# So You Wanna Be A Paleobotanist?

Paleontologists and paleobotanists use a few methods to reconstruct past climates. Fossils provide the clues we need to learn about the distant past. Fossils are extremely important in reconstructing the conditions of the paleoclimate because each species is adapted to a particular habitat and environment. This means that knowing what things lived in an area can give scientists clues about the past climate of the studied area. For example, if a fossil fish is found it tells us that the area was once covered by water.

## You will need:

* Pictures of fossil plants
* Dichotomous key
* Growing condition data strips
* Pencil
* Paper

## Instructions

Step One: Pick at least 5 fossil leaves to identify. If you choose to identify more, the stronger your data will be later to determine the climate.

Fossil plants are especially helpful in reconstructing paleoclimate conditions. This is partly because most extinct plant species have living relatives that are thought to live in similar habitats today. Also, unlike animals, plants are stuck in the area where they are rooted and cannot move around from place to place. This means that studying plant fossils to reconstruct the past climate is more representative of the local environment rather than studying prehistoric animals that could have moved.

Step Two: Use the dichotomous key to identify the leaves you picked one at time. Start at page 1 and pick which of the two options best describes the leaf you are looking at. When you pick an option, turn to the page it tells you and make your next choice. Keep going until you get to the plant's identity. (Watch the video below to see our intern walk you through identifying one leaf.) Repeat this until you identify all your leaves.

Different species of trees need different conditions to live and grow. What are some factors that could affect how well a tree grows? Some conditions include soil type, temperature, sunlight, and amount of water.

In this activity we will be looking at the annual averages of temperature and precipitation. You will be using the conditions needed by the plants you have identified to reconstruct the paleoclimate they all once lived in.

Step Three: Pick out the data strips for each of the plants you identified.

Each strip has the plant name, temperature, and precipitation data. The yellow outlined box on each thermometer and rain gauge shows the range of temperature and precipitation the plant can live in.

Step Four: Place the strips side by side on a table so that the thermometers are all at the same height. Figure out which is the lowest high temperature (the coldest of the warm temperatures shown by the top of the box on each thermometer) out of the group and write it down. This is the highest temperature at which all the plants can grow. Write this temperature down.

Step Five: Find the highest low temperature (the warmest of the cold temperatures shown by the bottom of the yellow box) and write this temperature down too. This is the lowest temperature at which all the plants can grow.

These two temperatures you have written down tell you the range at which all these plants could survive.

Step Six: Repeat steps four and five to find the lowest high and highest low levels of precipitation with the rain gauges. This will show you the range of precipitation levels all your plants can live in. Write this range down as well.

A number of studies by scientists used a variety of methods to analyze the plant fossils from Florissant Fossil Beds National Monument. These studies have found that the climate of the Florissant valley 34 million years ago was much wetter and warmer than today.

Today, Florissant has an average temperature of 39.5°F and an average annual precipitation rate of about 17 inches. Scientists who used the same method you did estimated an average annual temperature range of 55°F to 59°F and an average annual precipitation range of 20 to 31.5 inches.

Other studies that used different methods such as leaf morphology have some to slightly different, but similar conclusions. Their results estimated past temperatures of 55°F to 64°F. This is still warmer than temperatures today, so the general agreement that Florissant's Eocene climate was much warmer and wetter than today.

## Vocabulary:

* **Paleobotany**: *noun;* the study of fossil plants
* **Paleoclimate**: *noun;* a past climate that existed in an area during a particular time in the geologic past
* **Precipitation**: *noun;* water or the amount of water that falls to the earth as hail, mist, rain, sleet, or snow
* **Paleontologist**: *noun;* a specialist in paleontology
* **Dichotomy**: *noun;* a division into or distinction between two groups that differ greatly