earthy bitumen, as well as for the occurrence of scales of fish and other aquatic animals in such beds. Lyell's interesting observation of the submerged areas at New Madrid, keeping free of Mississippi mud, because fringed with a filter of cane-brake, shows that the areas of coal accumulation might often be inundated without earthy deposit, if, as seems probable, they were fringed with dense brakes of calamites, sheltering them from the influx of muddy water. It seems also certain that the water of the coal areas would be brown and laden with imperfect vegetable acids, like that of modern bogs, and such water has usually little tendency to deposit any mineral matter, even in the pores of vegetable fragments. The only exception to this is one which also occurs in modern swamps, namely, the tendency to deposit iron, either as carbonate (Clay Ironstone), or sulphide (Iron Pyrite), both of which are products of modern bogs, and equally characteristic of the coal swamps.

Where great accumulations of sediment are going on, as at the mouths of modern rivers, there is a tendency to subsidence of the area of the deposit, owing to its weight. This applies, perhaps, to a greater extent to coal areas. Thus the area of a coal swamp would ultimately sink so low as to be overflowed, and a roof shale would be deposited to bury up the bed of coal, and transmit it to future ages, chemically, and mechanically changed by pressure and by that slow decomposition which gradually converts vegetable matter into carbon and hydrocarbons. The long continuance and great extent of these alternations of growth and subsidence is perhaps the most extraordinary fact of all. At the South Joggins, if we include the surfaces having erect trees with those having beds of coal, the process of growth of a forest or bog, and its burial by subsidence and deposition must have been repeated about a hundred times before the final burial of the whole under the thick sandstones of the Upper Carboniferous and Permian.