

or antheridia, are very delicate and destitute of the dense outer wall of the macrospores. Hence such parts are little likely to have been preserved in a fossil state; and in the Erian shales, if present, they probably appear merely as flocculent carbonaceous matter not distinctly marked, or as minute granules not well defined, of which there are great quantities in some of the shales.

The vegetation appertaining to the Sporangites has not been distinctly recognised. I have, however, found in one of the Brazilian specimens two sporocarps attached to what seems a fragment of a cellular frond, and numerous specimens of the supposed Algæ, named *Spirophyton*, are found in the shales, but there is no evidence of any connection of this plant with the *Protosalvinia*.

Modern Rhizocarps present considerable differences as to their vegetative parts. Some, like *Pilularia*, have simple linear leaves; others, like *Marsilea*, have leaves in whorls, and cuneate in form; while others, like *Azolla* and *Salvinia*, have frondose leaves, more or less pinnate in their arrangement. If we inquire as to fossils representing these forms of vegetation, we shall find that some of the plants to be noticed in the immediate sequel may have been nearly allied to the Rhizocarps. In the mean time I may state that I have proposed the generic name *Protosalvinia* for these curious macrospores and their coverings, and have described in the paper in the "Bulletin of the Chicago Academy of Sciences," already quoted, five species which may be referred to this genus.

These facts lead to inquiries as to the origin of the bituminous matter which naturally escapes from the rocks of the earth as petroleum and inflammable gas, or which may be obtained from certain shales in these forms by distillation. These products are compounds of carbon and hydrogen, and may be procured from recent vegetable substances by destructive distillation. Some vegetable matters, also, are much richer in carbon and hydrogen