**DNA, transcription, and translation revisited**

**Study guide and reading assignments**

***Reading assignments***.

* Required: Bradbury et al. fragrance. Full paper

1. Understand the genome formula, genome size and pollination biology of rice.
2. How was the inheritance of rice studied in 1994 and how was it studied by Bradbury et al.?
3. Are doubled haploids useful in rice breeding and genetics, and if so, why?

The following questions relate to the Bradbury et al. paper and follow the order of the slides presented in class.

1. Is the gene associated with aroma dominant or recessive?
2. What does the “aroma” gene encode and is the gene the same as the chemical compound associated with aroma?
3. How can aroma – a “gain of function” in terms of the phenotype – be due to a “loss of function” in terms of the genotype?
4. What is a gene family?
5. Give an example of a gene family in rice.
6. What is pleiotropy and what role may it play in the aroma-in rice story?
7. Why might many traits selected for during domestication be due to recessive alleles?
8. What is linkage mapping?
9. What is the unit of distance in a linkage map and what is this unit based on?
10. What are genetic markers?
11. Differentiate between SSRs and SNPs.
12. How do mutations relate to polymorphisms?
13. What is marker-assisted selection and why is it an attractive option for many plant breeders?
14. Is the rice genome completely sequenced? If yes, what does this mean?
15. What is a transposable element and what role to transposable elements play in genome size expansion?
16. What is synteny?
17. Why does the rice genome sequencing paper give a different genome size than the Kew database?
18. Write a haiku using as many of the “–omics”, as possible, starting with DNA and ending with phenotype.
19. What is a BAC clone and how were BAC clones useful in identifying the gene for aroma in rice?
20. What is the difference between a genetic map and a physical map?
21. What is a cDNA and how is one obtained?
22. Can introns be identified in a cDNA sequence? Why or why not?
23. What is the role of stop codons in the aroma of rice?
24. What are four ways to determine DNA sequence that were defined in class?
25. If you wanted to determine the sequence of an allele, which of the four sequencing methods might you choose and why?
26. If you wanted to sequence the whole genome of your favorite plant, which of the four methods might you choose? Why?
27. What does BLAST stand for and what is the purpose of this bioinformatics tool?
28. Explain how you could use BLAST to determine if there is a gene with homology to BAD2 in your favorite plant.
29. What bioinformatics tool is useful for aligning sequences?
30. What insights can be gained from aligned DNA sequences? What insights can be gained from aligned amino acid sequences?