

## NEW RESEARCH IN ILLINOIS COAL BALLS

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During the last year, several hundred coal balls from the former strip mine at Calhoun, Richland County, were sectioned. This coal was classified by Worthen as seam No. 13 or 14, which places it stratigraphically high in the upper part of the McLeansboro formation, the youngest formation of the Pennsylvanian system.

In order to examine the coal balls rapidly, they were quartered and the surfaces of the cuts were treated with cellulose film. In order to obtain a cellulose film, the surface of the coal ball must first be smoothed and then etched with hydrochloric acid. A layer of calcium is thus removed and the carbonized cell walls protrude from the surface like fibres of velvet. If a solution of cellulose is poured over this surface the cell walls become embedded in the cellulose film which easily peels off. This process proves that no replacement of organic substance takes place, but that the cell walls are actually preserved. We may conclude that the theory which assumes a complete destruction of cellulose by bacterial action in the coal swamp does not seem to be borne out by facts, as far as observations of coal balls indicate.

A close comparison between the coal balls from coal No. 5, Harrisburg, Illinois, from the Pyramid Coal Company, near Duquoin, from coal No. 6, and from coal No. 7, Danville, Illinois, with those of the Richland County coal give the following results:

1. They are richer in fern sporangia, containing a type which belongs probably to the genus *Sturiella*, but of a new species<sup>1</sup>.
2. These coal balls are richer in various fern steles, especially of the genus *Botryopteris*.
3. Various *Lepidodendron* stems seem to be close to the species *Lepidodendron vasculare*.
4. A new *Sigillaria* type occurs which has not yet been named.
5. A new *Bothrodendron* type is also present.
6. More than one species of *Stigmaria ficoides* is observed.
7. Except for a number of new species, the coal ball floras of coals Nos. 5, 6, 7, and 14 do not differ radically. They even seem to have a large number of species in common.
8. Contemporary Upper Carboniferous floras of Western Europe and of America differ from each other far more than has been generally assumed.

<sup>1</sup> Mr. Roy Graham, University of Chicago, is preparing a doctor's dissertation on this new fern sporangia.