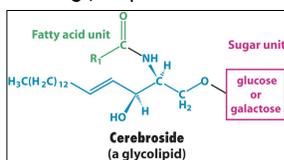
- Core is built on sphingosine instead glycerol.



Chem 452, Lecture 8 - Lipids and Cell Membranes 9

Sphingolipids

- Sphingolipids often are attached to carbohydrates (glycolipids).

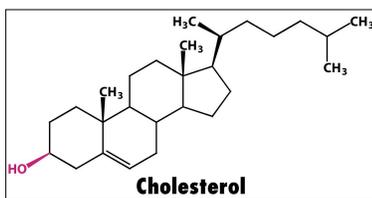


- Glycolipids are prevalent in nerve tissues and are associated with many neurodegenerative diseases.

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Membrane Lipids

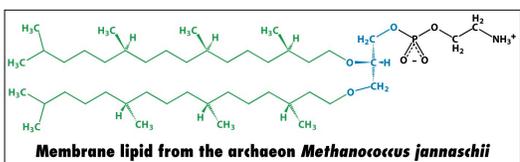
- Phospholipids
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Chem 452, Lecture 8 - Lipids and Cell Membranes 11

Membrane Lipids

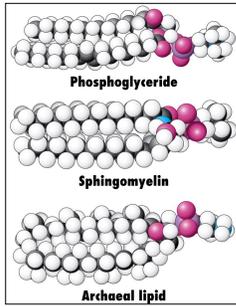
- The structure of membrane lipids is a feature that distinguishes Archean organisms from Eukaryotes and Bacteria.



Chem 452, Lecture 8 - Lipids and Cell Membranes 12

Membrane Lipids

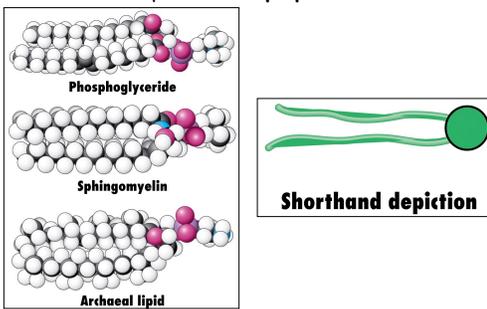
† Membrane lipids are **amphipathic**.



Chem 452, Lecture 8 - Lipids and Cell Membranes 13

Membrane Lipids

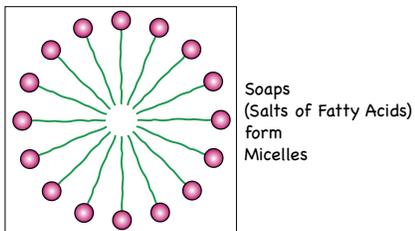
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Chem 452, Lecture 8 - Lipids and Cell Membranes 14

Membrane Lipids and Water

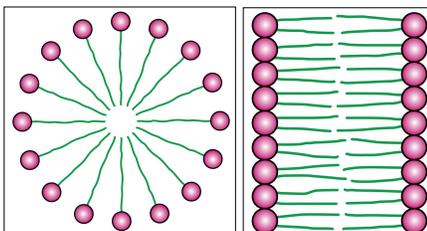
† Membrane lipids self assemble into lipid bilayers when exposed to aqueous environments.



Chem 452, Lecture 8 - Lipids and Cell Membranes 15

Membrane Lipids and Water

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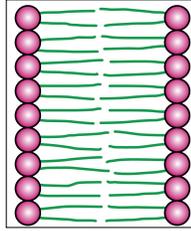


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Membrane Lipids and Water

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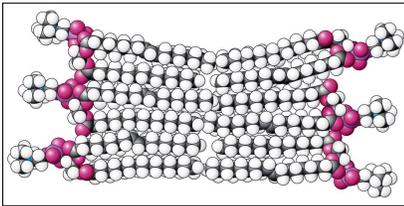
Membrane Lipids form Bilayers



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Membrane Lipids and Water

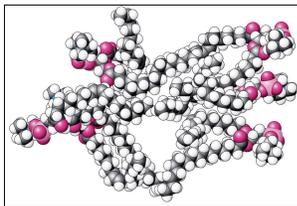
- Membrane lipids self assemble into lipid bilayers when exposed to aqueous environments.
- The process is driven by hydrophobic interactions and stabilized by vander Waals interactions.



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Membrane Lipids and Water

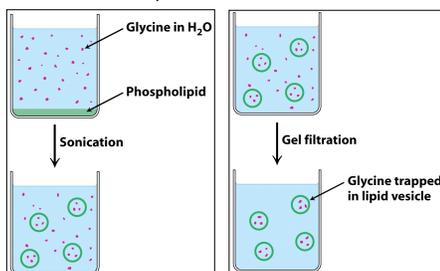
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Membrane Lipids and Water

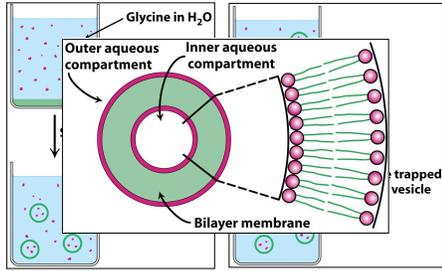
- In the lab, membrane lipids can be used to make vesicles (liposomes).



Chem 452, Lecture 8 - Lipids and Cell Membranes 18

Membrane Lipids and Water

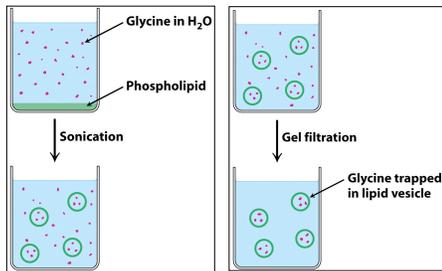
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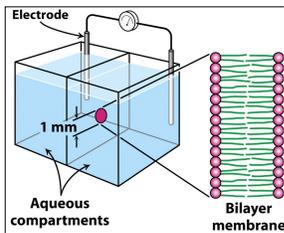
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Membrane Lipids and Water

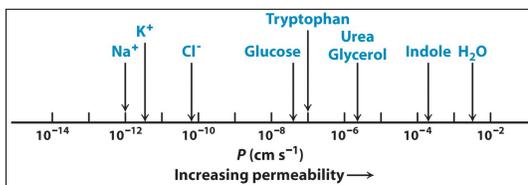
† Another way to study membranes in the lab is to suspend it across a hole.



Chem 452, Lecture 8 - Lipids and Cell Membranes 19

Membrane Lipids and Water

† Lipid membranes display a wide range of permeability's to small molecules.



Chem 452, Lecture 8 - Lipids and Cell Membranes 20

Next up

- + Unit IV, Lecture 8 - Lipids and Cell Membranes, cont'd. (Chapter 12)
 - The roles that proteins play in cell membranes.