

Lesson Plan: Lecture 1

Timing

Course # and Title: GENE460: Conservation Genetics

of students: 16

Length of session: 75 minutes

Theme for Today's Class: Natural Selection & Adaptation

Instructional Objectives: At the end of this session students will be able to:

1. Identify factors influencing evolution
2. Explain the effect of dominance on the strength of selection
3. Predict quantitative trait frequency after different forms of selection

Agenda/Outline

We will have a VERY short quiz that will serve to ensure they did the reading. I will then split the class into roughly 4 groups of 4 and distribute teaching tools and worksheets. This being my first session of a 5 part series, I will take time to introduce the format for the next 2.5 weeks. I will lead a brief discussion (directed by my power point and discussion points) that will take the students from the definition of evolution to the factors influencing evolution. The groups will run through an exercise with their MMs to demonstrate the factors of evolution to themselves. We will come back as a class to discuss our findings and then postulate on the effect of dominance and generate a graph of the effect of levels of dominance on allele frequency over time. The groups will run through an exercise with their strips of paper to explore selection models on quantitative traits. We will discuss our findings as a group and bring it back to examples that we see in nature. I will end by discussing their group project.

How will you begin?

2 minutes

I will have instructions on the powerpoint to answer the quiz question. I will also have jars with M&Ms of different colors at the front of the class to strike their interest and get them thinking about 1) the possibility of eating candy and 2) what role the candies will play in today's lesson. Once they've completed their quiz, I'll ask them to break up into groups (~4 per group) that they'll remain in for the next 2.5 weeks.

Content (3-5 Salient points from Instructional Objectives)

1. **Teach** – Discussion

12 minutes

I will have a power point with images and lead questions to guide the students through answering the following questions:

- What causes species to change?
- What about the species changes?
- Can we see species changing and/or evidence of change? Examples?
- What factors (population dynamics) influence evolution?

2. **Teach** – M&M Activity

15 minutes

Each group will have a bag of two colors of M&Ms and worksheets. They will use the M&Ms to demonstrate to each other the effect of mutation, migration, selection, and drift on allele (M&M color) frequency. I will suggest that each group member tackles one of the 4 forces. I will circulate to make sure they're on the right path.

3. **Teach** – Discussion

15 minutes

We'll sum up what we just saw with the M&Ms with lead questions from the power point. I'll then lead a discussion on dominance with lead questions from the power point. I will ask one of the students to

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volunteer (or I'll pick someone) to draw graphs of the relative fitness of alleles and the change in allele frequency over time under a dominant/additive/recessive model.

20 minutes

4. Teach – Quantitative Traits Activity

Each group will have a stack of strips of paper with different lengths (quantitative phenotypes) and a worksheet. They will use the strips to demonstrate the effect of directional/balancing/disruptive selection on a quantitative trait and draw out graphs on the worksheet. I will circulate to make sure they are on the right track.

Summary/Closure

10 minutes

We will come back and think of a few examples of directional/balancing/disruptive selection in nature. I will then explain their group project, which will simply be to find a journal article that presents evidence for selection/mutation/migration/drift in a population of conservation concern. They will make a 15 minute presentation to communicate the salient points of the paper to the class. I'll hand out the rubric for the group project. I'll remind them that they will have a quiz on Chapter 7 next Tuesday.

Resources and Strategies:

I will have a projector, white board, worksheets, markers, M&Ms, and Paper Strips.

This point in semester, where are students? What process can you use? At what level of Challenge?

This is the 8th meeting of the semester. At this point, students should have a firm handle on what genetic diversity is and how we measure it. The students are now being challenged to make predictions about how diversity is affected by the environment. They are also being challenged to read and interpret scientific journals.