worm shell (*Spirorbis*) found with them, are not necessarily marine, though some of them belonged probably to brackish water, and they have not yet been found in those carboniferous beds deposited in the open sea. There is thus in the whole thickness of the middle coal measures of Nova Scotia a remarkable absence at least of open sea animals; and if, as is quite probable, the sea inundated at intervals the areas of coal accumulation, the waters must have been shallow, and to a great extent land-locked, so that brackish-water rather than marine animals inhabited them.

On the other hand, there are in these coal measures abundant evidences of land surfaces; and subaërial decay of vegetable matter in large quantity is proved by the occurrence of the mineral charcoal of the coal itself, as I have elsewhere shown.[1] The erect trees which occur at so many levels also imply subaërial decay. A tree imbedded in sediment and remaining under water, could not decay so as to become hollow and deposit the remains of its wood in the state of mineral charcoal within the hollow bark. Yet this is the case with the greater part of the erect Sigillariæ which occur at more than twenty levels in the Joggins section. Nor could such hollow trunks become repositories for millipedes, snails and reptiles, if under water. On the other hand, if, as seems necessary to explain the character of the reptiliferous erect trees, these remained dry, or nearly so, in the interior, this would imply not merely a soil out of water, but comparatively well drained; as would indeed always be the case, when a flat resting on a sandy subsoil was raised several feet above the level of the water. Further, though the peculiar character of the roots of *Sigillariæ* and *Calamites* may lend some countenance to the supposition that they could grow under water, or in water-soaked soils, this will not apply to coniferous trees, to

[1] *Journal of Geological Survey*, vol. xv.