

Identification Key for Illinois Plant Fossils

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A comprehensive treatment of this subject by the same authors will appear soon in a Bulletin on "The Fossil Floras of Galesburg and Colchester", to be published by the Illinois State Geological Survey. Keys are in general use for the identification of living plants, and can be profitably applied to fossil plants although the latter lack some nonpreservable characters such as color and odor. A key of this kind would be very helpful for the classification of plant forms occurring throughout the Central Interior Coal Field, and also would be useful in other Middle Pennsylvanian localities of the United States.

The key consists of six principle divisions corresponding, in general, to the several plant orders represented in the Middle Pennsylvanian of Illinois, and a separate division for the generic form names of gymnospermous seeds. These primary divisions are:

1. Equisetales
2. Sphenophyllales
3. Lycopodiales
4. Filicales & Cycadofilicales
5. Cordaitales
6. Gymnospermous seeds

Each of these divisions is subdivided numerous times upon the basis of observable characteristics in fossilized specimens. In general, the steps proceed progressively through the families and genera to the species.

The key is based upon the most striking similarities and differences which are apparent in the fossils. It consists of a series of alternatives, and proceeds by an orderly process of elimination. The unknown specimen to be identified is compared with these contrasting descriptions, and is found to fit into one of several possible alternatives. When it is pigeon-holed in the first category, another series of alternatives presents itself. In this way the specimen can be traced down through various steps to its own correct species. The key has for its main purpose the guidance of the user through preliminary steps leading to a definite identification of any particular specimen.

A small portion of the key, pertaining to the orders Equisetales and Sphenophyllales, has been adapted from W. J. Jongmans' work on these two orders in Europe. Appropriate changes have been made to conform to the present purpose. E. Weiss has divided the Calamites into three principal subgenera, based on differences in occurrence of branch-bearing nodes along the main stem. For these he proposed the names Calamitina, Eucalamites, and Stylotalamites. These divisions have been recognized by Jongmans, and have been retained as a primary basis of classification in the present key.

However, the customary use of the generic name, *Calamites*, is retained in all cases when used in conjunction with the species names.

The order Lycopodiales is represented in the Middle Pennsylvanian of Illinois largely by impressions of the outer bark of the stems and roots, although leaves and seed-cones are also found. Before their true nature was known, imperfectly preserved stems which had reached various stages of decortication prior to fossilization were placed in separate genera. Four principal stages of decortication, in addition to the outer bark, have been given generic status in the literature dealing with Lepidodendroid forms. However, many transitions may be found between these stages. Since they are of very little botanical or geological value, it is impractical to devise a complex key to cover them. The stages which have been given generic status are listed in the key, and are as follows:

1. *Lepidodendron*—the epidermis or outer bark.
2. *Aspidiaria*—the outer cortex.
3. *Bergeria*—the middle cortex.
4. *Knorria*—the inner cortex.
5. *Aspidiopsis*—the surface of the interior cavity of the trunk.

The similarity of fern-like foliage borne by members of the orders Filicales and Cycadofilicales makes their separation difficult. They are properly differentiated on the basis of fructification and stem anatomy. However, the super-abundant occurrence of sterile and detached leaflets in the coal measures requires the classification of most of these forms solely on characteristics of leaf appearance. Insofar as the use of the key is concerned, no division into the two orders is necessary, and they are considered as a single unit. The generic names used in the key are based on leaf form except in instances where the fructification of a particular form has been definitely established.

With one exception, all of the plant forms included in the key occur in Illinois. This exception is in the portion of the key devoted to the Alethopterideae, and covers the genera *Pecopteridium* and *Lonchopteris*. These genera, which are characterized by reticulate, or net-like, veination in the leaves, have been found in the Carboniferous of Europe. Specimens have also been found there in which the reticulate veination is seen to grade into a non-reticulate veination. Inasmuch as the situation in Europe suggests the possibility that forms of this nature might sometime be found here, a section covering them has been included in the key.

In addition to the great numbers of leaf, stem, and root impressions found in Illinois, there are also many gymnospermous seeds. They usually occur as detached casts in the shales, and belong to either the Cycadofilicales or the Cordaitales. Only in extremely rare instances are seeds found attached to the parent stems. Fossilization which has preserved internal structure, as in the case of coal balls, has provided a basis for biological classification of many of these forms. But detached casts must necessarily be classified on the basis of external appearance, and the key has been devised for use under such circumstances.