with beds of white grit and conglomerate of coarser grain than I ever saw elsewhere, associated with pure coal. The pebbles of quartz are often of the size of a hen's egg. On following these pudding-stones and grits for several miles from Pottsville, by Tamaqua, to the Lehigh Summit Mine, in company with Mr. H. D. Rogers, in 1841, he pointed out to me that the coarse-grained strata and their accompanying shales gradually thin out, until seven seams of coal, at first widely separated, are brought nearer and nearer together, until they successively unite; so that at last they form one mass, between 40 and 50 feet thick. I saw this enormous bed of anthracite coal quarried in the open air at Mauch Chunk (or the Bear Mountain), the overlying sandstone, 40 feet thick, having been removed bodily from the top of the hill, which, to use the miner's expression, had been "scalped." The accumulation of vegetable matter now constituting this vast bed of anthracite, may perhaps, before it was condensed by pressure and the discharge of its hydrogen, oxygen, and other volatile ingredients, have been between 200 and 300 feet thick. The origin of such a vast thickness of vegetable remains, so unmixed with earthy ingredients, can, I think, be accounted for in no other way, than by the growth, during thousands of years, of trees and ferns, in the manner of peat,—a theory which the presence of the Stigmaria *in situ* under each of the seven layers of anthracite, fully bears out. The rival hypothesis, of the drifting of plants into a sea or estuary, leaves the absence of sediment, or, in this case, of sand and pebbles, wholly unexplained.

But the student will naturally ask, what can have caused so many seams of coal, after they had been persistent for miles, to come together and blend into one single seam, and that one equal, in the aggregate, to the thickness of the several separate seams? Often had the same question been put by English miners before a satisfactory answer was given to it by the late Mr. Bowman. The following is his solution of the problem. Let *a a'*, fig. 506, be a mass of vegetable matter, capable,

Fig. 506.

Fig. 507.

when condensed, of forming a 3-foot seam of coal. It rests on the underclay *b b'*, filled with roots of trees *in situ*, and it supports a growing forest (C D). Suppose that part of the same forest D E had become submerged by the ground sinking down 25 feet, so that the trees have been partly thrown down and partly remain erect in water, slowly de-