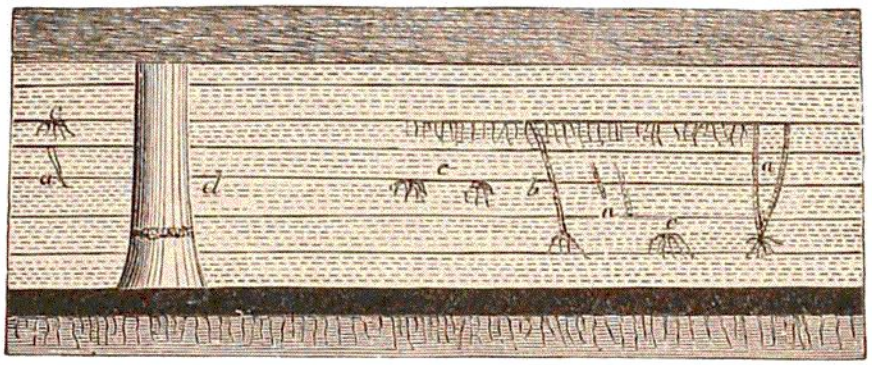
result of whatever circumstances succeeded; but it is common to find great numbers of fragments or trunks of trees and ferns in the first stratum. The shaly beds often contain the ancient ferns, spread out between the layers with all the perfection they have in an herbarium, and so abundant that,

1028.




**Section of Coal-measures at the Joggins, Nova Scotia (with erect stumps and stems, a, b, c, d, in the sandstone, and rootlets in the underclays). Dawson.**

however thin the shale be split, it opens to view new impressions of plants. In the sandstone layers, broken trunks of trees sometimes lie scattered through the beds. Some of the logs in the Ohio Coal-measures, described by Dr. Hildreth, are 50 to 60 feet long, and three in diameter. At Carbondale, in Pennsylvania, a forest of Calamites, or tree-rushes, was cut through in opening an inclined tunnel through sandstone to the underlying coal-bed, and the trunks, or rather their fragments, were so numerous that they were used as a foundation for a tramway for transporting the coal out of the mine. In the walls crowds of other stems of the old jungle were left. Lesquereux refers the species of Calamites to *C. Suckovi* and *C. approximatus*. He also states that in the roof-shale of the coal-bed at Carbondale, Pa., there was found an impression of the bark of a *Lepidodendron*, two feet wide and *seventy-five feet* long. Andrews mentions that thousands of the trunks of the Fern, *Pecopteris arborescens* Schloth., are found in the shale over the Pomeroy coal-bed; and at one place the trunk of a *Sigillaria* was traced by him for more than 40 feet. In Kentucky, at Paintsville, the stony bottom of the river is an irregular mosaic work made of cross-sections of trunks of *Sigillaria* which stand crowded together in the position of growth (Lesquereux). One trunk is 22 inches across, showing that the region was the site of a forest.

Such facts are common. These facts are enough to prove the vegetable origin of coal. But Ferns, Lepidodendra, and other plant-remains are often spread out in perfection *within the coal-beds, and sometimes in the solid masses of anthracite.* They occur also in the textureless cannel coal, as at Breckenridge, Ky., where the coal "is marked through its whole mass by stems and leaves of Stigmaria and Lepidodendron rendered distinct by infiltration of sulphuret of iron" (Lesquereux). Further, the coal is often penetrated with the tissues and spores of the plants. Even the solid anthra-