Study Guide for Final Exam in Evolution (Bio 213) Fall 1996

1. The final exam will consist of one (1) 20-point essay question (see below), one cladogram to construct (10 points) , two (2) 10-point short answer questions (see below), and 50 multiple choice questions, each counting three (3) points. You MUST bring a long (50 answer blanks on each side) scantron answer sheet and pencils and erasers to take the exam.

2. There will be 33 multiple choice questions on material covered since the second exam, and 8 or 9 multiple choice questions on material covered by each of the other two exams. Of the 33 questions on material since the last exam, there will be 3-4 multiple choice questions from each of Chapters 14-22. There will be no more than 1 multiple choice question on material covered by each chapter you were responsible for on each of the first two exams. It is not impossible that some questions from the first two exams will appear on this final.

3. The essay question will be simply "Explain evolution." You need to write between 300 and 500 words. Please try to write as legibly as possible. I suggest you write out and more or less memorize your essay before the final. You need to say what evolution is, what the evidence is for evolution, explain the very basics of evolutionary genetics, adaptation and natural selection, classification and speciation, and macroevolution. I highly recommend you look at the prefaces to each of the 5 "Parts" of you book as you try to distill your thoughts for this essay. You may also memorize the essay printed on the back of this sheet and repeat it on the exam, if you wish.

4. Short answer questions. Two of the following four questions will be asked: (a) give three definitions of a species, choose the one you think is best, and defend your answer. (b) list and define the reproductive isolating mechanisms. (c) list and define the reasons why species are of limited distribution in the world. (d) Compare and contrast evolutionary gradualism and punctuated equilibrium as theories of evolutionary rate

5. Read over your old exams and study guides for tests 1 and 2, as well as the chapter summaries for those tests as preparation.

6. For material since the last test: read the assigned chapters, **especially studying the chapter summaries.** Assigned chapters are 14-22. Remember that the book has a glossary — you might read it over to get terms straight in you mind. If I ask for definitions of terms in the glossary, your answer should be very close to the glossary definition.

7. Chapter summary points from which multiple-choice questions (3-4 per chapter for a total of 33) will be taken for Chapters 14-22. Some of these multiple-choice questions may be definitions of terms used in the chapter summary points..

Ch 14: 1, 2, 5, 6.
Ch 15: 1, 2, 3, 4, 5, 6, 7.
Ch 16: 1, 2, 3, 4, 5, 6, 7.
Ch 17: 1, 2, 3, 7.
Ch. 18: 1, 2, 3, 4, 5, 6, 7, 8, 9.
Ch. 19: 1, 2, 3, 5, 7, 9, 10, 11.
Ch. 20: 1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 15.
Ch. 21: 1, 2, 3, 4, 5, 6, 7, 8, 9.
Ch. 22: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

8. Half the points of the final will come from the above chapter summary points, so READ THEM!

Study Guide for Final Exam in Evolution (Bio 213) Fall 1996

Explain Evolution. Write between 300 and 500 words, as legibly as possible.
(The following is 497 words)

Evolution is genetic change in a lineage, which is a group of organisms and their ancestors and/or descendants through time. The study of evolution includes the study of evidence for evolution, population genetics, adaptation and natural selection, classification, and the rates and modes of evolutionary change. The evidence for evolution includes the fossil record, which shows ever more dissimilar fossils as rocks get older; laboratory experiments which can produce new species; artificial selection experiments which produce new kinds (dogs, cats, pigeons, and flowers, for instance); evolution on a small scale in nature (such as the peppered moth and insects evolving resistance to insecticides); the imperfectness of adaptation; and homologous similarities among organisms.

Population genetics is the branch of genetics which studies the ways in which genetic changes may occur in lineages. Such changes have been seen in extensive laboratory experiments, and the mathematical theory is well-developed. Five major forces can cause evolutionary genetic change: selection, migration, mutation, non-random mating and genetic drift. Of these, selection, which is a difference in reproduction among individuals, is the most generally important. Selection is also the only force that can produce an adaptation, which is a feature of an organism that allows it to reproduce better than if it lacked the feature.

Organisms may be classified in many ways, but the cladistic method is the most generally used today. This method involves classification by shared derived traits, and defines a species as the organisms in a lineage between branching points of that lineage. Other methods of classification define species differently.

Fossils are traces of past life. Single-celled organisms arose at least 3.8 billion years ago, and large multi-cellular organisms arose in quantity 600 million years ago. Since then, there has been a general increase in the size and complexity of organisms on the planet. Evolution may proceed gradually with unnoticeable gradations from species to species (phyletic gradualism), or species may remain practically unchanged until a new species arises in a geologically short period of time (punctuated equilibrium). It is currently unresolved whether either phyletic gradualism or punctuated equilibrium is the case for most of evolutionary change. As far as the evidence goes, changes which result in new kingdoms, phyla or other large groupings are no different in kind than those which result in new species — macroevolution is brought about by the same processes as microevolution.

Species may go extinct due to competition, shifts in climate or other factors, and the majority of species that have lived on the planet are extinct. However, species do not "age"; that is, they appear to have a constant probability of extinction which does not increase with the length of time the species has existed. On occasion, many species go extinct simultaneously, which is called a mass extinction. The best studied of these, between the Mesozoic and Cenozoic, was caused by a meteorite that fell on the Yucatan Peninsula in Mexico, 65 million years ago. Probably not all mass extinctions were caused by meteorites.