

**Fall 2002 Biology 111 Exam #2.5 - Molecular Genetics Half Exam**

There is no time limit on this test, though I have tried to design one that you should be able to complete within 1.5 hours, except for typing. You are not allowed to use your notes, old tests, any electronic sources, any books, nor are you allowed to discuss the test with anyone until all exams are turned in by class on Monday November 4. **EXAMS ARE DUE AT CLASS TIME ON MONDAY NOVEMBER 4.** You may use a calculator and/or ruler. The **answers to the questions must be typed on a separate sheet of paper** unless the question specifically says to write the answer in the space provided. If you do not write your answers on the appropriate pages, I may not find them unless you have indicated where the answers are. There are 4 pages to this exam, including this cover sheet.

- 3 pts if you do not follow this direction.

**Please do not write or type your name on any page other than this cover page.** Staple all your pages (INCLUDING THE TEST PAGES) together when finished with the exam.

Name (please print):

Write out the full pledge and sign:

How long did this exam take you to complete (excluding typing)?

**10 pts.**

1) On the last page of this exam are some PCR/VNTR data. Please analyze them and answer these questions:

a) calculate the molecular weights in base pairs for each allele in this pedigree. List your findings for each person (1 = x and y, etc.)

b) Explain the mode of inheritance for this disease.

Note, individual 7 has only one band (focus on the main band with a black dot next to it).

Use the graph paper included in this test to calculate the molecular weights. Without a graph, done by hand, you will not get credit for part a.

**6 pts.**

2) a. What is a tetrad?

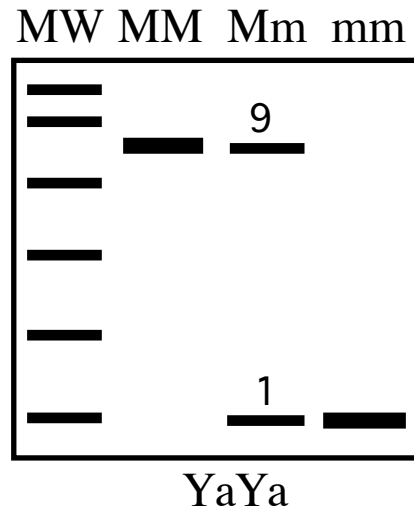
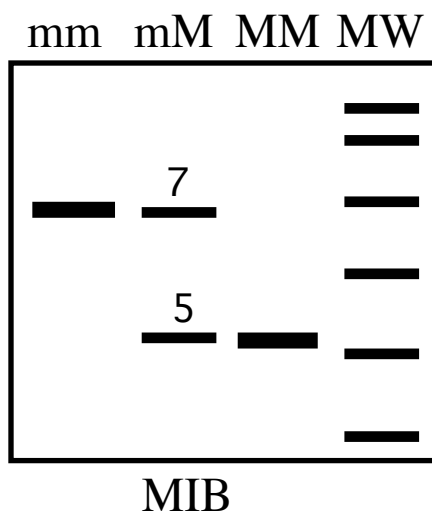
b. When does recombination normally occur?

c. Linkage analysis is proportional to the distance between two loci. Explain what this means using non-jargon terminology.

**7 pts.**

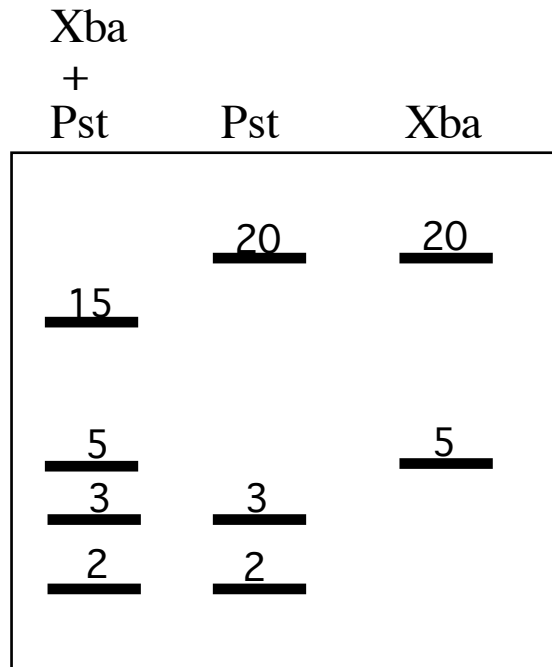
3) Map these three loci (MIB, YaYa, MR). Two loci are RFLPs and one locus is a gene. Your answer must include a map drawn on the line below. For partial credit options, include any scrap paper you use. MR is a recessive disease.

<u>genotypes</u>	<u>frequency</u>
wild-type & 5	368
disease & 7	367
wild-type & 7	12
disease & 5	11
wild-type & 9	348
disease & 1	349
wild-type & 1	31
disease & 9	30
5 & 9	338
7 & 1	336
5 & 1	41
7 & 9	43



**9 pts.**

4) Map the restriction sites using the data in the gel below. This gel contains DNA fragments on a gel, it is not a blot. Draw your map on the line below the gel. The numbers above each band indicate molecular weights in kilobases.



**6 pts.**

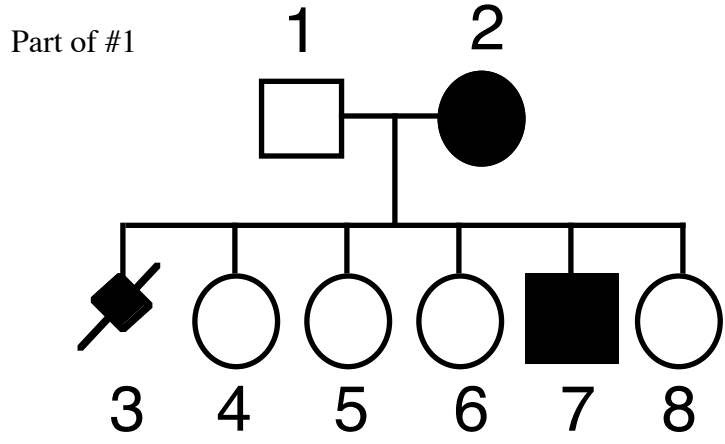
- 5) a. Explain why DNase is prescribed as medication for people with cystic fibrosis.  
b. List 3 potential hazards of performing gene therapy for cystic fibrosis.

**6 pts.**

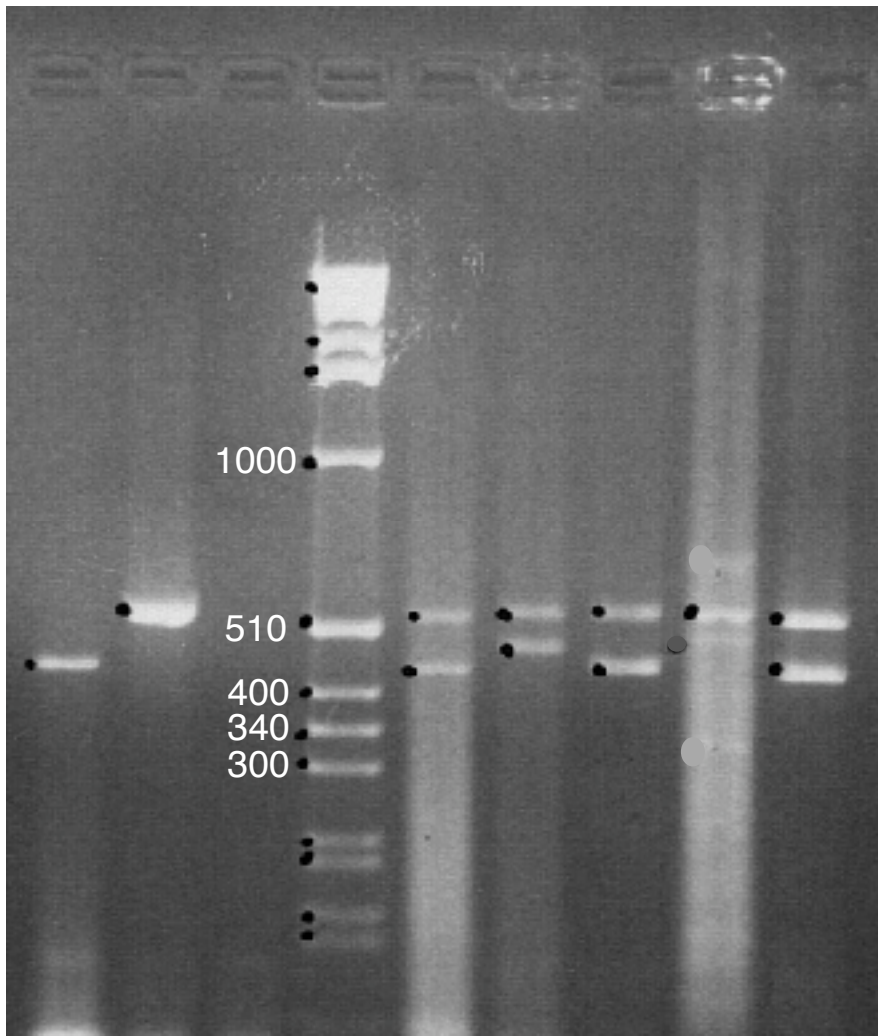
- 6) a. How was exon amplification used to clone the HD gene?  
b. Give two names for the type of mutation that leads to HD.  
c. Design an experiment to detect whether you have HD or not.

**6 pts.**

- 7) Read this sequencing gel beginning with the band pointed to by the arrow. List sequential 20 bases and label the appropriate ends 5' and 3'.



1 2 3 MW 4 5 6 7 8



Part of #7

