Study Guide for Exam 4
(Exam 4 will be 3:30-5:30 Tuesday, May 7, 2019)

There are only 5 lectures contributing material for this exam. As with the study guide for exam 3, this study guide will grow after each lecture.

Thursday, April 18: Population genetics

• What is the difference between observed and expected heterozygosity?

• Does genetic drift result in evolution?

• What is the main factor determining how much of an influence drift will have in a population?

• What are two different processes that both lead to a reduction in the number of heterozygotes (i.e. heterozygosity) in a population?

• Which of these accomplishes the reduction in heterozygosity via fixation of alleles?

• What is the Wahlund effect?

• What does Wright's Fst measure?

• What is the minimum/maximim possible value for Fst (and what is true about a group of populations when Fst is at its minimum/maximum)?

• Which two assumptions of Hardy-Weinberg equilibrium cannot possibly be true in any human population?

• What is a coalescent event?

• What is effective population size, and how is it different from the census size of a population?

• Does the amount of time back to the coalescent event for two randomly selected gene copies depend on the effective population size? If so, how?

• Would you agree with someone who claimed that mitochondrial DNA proves that there was just one female human alive around 125,000 years ago that is the female ancestor of all humans alive today? What issues would you raise with this claim?

Tuesday, April 23: Population genetics (cont.)

• Provide examples of reasons why the effective population size is often smaller than the census size.

• What is a documented example of an organism that has gone through a genetic bottleneck?

• How does a genetic bottleneck differ from founder effect?

• What does polydactyly in the Pennsylvania Amish community have to do with genetic drift?

- At what point does selection become stronger than drift? Answer in terms of selection coefficient (S) and effective popluation size (Ne).

- Which of the following generates an adaptive landscape with two peaks and an unstable equilibrium between the peaks? Dominance, overdominance, or underdominance.

- Why do hybrids between the sunflowers Helianthus annua and H. argophyllus represent a case of underdominance?

- Does migration intensify or reduce the effects of drift?

- Is it possible to have continuous directional selection and yet no evolutionary change? Name an example of this that was discussed in lecture?

Thursday, April 25: Allopatric speciation, reproductive isolating barriers

- What was one important thing about microbial (bacterial) evolution that you learned from the video associated with the Baym et al. 2016 study (links to both the paper and the YouTube video are provided at https://uconneeb.github.io/evolution/literature-cited/)

- What characterizes most species pairs that are allopatric?

- What characterizes most species pairs that are sympatric?

- What are species according to Mayr's biological species concept (BSC)?

- What are the two main types of reproductive isolating barriers (RIBs) and how do they differ?

- What are some examples of prezygotic isolating barriers?

- What are two examples of postmating isolating barriers?

- What are two examples of actual events that caused formerly contiguous populations to become allopatric, leading to allopatric speciation?

- What is the main difference between Batesian and Mullerian mimicry?