Questions to guide the exploration of
The Paleoecology Module in The Virtual Forest Initiative at Black Rock Forest
http://blackrock.ccnmtl.columbia.edu/paleoecology/
(use Mozilla or Chrome as your browser) This exercise takes about 2 hours.

►Use the Pollen Identification Tool to become familiar with pollen and plant macrofossil (needles and seeds)morphology and terminology:

First, explore the specimen keys (pollen, needles, seeds) by reading through them. Here are some pollen morphology terms and their definitions:

Bladder (a balloon-like air sac attached to the pollen grain)
Spine (sharp sculptural feature on the pollen surface)
Bump (rounded sculptural feature on the pollen surface
Pore (openings in pollen surface that are generally round)
Furrow (openings in pollen surface that are generally elongated)
Arc (curved lines that join the pores)
Vesiculate (has air bladders that assist with wind dispersal of pollen)
Porate (pollen has pores)
Colpate (pollen has furrows)
Colporate (pollen has furrows and pores)
Verrucate (pollen surface has bumps)
Echinate (pollen surface has spines or sharp projections)

Second, start the specimen identification (pollen, needles and seeds are presented). Use the identification keys until you identify all 22 of the specimens. Next, click the "check answers" button to see how you did (green means correct, red means incorrect). Using the "check answers" display examine these three pollen types and answer the questions below.

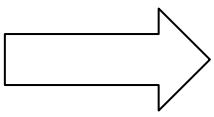
Alnus (alder) pollen
Pinus strobus (white pine) pollen
Abies (fir) pollen

Draw each of the above.
What feature of alder pollen is unique in our pollen study set?
What is the main similarity between white pine and fir pollen?
What is one major difference between white pine and fir pollen?

►Use the Sediment Sampling Tool to observe changes in fossil pollen percentages through the core. Changes in the percentages of pollen types through the core represent the core site's vegetation history and the associated environmental changes, for example, climate change.

First, become familiar with the Sediment Sampling Tool by clicking on various levels and observing how the pollen percentages change in the core. The proportions of each pollen type, at a given core level, are visualized in pie charts.

Second, start the Sediment Sampling Tool by clicking on various levels and observing how Picea (spruce) changes in abundance (%) over the history of the forest. Support your answer by citing some key core levels and the associated spruce pollen percentage values.



Third, using the available spruce data from the entire core, construct a graph that illustrates your answer. (Clue: check out the "download csv" button and select the data you want). Note that the first column in the spreadsheet has the radiocarbon ages of the core levels in years before present (yr BP). Plot radiocarbon age on the Y axis versus Picea percentages on the X axis for values from the present back to 12,600 yr BP.

Fourth, considering what you know about spruce ecology, what factors may explain what you see? (For information on tree ecologies, google "Silvics of North America".)

Repeat steps 1 – 4 for Asteraceae (Ambrosia/ragweed, etc.) and Quercus (oak).