Exam 3 **Biol 213** **Molecular Cell Biology** **Fall 2011**

Neatly printed name_____ **Signature**_____

Please note that there are 105 points on this exam but the maximum score you can receive is 100. The space provided for each question should be sufficient for your answers.
Questions 1-15 are worth 3 points each. Circle your answer.

1. In a DNA double helix,
- (a) thymine pairs with cytosine
- (b) the two DNA strands run antiparallel
- (c) thymine pairs with guanine
- (d) purines pair with purines
- (e) pyrimidines pair with pyrimidines

2. In a manic-depressive patient taking an HDAC inhibitor, you would expect to see
- (a) an altered nucleotide sequence
- (b) an altered DNA polymerase structure
- (c) an altered RNA polymerase structure
- (d) an altered ribosome structure
- (e) an altered protein expression profile

3. In tumors, the beginning of DNA synthesis is a key step that starts the formation of a new tumor cell. DNA synthesis starts
- (a) at an origin of replication
- (b) at an AUG
- (c) with homologous recombination
- (d) with a tRNA docking to a ribosome
- (e) with an amino acid being covalently linked to a tRNA

4. Determining the exact sequence of a piece of DNA is a key tool in forensic science, biotechnology, biology research, and genetic counseling. DNA polymerase reactions are the standard way to determine DNA sequences. DNA polymerase requires
- (a) a DNA primer and a DNA template
- (b) an RNA primer and a DNA template
- (c) a DNA primer and a RNA template
- (d) either a or b
- (e) DNA polymerase does not need a primer

5. To begin making RNA, plants use
- (a) sigma factors.
- (b) an origin of replication.
- (c) transcription factors.
- (d) either a or b.
- (e) a primer.

6. TATA boxes
   (a) are found only in bacteria.
   (b) are found only in eukaryotes.
   (c) terminate transcription in bacteria.
   (d) are found in both bacteria and eukaryotes.
   (e) are only found at the ends of chromosomes.

7. Some RNA molecules
   (a) can cleave themselves but not ligate themselves.
   (b) can ligate themselves but not cleave themselves.
   (c) can cleave themselves and ligate themselves.
   (d) function as pseudogenes.
   (e) No, RNA molecules do not have catalytic activity.

8. Which of the following does *not* occur before a eucaryotic mRNA is exported from the nucleus?
   (a) The ribosome binds to the mRNA.
   (b) The mRNA is polyadenylated at its 3' end.
   (c) 7-methyl-G is added in a 5' to 5' linkage to the mRNA.
   (d) RNA polymerase dissociates.
   (e) Splicing out of introns in mRNA.

9. Stop codons
   (a) inhibit DNA polymerase
   (b) inhibit RNA polymerase
   (c) stop protein synthesis only if they are in the correct reading frame.
   (d) regulate the final step in RNA splicing.
   (e) stop protein synthesis no matter what reading frame the stop codon is in.

10. Nuclear transplant experiments indicate that
   (a) an embryo can only be generated from an embryonic nucleus.
   (b) an embryo can be generated from a skin cell nucleus.
   (c) an embryo can only be generated after UV irradiation.
   (d) an embryo can be generated without a nucleus.
   (e) an embryo can only be generated from a nucleus from an embryonic cell mass.

11. Mutations of the zinc finger protein WT1 cause Wilms' tumor, a pediatric renal tumor. Zinc fingers are typically found in
   (a) methylases and acetylases.
   (b) just acetylases.
   (c) telomerases.
   (d) ribozymes.
   (e) transcription factors.

12. Enhancers
   (a) are only found upstream of genes.
   (b) can be found upstream or downstream of genes.
   (c) need to be immediately adjacent to the AUG.
   (d) need to be immediately adjacent to the transcription start site.
   (e) need to be immediately adjacent to the kinetochore.

13. Which amino acid would you expect a tRNA with the anticodon 5'-CAU-3' to carry?

(a) histidine
(b) valine
(d) tyrosine
(d) methionine
(e) tryptophan

AUG

14. Somatic cell mutations

(a) almost always cause cancer
(b) are often passed to the offspring
(c) are often passed to the onspring
(d) are not passed to the offspring
(e) are often passed to the zygote cells

15. Genetic changes that allow new organisms to evolve

(a) arise only from gene duplication.
(b) arise only from point mutations.
(c) arise only from the insertion of transposons.
(d) arise from gene duplications, transposons, and point mutations.
(e) arise only from gene duplications and point mutations.

3 points

16. The antibiotics chloramphenicol and its derivative thiamphenicol (commonly used in veterinary medicine) block the peptidyl translocation reaction in bacterial ribosomes. What would you expect to observe in the A site of a bacterial ribosome that has been exposed to chloramphenicol while it is in the process of synthesizing a protein?

It can bind with mRNA at large 50S subunit of ribosome, which stop new tRNA into ribosome and synthesis new peptide. Therefore stop protein translation.

3 points

17. What is the enzyme that can 'glue' the 5' end of one strand of DNA to the 3' end of another strand of DNA?

DNA ligase

5 points

18. What is the basic mechanism that has allowed, for instance in hospitals, bacterial species that were previously killed by penicillin to rapidly evolve into penicillin-resistant strains?

penicillin can stop bacteria protein synthesis. After the mutation of DNA, only bacteria which contein the mutation preventing protein stoped synthesis by penicillin can survive. Otherwise, all other unfit ones will be seleted out (die). After long time treatment, the suvived bacteria evolved with penicillin-resistant strains.

plasmid DNA be apart