

EXAM 2 Plant Molecular Biology (Bio350M/388M) Fall 2002 D. Herrin, Instructor

Answer all of the following 25 questions on the test itself. For the True-False and multiple-choice questions, circle the single best answer. The short answers are worth 2 pts each, and the whole test is worth 100 points.

Name _____

1. (10 pts) Briefly define and/or describe the role of the following in protein targeting to organelles:

a. transit peptide -

b. NLS -

c. chaperonins -

d. Toc -

e. *secA*-like protein -

2. (10 pts) Describe the sequence of events involved in pre-plastocyanin getting to its final location in the thylakoid lumen (write on the back if necessary).

3. The energy requirement for transport of proteins across thylakoid membranes is met by:
 - a. ATP
 - b. GTP
 - c. pH gradient across the membrane
 - d. a and b
 - e. all of the above
4. The nuclear envelope is composed of :
 - a. 1 membrane
 - b. 2 membranes
 - c. 2 membranes + lumen
 - d. 1 membrane with pores
 - e. 2 membranes + lumen + pores
5. The nucleolus is the site of:
 - a. pre-mRNA splicing
 - b. rRNA genes
 - c. pre-ribosomes
 - d. both b and c
 - e. all of the above
6. The “beads-on-a-string” structure refers to _____.
7. DNA is attached to the nuclear matrix (or scaffold) by _____.
8. (8 pts.) The size range (in bp) for the nuclear genomes of flowering plants is exceedingly broad. About how large are the smallest and largest angiosperm genomes known, in bp, and what plants are these.
9. The *Arabidopsis thaliana* genome contains approx. _____ genes.
10. The *Oryza* (rice) genome contains approx. _____ genes.
11. (10 pts) What are some factors that could explain the large difference (>10-fold) in the sizes of the rice and *Arabidopsis* genomes (in terms of base pairs).

12. Which of the following are found in transposon *Ac*:
- 11-bp terminal direct repeats
 - 11-bp terminal inverted repeat
 - 2 ORFs
 - sub-terminal inverted repeats
 - b and d
13. The excision of *Ac* at the DNA level can still leave behind an altered gene because of:
- alternative splicing
 - foot prints
 - direct repeat
 - b and c
 - all of the above
14. True or False. In some plants with variegation or sectoring, the cells in the altered sector are derived from a single somatic cell that underwent a DNA transposition event involving a transposable element.
- 15-17. The *Mu* element transposes via a mechanism that involves a _____ intermediate. The large ORF in *Mu* probably has _____ activity, which is needed to convert the intermediate to _____ .
18. The expression of transposons and their encoded genes are limited by :
- weak promoters
 - autoregulation from the transposases
 - gene silencing
 - both b and c
 - all of the above
19. Photolyases are proteins that
- directly repair T-T dimers
 - might act as blue light receptors
 - use light energy
 - not found in animals
 - all of the above
20. The DNA repair pathway that requires DNA glycosylases is called _____.
- 21-22. Double-strand breaks in the nuclear genome of plants are repaired mainly by _____, but can also be repaired by _____.
23. The latter pathway requires a strand-transfer activity similar to that of _____ in *E. coli*.

24. (15 pts.) Describe the processes and mechanisms involved in plant cell transformation and tumor formation caused by *Agrobacterium tumefaciens*.

25. (9 pts). What is the “binary vector system” for engineering dicots using *Agrobacterium*. What is the selectable marker for in this system, and what is a commonly used one for dicot plants?