MINIATURE FOSSIL CONCRETIONS OF MAZON CREEK

RAYMOND E. JANSSEN
Marshall College, Huntington, West Virginia

The Mazon Creek area in northeastern Illinois has long been recognized as one of the world's most famous localities for Pennsylvanian flora. Here the superb fossil impressions are preserved in ironstone concretions, or nodules, of exceptional interest.

Since isolated plant fragments have here acted as nuclei around which the concretions have formed the concretions roughly approximate the sizes and shapes of the enclosed fossils. The smallest nodules are round or oval in shape and are about the size of a marble or walnut. The larger ones are usually elliptical, being several times longer than wide, with maximum lengths of twenty inches or more and widths up to six inches. The larger ones generally contain complete plant parts, such as fern pinnae, leafy tree twigs, or sections of trunk. The smaller ones contain single or ultimate units of plant parts, such as pinnules, small pinnae from terminal portions of fronds, buds, seeds, or immature organs. Since the larger concretions contain the larger, more complete fossils, more attention has been given to them in studies of the fossil plants. The tiny ones, however, are equally interesting because the fossils preserved in them are similar in quality to the larger ones, Also, some kinds of plant parts, such as seeds and pinnules, by their very nature of being small in size, may be found abundantly in the smaller nodules, and be rare in those of large or average size.

In order to evaluate the variety of flora represented in the small, or so-called miniature, concretions, a study was made of an assemblage totalling 440 miniatures. For the purpose of this study, only those nodules measuring less than one and three-quarters inches in greatest diameter were considered. For the most part, however, their dimensions were considerably smaller. These were collected at various times over a period of several years from the strip-mining shale heaps of the Northern Illinois Coal Corporation's workings in Will and Grundy counties. The genera of plant fragments found in them are summarized as follows:

Fern foliage; pinnules and small pinna:	
Neuropteris	168
Asterotheca	80
Ptychocarpus	28
Alethopteris	18
Diplothmema	7
Sphenopteris	5
Odontopteris	1
Total fern foliage	307
Calamites rushes:	
Calamites stems	3
Annularia leaflets	74
Asterophyllites leaflets	4
Paleostachya cone	1
Macrostachya cone	1
Total Calamites	83
Lycopodiales tree fragments:	
Lycopodites leafy stems	3
Lepidostrobophyllum bracts	21
Lepidophyllum leaves	4
Total Lycopodiales	28

Gymnospermous seeds:	
Holcospermum	9
Cordaicarpus	8
Total seeds	17
Sphenophyllales herb:	
Sphenophyllum leaflets	2
Sphenophyllum stems	3
Total Sphenophyllales	5
Total number of specimens	440

From the foregoing figures, it can be seen that nearly 75 percent of the miniature concretions contain fern leaf foliage. Since such foliage always predominates in any representative collection of coal age flora, the Carboniferous has often been called the Age of Ferns. However, among the miniature concretions, this predominance is even greater than the average. This can be accounted for by the very nature of the foliage itself. Because fern fronds are subdivided numerous times into smaller units, called pinnae and pinnules, these readily fall apart after death of the plant and tend to become buried and preserved as tiny, isolated units. Hence they would give rise to unusual numbers of the tiny concretions. Next in order of abundance among the fossil miniatures are the *Annularia* leaflets. These grew in whorls around the *Calamites* stems; hence, in falling apart, they too provided the nuclei for great numbers of small nodules.

Rarest among these concretions, as a group, are those containing the little leaflets of *Sphenophyllum*. Their rarity, probably, is in accordance with the general uncommonness of the genus itself, rather than because of the nature of the plant fragments. It is interesting, too, to note that among the various genera of fern foliage, *Neuropteris* is extremely abundant, and *Sphenopteris* very rare; whereas both are quite common among the larger concretions. This may be explained by the fact that the pinnules of *Neuropteris* were attached to the rachis by a single point, and so would readily fall apart after death. Those of *Sphenopteris*, however, were attached by much broader bases, and would not separate from the stems as easily. Hence, the ultimate units of *Neuropteris* would provide abundant miniature concretions, but the larger units of *Sphenopteris* would preclude abundant formation of miniatures.