

THE FOSSIL FLORA OF HARRISBURG, ILLINOIS.

A. C. NOÉ, UNIVERSITY OF CHICAGO AND THE ILLINOIS
STATE GEOLOGICAL SURVEY.

At the time when coal seam No. 5 of Saline County was formed a great subtropical swamp covered the place where Harrisburg now stands. Let us visualize the vegetation which filled the swamp from the fossils which we find embedded in the roof shale of coal No. 5 and in the coal balls which are scattered throughout certain portions of the coal seam.

The underbrush of the swamp consisted of numerous ferns (Filicales) and fern-like seed plants (Cycadofilicales). Some of these plants were herbaceous, some were climbing up on the trunks of the big trees, and some formed small trees themselves, like the tree ferns of present-day New Zealand.

Scattered throughout the swamp were groups of tall trees, very different from any big trees growing in our age. Their nearest living relatives are the Club Mosses (Lycopodiales), but in the time of the coal age the Lycopods attained a height of one hundred feet, forming shafts with slender branches at the top and bearing, at the end of these, grass-like leaves and cones with spores.

Along the rivers and brooklets which meandered through the great swamp stood gigantic Horse-tails (Equisetales), twenty to thirty feet high, forming thick stems, but otherwise very much like their present humble relative, *Equisetum*, the Horse-tail.

In the brooklets floated a water plant which is completely extinct now, having left no representative of its family. It is called *Sphenophyllum*, which means wedge-shape, because of the form of its leaves.

The type of ferns which grew in the No. 5 coal swamp are, taken as a whole, different from those which grew in the swamps which formed the No. 1, No. 2, No. 6, and No. 7 coal. There is a preponderance of a big, broad-leaved fern (*Neuropteris flexuosa*), which forms the largest number of all plant fossils collected at Harrisburg. Next to it comes a small-leaved fern of the same genus,

Neuropteris rarinervis, which is also characteristic for the No. 5 coal on account of the large number of fossils it left behind. The *Odontopteris* is another fern-like plant which is a good index fossil for coal seams of the upper Pennsylvanian.

These three types of ferns very likely bore seeds and should therefore, be grouped among the *Cycadofilicales*, or seed ferns.

The genus *Sphenopteris*, which is so characteristic for the lower coal seams of the Pennsylvanian, is rare at Harrisburg and so are *Linopteris* and *Allethopteris*, but the genus *Pecopteris* represented by numerous species like *P. vestita* and *P. miltone*, but *P. unita* is rare. The latter is extremely common in the coal No. 2.

We find another index fossil, *Annularia-stellata*, although it is not very frequent. Of *Lepidodendron lan- ceolatum* we find many impressions, also of *Sigillaria ovata*.

If we compare this flora with that of other floras in America and in Europe, we would put it above the middle of the Pennsylvanian formation. It corresponds to the uppermost Westphalian in Europe and approximately to the top of the Allegheny in Pennsylvania or the Carbondale in Illinois.

The aforementioned fossils have all been taken from the shale above the coal No. 5 in the Ledford Strip Mine, southwest of Harrisburg. There is another type of specimen, as mentioned in the introduction, the coal balls from the O'Gara Mine No. 11.

In a strip of territory between the O'Gara No. 9 and No. 11, I found limestone concretions in the coal, called coal balls by the geologist, and they contain the exact plant material from which the coal swamp was formed, preserved by a limestone saturation. A great many of these coal balls have been sectioned and the anatomic structures of seed ferns and even angiosperms were found in them.

One of the most striking discoveries made in the last years was *Angiospermophyton americanum* which Mr. Hoskins described in a paper from the Paleobotanic Lab-

oratory at the University of Chicago in 1923, and which gives the earliest known angiospermic plant structure.

The interpretation of this plant was questioned and the whole subject has been discussed lately; but whatever the ultimate outcome of this controversy may be, it has been established already beyond doubt that the structure is angiosperm-like; even if it may have grown on a Cycadofilicales stem, it shows a distinct tendency toward angiospermic development.