

PLSC 731
Plant Molecular Genetics
Spring 2007
Exam 1
Due, March 27, 5 pm via e-mail

Upon my honor, I have neither given nor received aid in writing this exam."

_____ Name

This is an essay exam. You must answer all questions with complete sentences.

1. Below are three SSR markers. A population of columbine plants was screened in an endangered region of the central Montana Rocky Mountains in Jackson County. The allelic frequencies are found above the fragment. Present a statistical analysis that you might use to determine which of these three primers is most informative. What experimental problems might you anticipate if you were asked to use these same SSR markers to study the degree of diversity in a columbine stand near Frisco, Colorado. For full credit, you will need to show your full work. **(15 points)**

<u>SSR#1</u>	0.6	0.1	0.3	
390 nt	—			
370 nt		—		
350 nt			—	
<u>SSR#2</u>	0.4	0.6		
180 nt	—			
160 nt		—		
<u>SSR#3</u>	0.2	0.5	0.2	0.1
220 nt	—			
210 nt		—		
200 nt			—	
190 nt				—

2. Discuss four types of DNA-based molecular markers covered in class. Describe in general the protocols for each and the inheritance pattern you would expect for each for different types of populations. Conclude with a narrative that describes the advantages and disadvantages of each marker class. **(25 points)**

3. Download the two manuscripts below from the class WWW site.

<http://www.ndsu.nodak.edu/instruct/mcclean/plsc731/homework/papers/exam1-paper1-2008.pdf>

<http://www.ndsu.nodak.edu/instruct/mcclean/plsc731/homework/papers/exam1-paper2-2008.pdf>

Both papers consider the genetic architecture of a crop species using chloroplast DNA markers. Critically read the two manuscripts paper and then write a discussion that details the experimental approaches and the general conclusions drawn in these papers. What experimental evidence was used to support the conclusions? What are the strong points of the paper that suggest the experimental approach is sound? What limitations do you see that might weaken the significance of the conclusions? Finally, provide a detailed discussion regarding the evidence used to determine the pattern(s) of domestication in these two species. Remember, this is a comparative analysis and your answer should be written in that manner. **(30 points)**

4. The objective of this question is for to explain the development of a molecular map. You can use the same species you reviewed or you can choose another species. Search the literature and find the **earliest report** of a molecular map for the species with which you are working. Provide a complete summary of the genetic and molecular tools used to develop the map. Also describe all the features of the map. Your answer must also describe any important information that was not described relative to the development or features of the map. With your answer, submit a copy of the materials and methods section from the paper. Place this in my mailbox with your name on it. **(30 points)**