

BIOLOGICAL SCIENCES

Introduction to Plant Evolution

By Rich Moran
Pajaro Valley High School

INTRODUCTION TO PLANT EVOLUTION

Summary: This lesson provides an introduction to evolution through hands-on observations of wetland plant species in a natural, yet disturbed, habitat. Students use evolutionary concepts to make assumptions about why certain plants are dominant in this setting .

Subject Area(s): Integrated Sciences

Grade level(s): 9th-10th grades

Lesson Duration: 4 class periods

California Content Standards:

7. Evolution is the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept:
 - c. Students know why natural selection acts on the phenotype rather than the genotype of an organism.
 - f. Students know variation within a species increases the likelihood that at least some of the members of a species will survive under changed environmental conditions.
 - g. Students know a vital part of an ecosystem is the stability of its producers and decomposers.

8. Evolution is the result of genetic changes that occur in constantly changing environments. As a basis for understanding this concept:
 - a. Students know how natural selection determines the differential survival of groups of organisms.
 - b. Students know a great diversity of species increases the chance that at least some organisms survive major changes in the environment.

Learning Objectives: Students will learn the basic concepts of ecology by examining the West Struve Slough, a habitat unique habitat to the Watsonville Wetland System, one of the few intact major coastal freshwater wetland areas between Arcata and San Diego. The students will examine the endemic flora and fauna populations, learning how different abiotic conditions such as the water, carbon, and nitrogen cycles provide an environment conducive to photosynthesis and respiration to support the flora and fauna species. By studying the plants, the students will learn the ecological importance of biodiversity, habitat conservation and/or irreversible destruction, and the possible short- and long-term effects of human impact upon fragile ecosystems both locally and globally.

Equipment, Materials, and Resources:

- | | |
|---------------------------|--------------------------------------|
| 1. Plant field guides | 7. Computer lab with Internet access |
| 2. Plant presses | 8. Index cards |
| 3. Pressing paper | 9. Pencils |
| 4. Live plant samples | 10. Marking pens |
| 5. Dichotomous plant keys | 11. Supplemental readings |
| 6. Plant journals | |

Lesson Narrative/Procedure:

Day 1: Plant identification lab at the Fitz Wetlands Educational Resource Center. Students will be introduced to the process of plant identification. Students will utilize individual stations comprised of field guides, prepared samples and live native species of grasses, rushes, sedges and other native plants native to Watsonville's wetland system. Students will learn basic plant taxonomy and morphology. Students will also create personal identification guides comprised of leaf shape and leaf margin sketches. Students will learn to classify and characterize unknown species of flora using field guides and keys.

Day 2: Field Trip to West Struve Slough. Students will work in collaborative groups to positively identify common flora located on the West Struve Slough Department of Fish and Game Reserve. Students will then be assigned to predetermined stations located in different areas on the property. Students will collect plant samples at stations located at various elevations: beginning along the waters edge and gradually moving higher in elevation onto a hilltop. The students will identify and collect the three most dominant plant species at their assigned stations. Students will record both the common name and scientific name of each plant. Students will also describe any insects or fauna that might be associated with any particular species of plant. If possible, sample specimens of the fauna are to be collected and preserved for identification in the lab. Students will also take plant specimens back to the lab in order to confirm identification.

Day 3: Field Trip to West Struve Slough. Students will make comparisons between the structures of plants located at the different stations. Students will then record their observations in their journals. They will later work in collaborative groups and attempt to describe any observed differences between the various plant species located at different stations. Students will attempt to use evolutionary and genetic concepts to explain any observed differences in structure. Students will also attempt to compare and contrast the faunal species associated with each plant species using the same evolutionary and/or genetic principles. The instructor will then facilitate a discussion meant to explore the students' observations in an evolutionary context. As a culminating activity students will work in collaborative groups to use their observations to write an essay in support of species diversity or natural selection.

Day 4: Location: Fitz WERC or classroom. Students will take part in a plant pressing and preparation demonstration. The instructor will lead collaborative groups through the pressing process. All plant species are to be properly identified and prepared for pressing. Students will also prepare identification cards for all plant specimens collected. Students will press the

plants to create sample specimens for an experimental herbarium. Students will also use field guides, text and the Internet to identify and label all faunal species that were collected at each site.