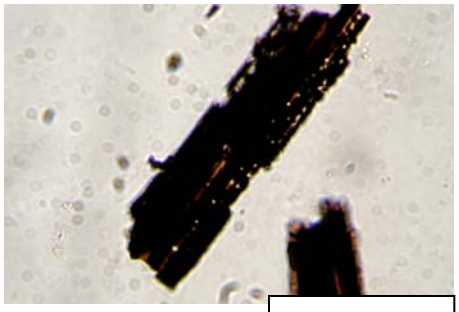
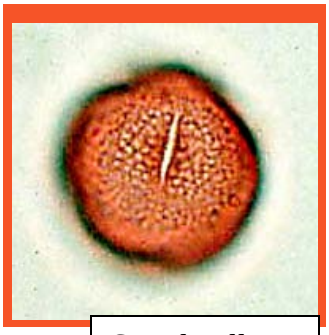
Name _____ Date _____

Change in the Hudson River Valley Since 1609

This activity is based on actual pollen data collected by scientists from Lamont-Doherty Earth Observatory in and around the Hudson River. Using the soil samples that you analyze during class, you will determine the amount of 'pollen' in each sample. From this information, you will determine the type of vegetation and age of the samples and will draw conclusions about the changes that have taken place since the arrival of European settlers in the 1500s.



Charcoal



Sorrel pollen

Materials:
Pie pan or paper plate
Tweezers (optional)
Soil samples with confetti representing pollen grains

Procedure:

1. Each group of students will receive a sediment sample, paper plate, and tweezers. Each sample contains 'pollen', with each color representing pollen from a different species of plant.
2. Separate the pollen from the sediment. Look carefully through the entire soil sample; some of the pollen grains are hard to find!
3. Use the pollen key below to determine what species of plants are represented in your sample. Calculate the percentage of the total pollen that comes from each species. Fill in the data table for your soil layer. Share your observations with the class.
4. Use the information given with each species description to decide what the climate was like when your layer was deposited.

Modified from a Windows to the Universe® (http://windows2universe.org) © 2010, National Earth Science Teachers Association (supported by UCAR) lesson plan, using data from Lamont-Doherty Earth Observatory, for the Changing Hudson Project, Institute of Ecosystem Studies, 2007. Last revision: Cary IES, January 2013.

Pollen Key

Color and Shape	Plant Species	Climate Characteristics
Pink Hearts	Oak	Found in warm, temperate sites with dry, warm summers
Red Hearts	maple	Native tree
Silver Circles	charcoal	Result of wide-scale burning
Clear stars	White pine	Usually grows at higher altitudes, but can tolerate seasons and variability
Silver stars	Chestnut	Prefers moist and colder temperatures
Blue stars	Hickory	Warm and dry, well-drained soils
Black stars	Birch	Enjoys cold, sub-alpine conditions
Gold hearts	Hemlock	Requires moist soil, temperate conditions
Green stars	Salt meadow cordgrass	Native marsh grass
Orange stars	Common reed	Can tolerate seasonal fluctuation, colonizes wet areas easily, invasive
Pink stars	Sorrel	Enjoys warmer climate, moist soil, invasive
Purple stars	Purple loosestrife	Invasive meadow species

Data: Write down the type and number of pollen you found:

"Pollen"	# Found	Plant species	Climate

Class observation data: Write down the **percentage** of each plant species found in each layer.

Plant Species	Sediment Layer					
	6	5	4	3	2	1
Oak						
Maple						
Charcoal						
White pine						
Chestnut						
Hickory						
Birch						
Hemlock						
Salt meadow cordgrass						
Common reed						
Sorrel						
Purple loosestrife						

Questions:

1. Based on your observations, what was the Hudson Valley like during the time when your pollen was shed?

   _____
   _____

2. Using the background reading, what time period do you think your layer corresponds to?

   _____

3. Fill in the rest of your data table with the class results. When looking at the cumulative data collected by your class, what trends do you notice?

   _____
   _____

4. What was the overall pattern of land use change over the past 400 years? What impacts do you think this has had on the ecosystem? What do you think will happen in the future?

   _____
   _____
   _____
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   _____
   _____