

Molecular Ecology and Evolution
Fall 2003
Final Exam

This is a closed book and note exam. Answer all the questions independently and without discussion with anyone else. The exam is due December 1, 2003 in class. Answer the questions completely and succinctly. Your answers will be graded on accuracy and detail. Each question is worth 25 points. The entire exam is worth 100 points and will account for 25% of your grade.

- 1) Below are a variety of molecular techniques. Choose **two** from **each** category below. Describe, in detail, the technical aspects of these procedures. From a molecular ecological perspective, what are the strengths and weaknesses of the techniques? What type of data is produced? When is it appropriate and inappropriate to apply these techniques and why? Describe an ecological/evolutionary project for which you could use these methods.

CATEGORY A

Microcomplement Fixation
DNA-DNA Hybridization
Microsatellite loci

CATEGORY B

Mitochondrial DNA RFLP
Chloroplast DNA sequencing
Single-copy DNA RFLP or sequencing

- 2) Several times throughout the course I've discussed the difference between single-locus approaches and genomic (i.e., multilocus) level assays. When is it necessary to look at several loci and when is it sufficient to assay only a single locus and why? Be complete.
- 3) What is the difference between an ordered and an unordered multi-state character? Of the approaches that we have covered, which techniques produce which type of character? How could you turn an unordered-multistate character into an ordered multistate character (include an example)? Describe an ecological/evolutionary situation in which an order state character can provide more information than an unordered one.
- 4) What is the single most important thing that you have learned from this course? How will it aid you in your future career? Why will you always/never use molecular genetic approaches in your future research?