

out, the props or supports of the roof will be removed, the whole upper strata will then sink down, and the upper coal may be safely worked. There is scarcely any water in this mine, and what is found there, is a salt brine, containing common salt nearly pure: it issues from the fissures in the coal with a hissing noise, being accompanied with carburetted hydrogen, (fire-damp.) All the beds of coal rest upon what is called bind, which is an argillaceous shale, more or less indurated, sometimes coloured black by bitumen, and sometimes intermixed with sand resembling sandstone, but generally, on exposure to the atmosphere, decomposing into a clayey soil, like the blue and black binds.

It seems extremely probable that these beds, called bind, which lie immediately under the coal, were once the soil on which flourished the different vegetables that form coal. When I examined the mine, in 1811, the vegetable remains appeared to me the same as those found in other coal-fields; but at that time they did not attract my attention, except one which is a nearly globular mass, composed of a series of cones within each other, and diverging from a common centre. These have been called "cone within cone" by the miners, but their nature is not well understood. Adolphe Brongniart, in his excellent work on vegetable fossils supposes they may be the seed vessels of a gigantic species of lycopodium.

The recurrence of frequent alternations of seams of ironstone with thin beds of blue bind, each alternation preserving the same thickness, is a circumstance well deserving attention, as it indicates a periodical succession of causes, probably dependent on the seasons.

There are a few beds called *rubly*, or *rumilly*, by the miners; they consist of loose materials and fragments, which indicate that they were deposited during an agitated state of the water. Many of the other beds have evidently been deposited by tranquil water in a lake, which occasionally became dry land. I have dwelt longer on this subject, than is perhaps consistent with an introductory work, but I was desirous to direct the attention of geologists to an enquiry which has hitherto been disregarded.

The conversion of vegetable matter into true mineral coal has been admirably elucidated by the experiments of Dr. Macculloch on wood in different states of bituminization, from submerged wood to peat, brown coal, surturbrand, and lastly to jet, in which the traces of organization are nearly destroyed. These substances, which have been subjected to the action of water only, all yield bitumen by gentle distillation; but they differ from mineral coal, by yielding also a large portion of acetic acid, which marks the remains of undecayed vegetable substances. Common coal was formerly regarded, as a combination of charcoal with bitumen; but, as bitumen is itself a combination of carbon with hydrogen, Dr. Macculloch says, it will be more proper to consider coal as a bitumen, varying in its composition from the fattest Newcastle coal to the driest Kilkenny coal,