How do paleobotanists use ancient pollen to find out about the earth’s climatic past?

This activity is based on actual pollen data collected from a peat bog in Colorado’s Rocky Mountains. You will analyze sediment samples with other material mixed in to represent pollen grains and determine the type and amount of the “pollen” in the samples. From this information, you will determine the type of vegetation and age of the samples and will present conclusions about the likely climate at the time the pollen was shed.

What You Need:
- Samples of sediment containing colored paper dots or shaped confetti to represent pollen
- Pie pan
- Tweezers or forceps

What You Do:
1. Your teacher will show a model sediment core containing six separate layers, each laid down at a different time in the past. Pay attention to the color and texture of each layer to help you identify the samples from the layers you will be working with.
2. Each pair of students will be given a sediment sample, pie pan, and tweezers. Each sample contains “pollen” (actually colored paper dots or confetti, with each color representing pollen from a different species of plant) from plants that grew in the area when the sediment was deposited.
3. You and your partner will separate out the pollen from the sediment. Empty the sediment into the pie pan. Sift and dig until you have found all of the pollen grains. Separate the pollen grains by color or shape.
4. Use the pollen key on the next page to determine what species of plants are represented in your sample and calculate what percentage of the total pollen comes from each species. Fill in the data table for the sediment layer you are working on.
5. Use the information given with each species description on the pollen key to figure out what the climate was like when your layer was deposited. Be sure to compare your sediment sample to those from other layers in the entire sediment core so that you know what level your sample is from and how old it is.

Observations and Questions:
1. Compare your conclusions with others in your class who were assigned the same sediment layer. Do you all find the same plant types? Do you all agree on the climate that probably existed at the time?
2. With your class, discuss the species of plants found in each layer and the climate that probably existed at the time. Fill in the rest of your table with the information provided by students who studied different sediment layers. Can you determine what the overall pattern of climate change was during these last 20,000 years? What might have caused the changes?
# Pollen Key

<table>
<thead>
<tr>
<th>Code</th>
<th>Color and Shape</th>
<th>Plant Species</th>
<th>Climatic Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>ponderosa pine</td>
<td>Long-needed pines, ponderosas occupy warm, dry slopes.</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>meadow grasses and wildflowers</td>
<td>Growing in warm summer temperatures and summer drought, this pollen is a mixture of herbaceous plants common to warm - temperate meadowlands.</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>aspen</td>
<td>Aspens can live in wetlands, but cannot survive in deep snow.</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>Engelmann spruce</td>
<td>Found in cold, usually sub-alpine sites.</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td>limber pine</td>
<td>Enduring the harshest of climates, these pines live high on ridge tops, where extremes in weather are the norm - strong winds, cold temperatures, drought, and poor soils.</td>
</tr>
<tr>
<td>F</td>
<td></td>
<td>lodgepole pine</td>
<td>Found in areas of very cool climates typically growing in poor soils.</td>
</tr>
<tr>
<td>G</td>
<td></td>
<td>bristlecone pine</td>
<td>Growing close to and in association with the lodgepole pine, these trees survive the coldest of temperatures.</td>
</tr>
<tr>
<td>H</td>
<td></td>
<td>Douglas fir</td>
<td>the Douglas fir usually prefers moderately cool to warm sites, growing best under temperate moist conditions.</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td>sedges and mosses</td>
<td>The pollen from these low growing plants is often found in very cool alpine/subalpine meadow sites, characterized by very cool, short summers, and harsh winters.</td>
</tr>
<tr>
<td>J</td>
<td></td>
<td>alpine grasses and daisies</td>
<td>These low growing plants are typically found in cool, moist, short summers and cold winters.</td>
</tr>
<tr>
<td>K</td>
<td></td>
<td>willows</td>
<td>Willows grow avidly in wetland areas. Their habitat is one of transition, often being replaced by the spruce-fir forests.</td>
</tr>
<tr>
<td>L</td>
<td></td>
<td>alpine sage</td>
<td>Low-growing shrub that’s found only at high-altitude, cold sites.</td>
</tr>
</tbody>
</table>

## Data Table

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<tbody>
<tr>
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