bark of *Quercus suber*); (3) the spores of Lycopods; (4, 5, 6) the common kinds of mineral coal; and (7) peat or vegetable material, partly altered to the coal-like condition.

		Carbon	Hydrogen	Oxygen	Nitrogen
I.	*Woody ingredients*				
	1. Wood	49·66	6·21	43·03	1·10
	2. Cork	65·73	8·33	24·44	1·50 = 100
	3. Lycopod spores	64·80	8·73	20·29	6·18 = 100
II.	*Coal products*				
	4. Anthracite	95·0	2·5	2·5	
	5. Bituminous coal	81·2	5·5	12·5	0·8
	6. Brown coal	68·7	5·5	25·0	0·8
	7. Peat	59·5	5·5	33·0	2·0

The relations of these woody materials and coals are still better exhibited in the following table, giving the atomic proportions of the constituents, carbon being made 100; the atomic equivalents of carbon, hydrogen, and oxygen being respectively 12, 1, 16.

	Carbon	Hydrogen	Oxygen
1. Wood	100	150	65
2. Cork	100	150	30
3. Lycopod spores	100	166	24
4. Anthracite	100	33	2
5. Bituminous coal	100	83	12
6. Brown coal	100	96	27
7. Peat	100	112·5	40

There was little ordinary bark in the beds of vegetable debris, since the cortical part of Lycopods, Ferns, and Calamites is not of this nature; although nearer coal in constitution than true wood, bark resists alteration longer, and is less easily converted into coal. The spores of Lycopods often retain their amber-yellow color in the coal, although undoubtedly changed in constitution. Resins, which are still nearer coal in the amount of carbon, but hold less oxygen, are found mostly as resins in coal, especially when they are in lumps or grains, but of somewhat altered composition. It is probable that, in the making of bituminous coal, at least three fifths of the material of the wood were lost; and in the making of anthracite, about three fourths. Besides this reduction to two fifths and one fourth by decomposition, there is a reduction in bulk by compression; which, if only to one half, would make the whole reduction of bulk to one fifth and one eighth. On this estimate, it would take five feet in depth of compact vegetable debris to make one foot of bituminous coal, and eight feet to make one of anthracite. For a bed of pure anthracite 30 feet thick (like that at Wilkesbarre), the bed of vegetation should have been at least 240 feet thick.

Anthracite coal is a result, according to most writers on the subject, of the action of heat on bituminous coal, under pressure, attending an upturning of the rocks, the heat driving off nearly all volatile matters it could develop, and so leaving a coke (the anthracite) behind. Made in this way,