Title: How Biodiverse is Your Environment?

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Abstract: Students will identify as many plant species in a given area. The NCBI BLAST site will be used to find the DNA sequence for the gene rbcL which is common to most plants. The DNA sequences will then be uploaded into the Mega site which will generate a phylogenetic tree showing the relationships of the plants in the area.

Subject, Grade, Level: This lesson is designed for higher level life science courses like AICE/AP/IB Environmental Science or Biology.

Learning objectives:

• Students will explain the meaning of biodiversity.
• Students will describe why biodiversity is important for a healthy ecosystem.
• Students will describe how a conserved gene can show evolutionary relationships amongst plants.

Timeframe: Seven days are budgeted for the lesson, although more time might be needed to get DNA sequences if many species are found.

List of materials:

• Field guides to plant identification.
• Camera (smartphone) to document plants.
• Copies of student worksheet from HHMI activity calculating biodiversity using the Shannon Index. https://www.hhmi.org/biointeractive/human-impacts-biodiversity
Procedure and general instructions (for instructor). REQUIRED.

Day One: Introduce what a bioblitz is by showing the HHMI video The Guide along with student worksheet.

Day Two: Students will complete the HHMI activity Human Impacts on Biodiversity, which has them use the Shannon Index to score the biodiversity level.

Day Three: Students travel to nature area and identify the different plant species while also recording the number of each plant species.

Day Four: Students total the different species found along with the number of each species and then use the Shannon Index to determine the biodiversity score.

Day Five: Students use the NCBI site (with tutorial) to find the DNA sequence for the rbcL gene for each of the plant species found.

Day Six: Students enter the FASTA files from NCBI into the Mega program to create a phylogenetic tree.

Day Seven: Students create display board with the phylogenetic tree and explaining the process of creating the phylogenetic tree for public viewing.

Procedure and general instructions (for students).

Student worksheets are available for the HHMI activities on the HHMI links. Tutorials for using the NCBI site and the Mega site are in progress.

OPTIONAL SECTIONS (other sections you can add if applicable)
Suggestions and materials for assessing student learning
Student data
Reference list
Student assignments related to the activity
Any other appendices appropriate for your particular activity