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Determination of Plant Fossils with the Help of Paleobotany

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Commentary

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DESCRIPTION

The field of botany known as paleobotany, also spelled palaeobotany, studies the recovery and identification of plant remains from geological contexts, as well as how these remains can be used to reconstruct past environments biologically (paleogeography) and to understand the evolutionary history of plants, which has implications for the evolution of life as a whole. Paleophytology is a similar word. Paleontology and paleobiology both include it as a component. The prefix palaeo-, which is derived from the Greek word palaios, meaning "ancient, old". Paleobotany encompasses the study of extinct terrestrial plants as well as extinct marine photoautotrophs like kelp, seaweed, and photosynthetic algae. Palynology, which is the study of extant and fossilised spores and pollen, is a closely related science.

In paleoecology and paleoclimatology, the reconstruction of ancient ecological systems and climate is crucial, and paleobotany is essential to the study of the growth and evolution of green plants. Paleoethnobotany and the use of phytoliths in relative dating are two applications of paleobotany that have made it significant to the study of archaeology.

In the Late Devonian, macrofossils made of plants, such as tree trunks, fronds, and roots, become common. It was previously believed that Archaeopteris, a tree with simple, fern-like leaves spirally arranged on branches atop a conifer-like trunk, was the earliest tree. However, Wattieza, a recent find, has now been identified as the earliest tree.

Numerous fossils from the Carboniferous Period's widespread coal swamp deposits in North America and Europe include arborescent lycopods up to 30 metres tall, a profusion of seed plants including conifers and seed ferns, and countless smaller herbaceous plants.

In the Early Cretaceous, some 130 million years ago, flowering plant pollen and leaves first appeared. Angiosperms, or flowering plants, originally originated during the Mesozoic. Any preserved portion of a long-dead plant is referred to as a plant fossil. These fossils could be fragments of charcoal that are only a few hundred years' old or prehistoric impressions that are millions of years old. Prehistoric plants include a variety of plant species that existed before written history (before about 3500 BC).

Preserving plant fossils secure: Middle Jurassic Ginkgoites from Yorkshire, United Kingdom, Compressed versions of leaves. Specimen in Germany's Munich Palaeontological Museum. Different techniques for preserving plants can yield different kinds of information about the original parent plant. These methods of preservation are covered in more detail in the general pages on fossils, however they can be summed up in terms of palaeobotany as follows.

- Compressions and impressions combined to form elements. These are the plant fossils that are most frequently discovered. Good morphological information is provided, particularly for dorsiventral (flattened) plant elements like leaves.

- Petrifactions (permineralisations or anatomically preserved fossils). These give precise information on the plant tissue's cell anatomy. Serial sectioning can also be used to determine morphological detail, but it is time-consuming and challenging.

- Castings and moulds these mostly maintain the tougher plant components, including seeds or woody stems. In the case of casts of tree stumps, they can show the density of the original flora and provide details on the three-dimensional form of the plant. However, they hardly ever retain any minute morphological or cell anatomical details. Pith casts, in which the centre of a stem is either hollow or possesses fragile pith, are a subset of these fossils.

- Genuine mineralizations these can offer incredibly precise three-dimensional morphological information and have proven particularly useful in the study of reproductive structures, which are prone to severe distortions in depressions. But since they develop in mineral nodules, such fossils are rarely very big.

- Fusain has some of the best evidence of early flowers preserved in it. Fire generally destroys plant tissue, but occasionally charcoalified residues can preserve fine morphological information that is lost in other techniques of preservation.