

Fun with Phylogenetic Trees Lesson Plan

Walton Raiders:

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School: Walton High School, Marietta, GA

Target audience: General Biology 102 (10th grade)

Objectives: Students will be able to:

- construct a phylogenetic tree using musical artists from the real world
- construct a phylogenetic tree using trees (angiosperms and gymnosperms) found around your school campus.

National Science Standard:

Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships. Species is the most fundamental unit of classification.

Georgia QCC:

QCC #13: Discriminates relationships when using a classification model to group living things.

QCC # 1: Uses terms and processes employed in scientific research

Key words:

Biological classification
Common ancestry
Derived character
Evolution
Phylogeny
Phylogenetic tree

Materials and equipment

- lab handout
- access to the following suggested web links:
 - www.columbiahouse.com
 - www.allmusic.com
 - www.mtv.com

- www.100.5.com
- www.99x.com
- www.pbs.org
- www.bet.com
- www.blackamericaweb.com
- www.putumayo.com

Procedure:

1. Divide the class into groups of 3-4 students. (Name that tune!!!!)
2. Each group's name will be called one of the following: Alternative Rock, Classical, Country, Heavy Metal, Jazz/Blues, Pop, Rap, Easy Listening.
3. Determine the characteristics that can be used to show relationships among the artists within your group. Record your characteristics in the **Results** section.
4. Using your results, construct a musical phylogenetic tree

Groups

Alternative

The Cars, Green Day, Alice in Chains, Cake, Stone Temple Pilots, Incubus, Oasis, Moby

Classical

Beethoven, Mendelssohn, Yo Yo Ma, Vladimir Horowitz, Stravinsky, Rachmaninoff

Country

Martina McBride, Alan Jackson, Willie Nelson, Garth Brooks, Dolly Parton, Trisha Yearwood, Shania Twain, Dixie Chicks, Johnny Cash

Heavy Metal

Alice Cooper, Metallica, Korn, Ozzy Osborne, Linkin Park, Marilyn Manson, Janes Addiction

Easy Listening

James Taylor, Michael Bolton, Bee Gees, Kenny G, Henry Mancini, Chicago, Carpenters

Jazz/Blues

Elle Fitzgerald, Duke Ellington, Count Basie, B.B. King, Frank Sinatra, Billie Holiday, Lena Horne

Pop

Avril Lavigne, Bruce Springsteen, Madonna, Journey, Alicia Keys, Eagles, Britney Spears

Rap

Ice-T, Usher, Vanilla Ice, Tupac Shakir, Trick Daddy, Nappy Roots, Eminem

Results

Record your characteristics below

Analysis

1. Explain several of the branching points on your tree?
2. Which artist seems to be the most ancestral? Justify your answer.
3. Which artist seems to be the most derived? Justify your answer.
4. What is the value of phylogenetic trees to biologists?

Extension

Construct a phylogenetic tree using 5 angiosperms and 5 gymnosperms found on your school campus. Include the table of your derived characteristics used to construct your tree. Scientific and common names of all organisms are required to be included on the tree.

Acknowledgement:

A special thanks to the Science Education staff of Emory University for assisting in the selection of popular artists.

Suggestions/Comments:

Collaborate with non-science faculty at your school