

aquatic origin of coal, except such as are based on misconceptions of the structure and mode of growth of sigillaroid trees and of the stratigraphical relations of the coal itself.¹ It is to be observed, however, that while I must maintain the essentially terrestrial character of the ordinary coal and of its plants, I have elsewhere admitted that cannel coals and earthy bitumen present evidences of subaquatic deposition; and have also abundantly illustrated the facts that the coal plants grew on swampy flats, liable not only to river inundations, but also to subsidence and submergence.² In the oscillation of these conditions it is evident that *Sigillariæ* and their contemporaries must often have been placed in conditions unfavourable or fatal to them, and when their remains are preserved to us in these conditions, we may form very incorrect inferences as to their mode of life. Further, it is to be observed that the conditions of submergence and silting up which were favourable to the preservation of specimens of *Sigillariæ* as fossils, must have been precisely those which

¹ It is unfortunate that few writers on this subject have combined with the knowledge of the geological features of the coal a sufficient acquaintance with the phenomena of modern marshes and swamps, and with the conditions necessary for the growth of plants such as those of the coal. It would be easy to show, were this a proper place to do so, that the "swells," "rock faults," splitting of beds, and other appearances of coal seams quite accord with the theory of swamp accumulation; that the plants associated with *Sigillariæ* could not have lived with their roots immersed in salt water; that the chemical character of the underclays implies drainage and other conditions impossible under the sea; that the composition and minute structure of the coal are incompatible with the supposition that it is a deposit from water, and especially from salt water; and that it would be more natural to invoke wind driftage as a mode of accumulation for some of the sandstones, than water driftage for the formation of the coal. At the same time it is pretty certain that such beds as the cannels and earthy bitumens which appear to consist of finely comminuted vegetable matter, without mineral charcoal, may have been deposits of muck in shallow lakes or lagoons.

² *Journal of Geol. Socy.*, vols. x. and xv., and "Acadian Geology."