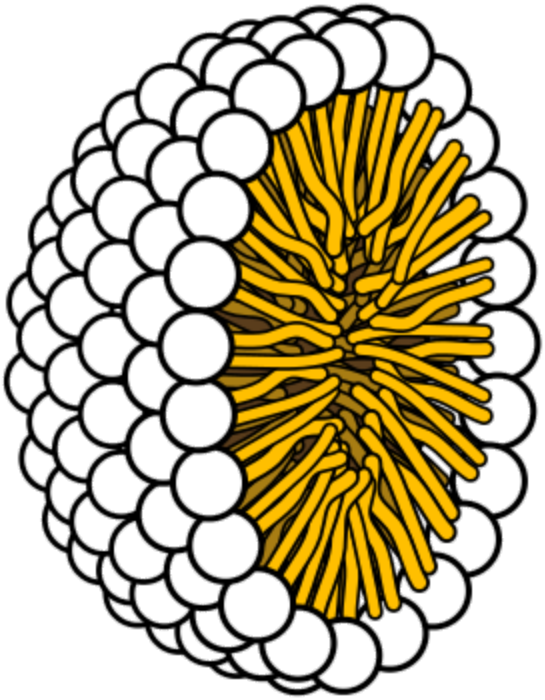
Please put questions here:

Can you further explain how DNA is directional?

Please put your names here:
ANONYMIZED FOR WEBSITE

Reminder that I am here to help you learn - even if you haven't reached out before - you can email me over the weekend and I'll do my best to get back to you before the exam. Your classmates are a resource too - that's why you have a groupchat or whatever - so you can work together. These small group blackboard collaborate rooms are always open and you all can study together, if you want, any time.

Imagine evolution had taken a different course. Instead of a plasma membranes as we know them, living things were built off of a unit that looks like this:



1. **What do you think the white circles represent? What about the yellow squiggles?**

The hydrophilic parts of the phospholipids which is the phosphate group and glycerol. The yellow parts are the hydrophobic parts which are the fatty acids.

I think the white circles represent polar molecules and the yellow squiggles represent nonpolar molecules separated from water.

2. **How is this structure different from the plasma membrane of your cells?**

- This structure is different from the plasma membrane of our cells because our plasma membranes are made up of a bilayer, while this membrane is only one layer of phospholipids. This is a big difference because our phospholipid bilayer allows us to have an aqueous, watery solution on the inside of our cells because the polar heads can interact with it. However, this membrane would have to have a nonpolar environment within its cells.

3. **How would this structure interact in an aqueous environment?**

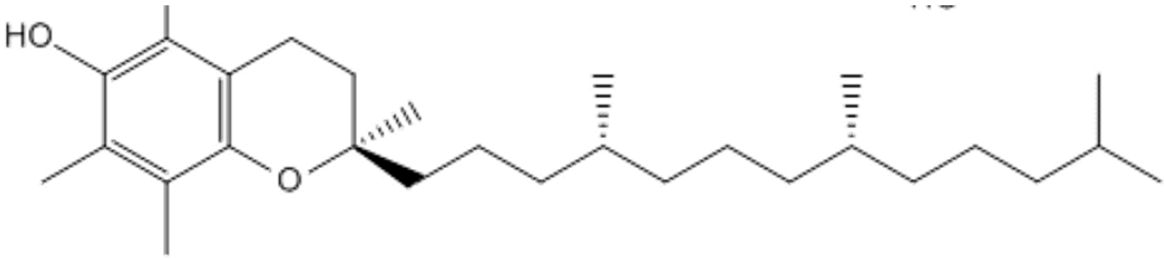
It would react the same with the environment around it as there is still an outside part of the membrane that can control what is going into the cell.

- The hydrophilic heads would be attracted to the water and the hydrophobic tails on the inside would avoid water

4. **What do you think the inside of this structure is like? Describe what you can infer about the "cytosol" of this structure. How is it different from the intracellular space of your cells?**

The inside of this structure is nonpolar and most likely aqueous. It is similar to our cells now as they are nonpolar in the cytosol.

Comment from Dr. Kline: You're halfway there! The inside of the structure is indeed nonpolar! But remember that aqueous solutions are POLAR



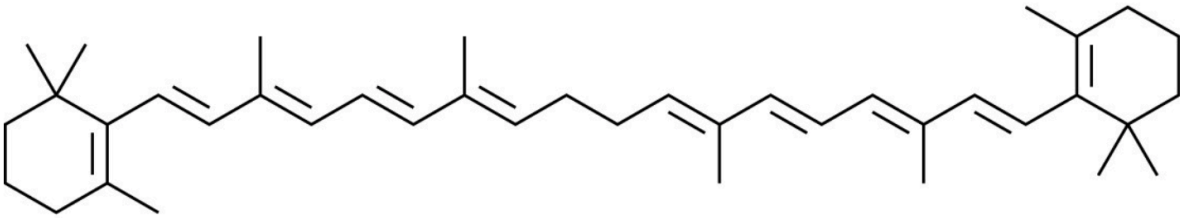
5. **This is vitamin E. First of all, what do these jagged, zig zagging lines represent? We haven't talked about this in class, but because you have all either taken chem before or are taking it now, I'm hoping you know. If not, work together to determine what these lines mean.**

   That is a carbon chain.

6. **How do you think vitamin E would interact with the structure we're assessing - how would vitamin E be oriented relative to the alternative evolution structure?**

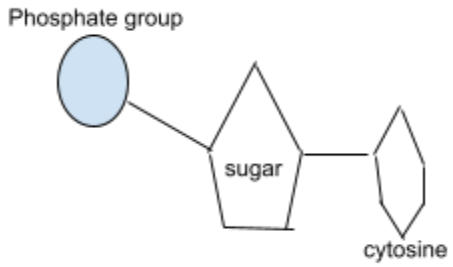
- Vitamin E would be oriented within the membrane so that the carbon rings interact with the polar heads and the carbon chain interacts with the nonpolar tails. This is because the hydroxyl group on the carbon rings is polar while the hydrocarbon chain is not.

7. **This is beta carotene. Where would beta carotene fit in an interaction with this alternative evolution structure?**



- The beta carotene would probably only interact with the nonpolar tails of the membrane because the molecule is nonpolar due to it being a hydrocarbon.

Okay new set of questions - no longer dealing with those pictures above. Please diagram the parts of a nucleotide - have someone in your group draw and insert an image (pls don't copy in a google image search I mean you can but I think that's unlikely to help you learn)



What is a nucleoside?

- A nucleoside is a molecule with a nitrogenous base and a 5 carbon sugar but it differs from a nucleotide because it does not contain a phosphate group.

How are nucleic acid monomers attached to form a DNA or RNA molecule?

- Nucleic acid molecules are formed through a phosphodiester linkage where two monomers through dehydration synthesis link the phosphate group of one monomer and the sugar of the other monomer together

There are 2 types of chemical linkages that hold the DNA double helix together. What are they?

- Covalent bonds and Hydrogen bonds

Where are these two types of linkages found in the double helix?

- The covalent bonds are between each strand (the backbone)
- The hydrogen bonds are between two strands and require the base from each

What is complementary base pairing?

- Complementary base pairing is used during DNA replication when a single strand of bases is used to pair to the complementary nitrogenous bases to form a new strand of DNA.

What does it mean when people say "DNA is directional"? What part of the nucleotide give DNA its directionality?

- DNA is directional → the chemical orientation from one end to another of one strand of nucleic acid (5' to 3' for DNA and RNA)
- Again, 5' - 3' is referring to the orientation of the nucleotides (of one single strand of DNA/RNA).
- 5' and 3' are referring to the 5th and 3rd carbon atoms in the sugar ring in either DNA or RNA

Why do you think it matters that purines pair with pyrimidines? Why can't 2 pyrimidines H bond in DNA?

Purine-pyrimidine pairing is just the right size to be able to fit in the space separating the sugar-phosphate backbones of DNA. A Purine-Purine pairing would be too wide and a Pyrimidine-Pyrimidine pairing would be too narrow.