Plan for Labs on April 9 and 11

Note: These notes are not self-explanatory. I will elaborate in the lab as needed.

1. Discuss **handedness** with CHClBr as an example.

2. Build **thalidomide**'s left and right-handed versions using long bonds. See page 10 of our molecular diagrams handout for its structure.

3. Build **amino acids** shown on page 7 of our molecular diagrams handout. Outside of water or blood, the O^- has a hydrogen attached, but within our blood that H leaves the oxygen. On the other hand, the NH_3^+ is an NH_2 outside of the blood, but acquires an additional H in our blood. We will make to out-of-blood molecule using a 3-hole pyramidal nitrogen. Later when we use it to make a peptide bond to the OH head of another amino acid, we will change it to a triangular nitrogen. Some amino acids have NH_2 tails which should be made with a 3-hole pyramidal nitrogen.

We will make it with all short bonds. When that is done, the carbon connected to the double-bonded oxygen will need to be a 3-hole triangular carbon. The double bond will no longer be obvious. Other double bonds with carbon need to have a similar modification.

Double bonds involving a nitrogen will need to use a 2-hole nitrogen.

We will build the polypeptide oxytocin shown at the bottom of page 7. It requires the following 9 amino acids with construction divided among the student groups:

Glycine
Leucine
Proline
Cysteine (2 required)
Tyrosine
Isoleucine
Glutamine
Asparagine

We will watch a **TED talk** about oxytocin ("Paul Zak: Trust, morality - and oxytocin" at *https://www.youtube.com/watch?v=rFAdlU2ETjU)* which will explain why I call it "Love Potion Number 9" after an old 1960's song.

As it is assembled, each peptide bond between an OH and NH_2 will free a water molecule.

4a. We will then watch some **animations about cell replication** linked at http://yosemitefoothills.com/Science-1A/Lab-13-NucleicAcidsAndDNA/ .
(If we are short of time, those will be watched after Spring Break when after making ice cream.)

4b. Next, we will build the **four nucleotides of DNA** (adenine A, guanine G, cytosine C, and thymine T) shown on page 9 of our molecular diagrams handout. These will also be build in the short bond style where the double bonds are not explicitly shown. As before, carbon with a double bond must be

made with a 3-hole triangular carbon, and nitrogen with a double bond must be made with a 2-hole nitrogen.

The nucleotides are paired as AT and GC as shown at the bottom of page 9 and connected using our purple hydrogen bonds, 2-hole hydrogens, and 3-hole triangular nitrogens.

Deoxyribose sugars will be made by each group using our experience with sugars in last week's lab.

The **phosphate groups** used in the double backbone of DNA will need to be made with 4-hole phosphates. Their double-bonded oxygen will not be distinguished from their other oxygens because we are using short bonds.

These can be assembled to make the stairs of DNA. See the various images linked at http://yosemitefoothills.com/Science-1A/Lab-13-NucleicAcidsAndDNA/ .

The stacking of these stair steps, held together by the pair of phosphate backbones, make DNA. The hydrogen bonds provide an easily broken "zipper" between the two strands which can then be used to each make copies as explained in the videos.