

Collecting climatic data that is millions of years old

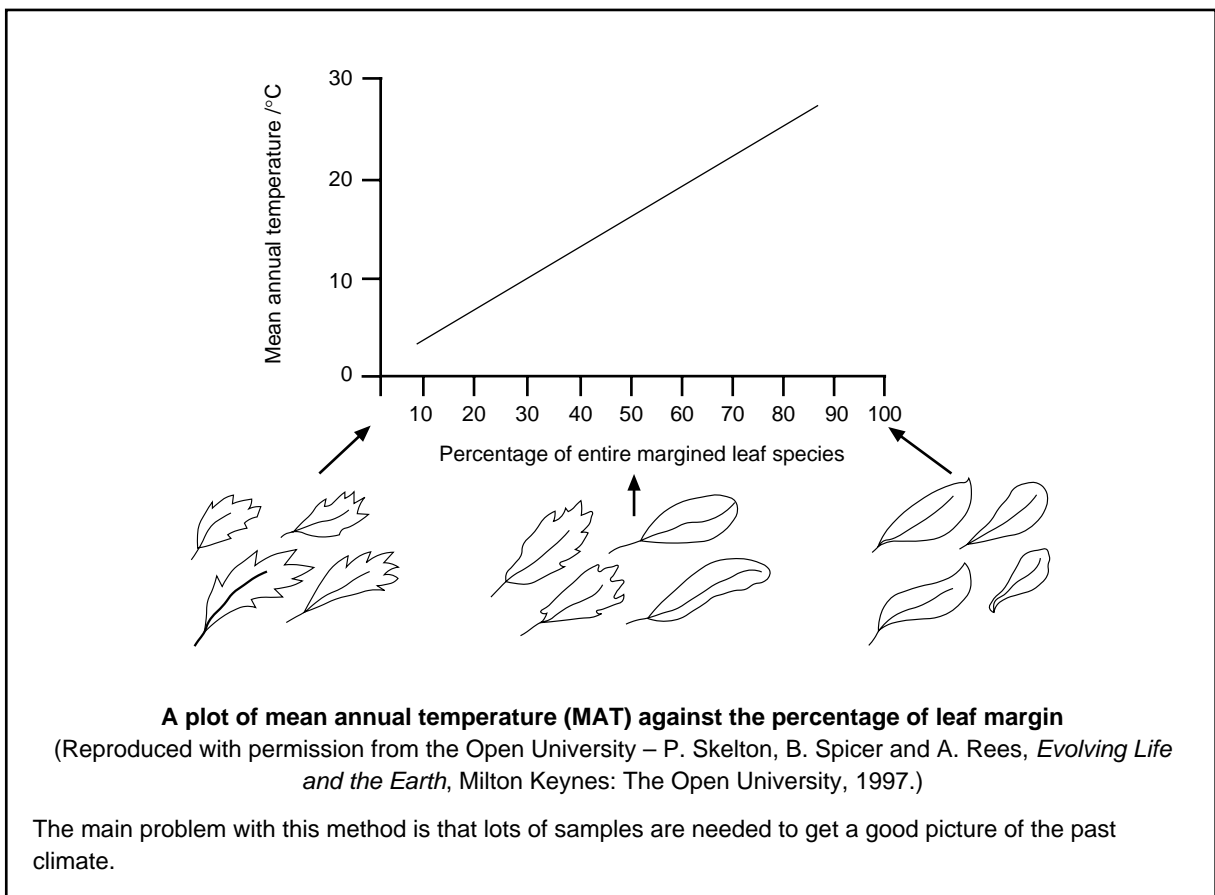
To investigate what the climate was like millions of years ago, geologists look to fossilised plants. By studying different types of plants they can gather climatic information, such as annual temperature range and water availability that corresponds to the time when the plant was living. This data can then be fed into computer climate models. Fossilised animals and pollen found in the same area, together with the position in the rock layer where the plants are found, are often used to age the fossilised plants.

Several different techniques are used to gather temperature information. Here are three methods that are used.

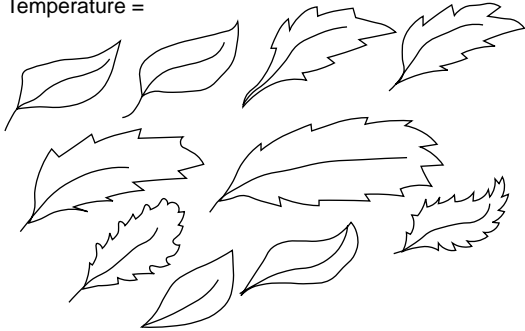
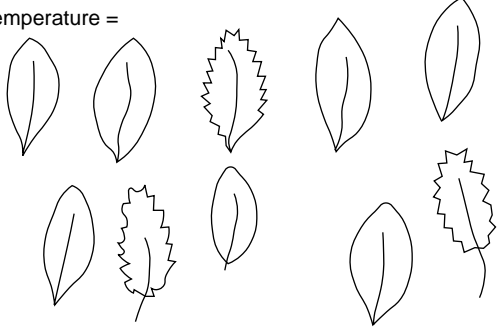
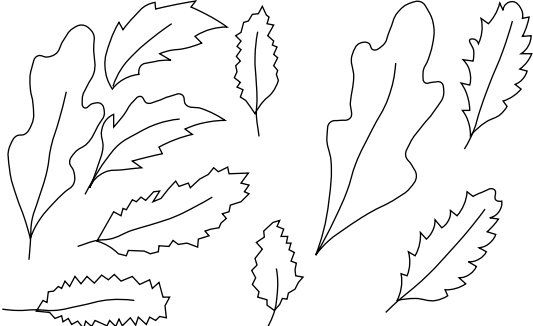
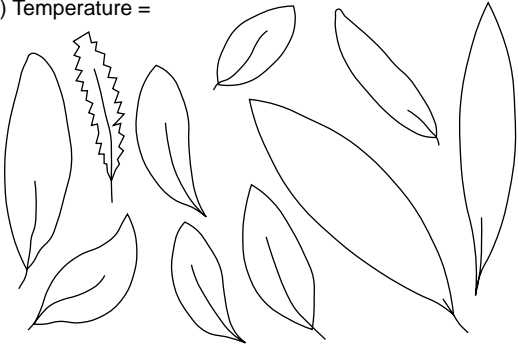
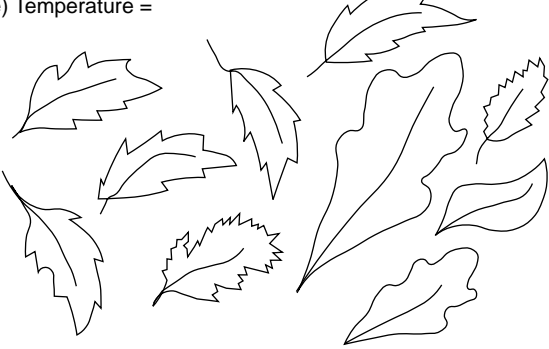

1. **Fossil flora** are compared to the nearest living plants today and the temperature is extrapolated back.

Question 1. What do you think is the main problem with this method?

2. **Leaves as thermometers.** The shape of the leaves, the nature of the leaf margin and the feature of the leaf cuticle can all be used to provide estimates of mean annual temperature, temperature range and water availability. The graph shows the relationship between temperature and the percentage of smooth leaves found together in an assemblage.



Question 2. Using the graph, work out the mean annual temperatures if the following leaves were found together in an assemblage.

<p>a) Temperature =</p> 	<p>b) Temperature =</p> 
<p>c) Temperature =</p> 	<p>d) Temperature =</p> 
<p>e) Temperature =</p> 	<p>f) Temperature =</p> 

3. **Tree growth rings** in fossil wood record a pattern of annual growth over their lifetime. They can give information about temperature changes, water availability, how long the growing season was, light levels and even what insects were around!



Photograph A

Photograph B

Tree growth rings

(Reproduced with permission of Jane Francis, University of Leeds.)

Question 3

Study the two photographs and then answer the questions.

- Which tree do you think lived in a warm wet climate? Explain your answer.
- Which tree lived through periods of drought? Explain your answer.
- How often did drought occur?

Extension question

How do you think the accuracy of the temperature measured by instruments today compares with early instrumental records and data collected from ocean sediments, ice cores and fossilised leaves and trees?