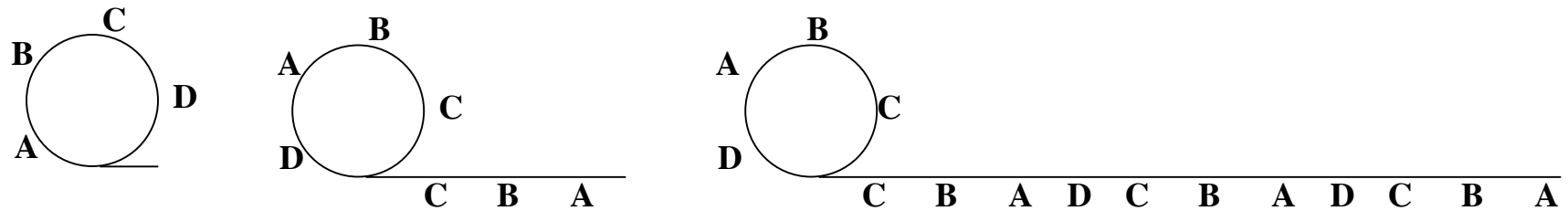


- *What is the major functional difference of Theta vs. Rolling-Circle replication, specifically in regards to the tandem linear repeats found in the R-C replication. You won't be responsible for this. Rolling-circle replication may not stop after making one complete genome. This happens in some bacteriophage, in making extrachromosomal copies of the nuclear rRNA genes in some eukaryotes, and possibly in some chloroplasts and mitochondria. It can be used to amplify a genome for various purposes. It has some interesting genetic consequences.*



- *Do we need to know all of the information about the lac operon (i.e. lac Y does ...) and the lac operon mutants?*

Yes. You need to understand the function of *lacI*, *P*, *O*, *Z*, and *Y* well enough to infer the phenotype of a haploid or diploid cells from their genotypes with respect to the various *lac* mutants described in the text.

• *Do we need to know the information about the scientists/researchers and who found what?*

Not for this exam. However in the next set of lectures I will make a timeline of major discoveries and add names and dates to it as we proceed. You will need to know those. Of the names we have encountered thus far, Mendel and Watson & Crick will be on it.

• *Can you explain conserved regions again.*

A conserved sequence or region is one that varies only a little between species, and even less within species. They are usually functionally important sequences. We will discuss this in detail, and explain why, in the section on population and evolutionary genetics.

• *What would you like us to know about the Wobble mechanism?*

Only that some bases in the anticodon of tRNAs can form H-bonds with more than one base in the third codon position of mRNA, and this is one of the reasons why the code is degenerate.

• *Do we need to know what happens during meiosis in an animal? Like that spermatogonia change into something else?*

Yes, you need to know the names of the cells at each stage of meiosis in both male and female animals.

On the sample exam, question 6 states the Methionine is the N-terminal amino acid in β -globin. My question: is Methionine the N-terminal amino acid in everything or just β -globin?

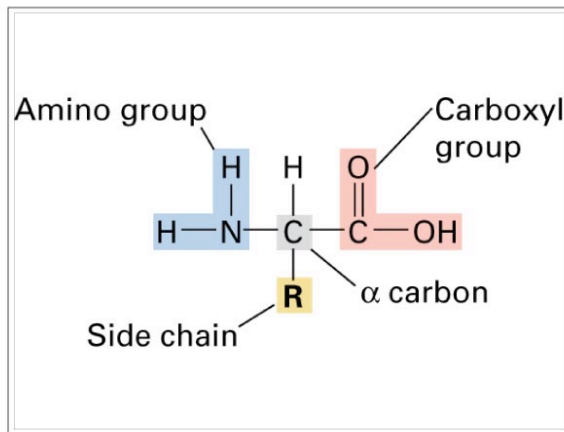
Yes, although in some cases a protein may undergo processing that removes some of the N-terminal amino acids. The N-terminal Met might be modified in some plants so it becomes one of the odd amino acids other than the 20n in the code; I'm not sure. Remember that ATG (AUG) is always the start codon.

Also in the notes you stated that: Polypeptide is made N-terminal to C-terminal...but I cant see that very clear on the diagram....can you go over it a little to make sure I have it right? See text p. 400-401.

R1 is $\text{CH}_2\text{-CH}_2\text{-S-CH}_3$
How do I know this?

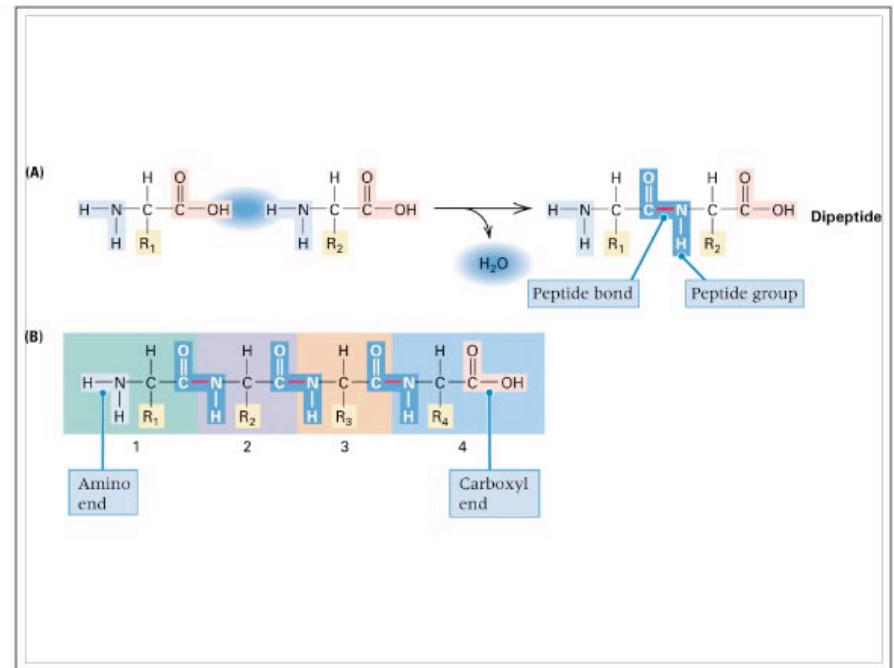
Amino acid structure

Figure 10.01



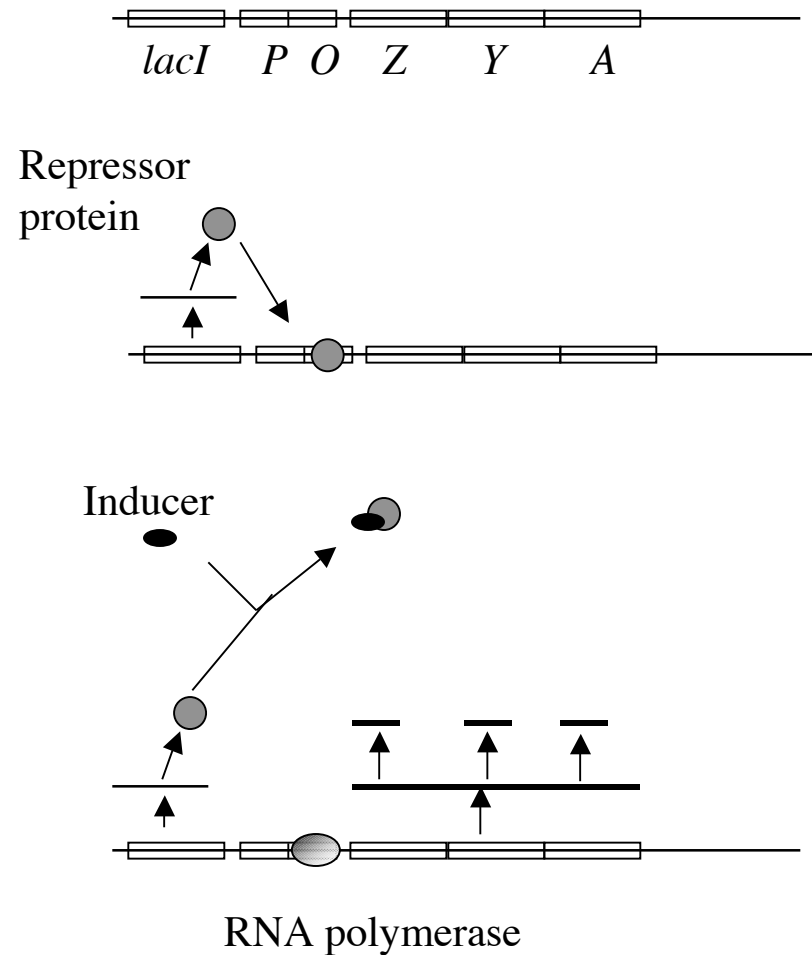
Properties of a polypeptide chain

Figure 10.03



Simple Model of *lac* System

Genotype	Nature
<i>lacZ</i> ⁻	Null mutation in <i>lacZ</i>
<i>lacY</i> ⁻	Null mutation in <i>lacY</i>
<i>lacO</i> ^c	<i>lacO</i> can't bind repressor; constitutive (always on)
<i>lacP</i> ⁻	Promoter can't bind RNA polymerase; operon not transcribed
<i>lacI</i> ^s	Repressor can't bind inducer; super-repressor

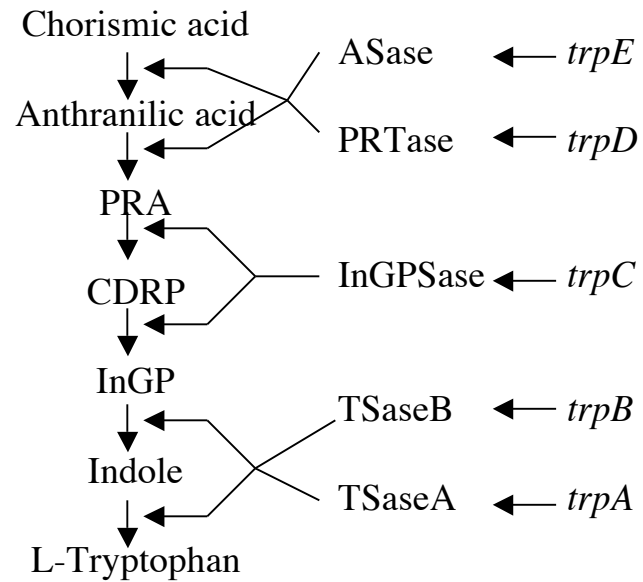


Phenotypes of *lac* Operon Mutants in Diploids

	Genotype	Synthesis of <i>lac</i> mRNA	Lac phenotype
→	1. F' <i>lacO^c lacZ⁺ / lacO⁺ lacZ⁺</i>	Constitutive	+
	2. F' <i>lacO⁺ lacZ⁺ / lacO^c lacZ⁺</i>	Constitutive	+
→	3. F' <i>lacI⁻ lacZ⁺ / lacI⁺ lacZ⁺</i>	Inducible	+
	4. F' <i>lacI⁺ lacZ⁺ / lacI⁻ lacZ⁺</i>	Inducible	+
→	5. F' <i>lacO^c lacZ⁻ / lacO⁺ lacZ⁺</i>	Inducible	+
	6. F' <i>lacO^c lacZ⁺ / lacO⁺ lacZ⁻</i>	Constitutive	+
	7. F' <i>lacI^s lacZ⁺ / lacI⁺ lacZ⁺</i>	Uninducible	-
→	8. F' <i>lacI⁺ lacZ⁺ / lacI^s lacZ⁺</i>	Uninducible	-
	9. F' <i>lacP⁻ lacZ⁺ / lacP⁺ lacZ⁺</i>	Inducible	+
	10. F' <i>lacP⁺ lacZ⁺ / lacP⁻ lacZ⁺</i>	Inducible	+
	11. F' <i>lacP⁺ lacZ⁻ / lacP⁻ lacZ⁺</i>	Uninducible	-
	12. F' <i>lacP⁺ lacZ⁺ / lacP⁻ lacZ⁻</i>	Inducible	+

Jacob, Monod, and collaborators deduced how the *lac* operon is controlled from these data and from the map position of the mutants. Note *lacO* and *lacP* mutants only affect expression of *lac* genes on the same chromosome, while *lacI* mutants can operate at a distance, from another chromosome.

Tryptophan Auxotrophs



	Grows On					
	CM	MM	MM+Trp	MM+indole	MM+InGP	MM+CDRP
<i>trp</i> ⁺	+	+	+	+	+	+
<i>trpA</i>	+	-	+	-	-	-
<i>trpB</i>	+	-	+	-	-	-
<i>trpC</i>	+	-	+	+	+	-
<i>trpD</i>	+	-	+	+	+	+
<i>trpE</i>	+	-	+	+	+	+

For some reason, question 1 of quiz 2 is confusing me.

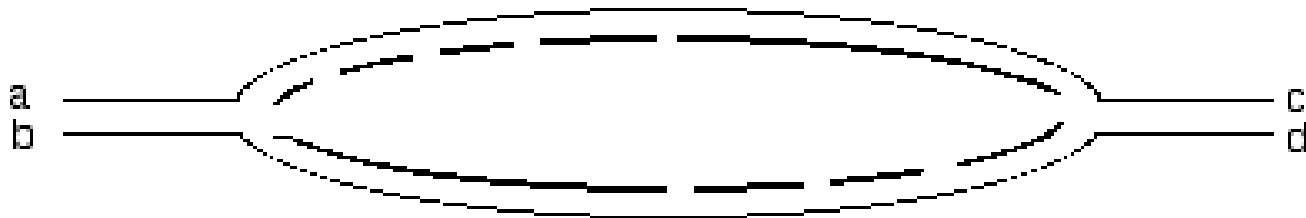
1. (2) Below is a eukaryotic DNA molecule caught in the act of replicating. Note that there are discontinuous and continuous strands. Letters a-d refer to ends of the molecule. State whether each of the following is a 5' or a 3' end:

a _____ 3' _____

c _____ 5' _____

b _____ 5' _____

d _____ 3' _____



Question 1.25 from text: A synthetic RNA molecule has the sequence

5' CGUUACCACAUGUCGCGAACUCG

How many reading frames are possible if this molecule is translated *in vitro*? *In vivo*?

The *in vitro* system does not require an AUG start, so it can start anywhere. Thus there are three possible reading frames.

In vivo translation requires an AUG start so it starts with the first AUG which uniquely determines the reading frame.

