Quiz 5 Key (Ave 56, High 100, Low 6)
BI-102-1, Fall '06, Dr. C. S. Tritt

Many students lost more points on the last half of the test than the first. I assume this means you did really have the time to study and absorb the Chapter 18 material. Therefore, expect to see it well represented on the final exam.

1. Name 2 important enzymes involved in replication.

Any 2 of the following helicase, primase, single-strand binding protein, DNA gyrase, DNA polymerase (I and III) or DNA ligase.

2. Name **or** briefly describe each of the three stages of DNA replication.

Initiation – Formation of replication forks by an initiator protein at *OriC* site.

Elongation – Addition of successive nucleotides to the new strands.

Termination – Completion of replication requiring the disentanglement of the two newly created DNA double helixes.

Half credit given for describing transcription or translation.

3. **Describe** the overall process of transcription (including each of its major steps or stages).

Initiation – RNA polymerase binds to promoter region and begins to unwind the DNA double helix.

Elongation – RNA polymerase adds RNA bases to growing RNA strand in the "transcription bubble."

Termination – RNA polymerase reaches a "stop" sequence in the DNA breaking the RNA-DNA duplex and releasing the new formed RNA strand.

Half credit given for describing DNA replication or translation.

4. Briefly describe the role of mRNA in translation.

It carries the "message" (the 3 base codes for the sequence of amino acids in a protein). Not saying or implying amino acid sequence was -3. Note that translation is done by ribosomes that consist of a combination of rRNA and proteins (not a required part of the answer).

5. Name or describe the three ways in which mRNA is typically modified (processed) in eukaryotes.

Addition of the 5' cap (a methylated GTP residue).
Removal of introns.
Addition of a 3' poly-A tail.

Worth about 3 points each.

6. Briefly explain how can DNA be “read” without being unwound?

Proteins containing DNA binding motifs and RNA can interact with and “recognize” bases and base sequences in the DNA double helix via the major groove (from the side or edge). For full credit, you generally needed to say or imply the “major groove” **or** provide a reasonable description of the DNA binding motifs.

7. Briefly describe the role of DNA methylation in the control of gene expression.

Methylation appears to keep inactivated genes switched off. Half credit given for describing the interaction between methylation and the DNA binding motifs (this is the mechanism that keeps the genes switched off). Describing the role methylation plays in marking old (versus new) strands in DNA proofreading was -2 (because it didn’t relate to gene expression).