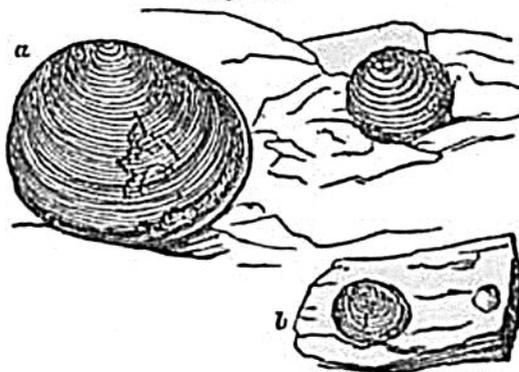


and between the seams of coal. In order to explain this fact we must suppose such shales and sandstones to have been gradually accumulated during the slow and repeated subsidence of the whole region.

It is worthy of remark that the *Equisetum columnare* of these Virginian rocks appears to be undistinguishable from the species found in the oolitic sandstones near Whitby in Yorkshire, where it also is met with in an upright position. One of the Virginian fossil ferns, *Pecopteris Whitbyensis*, is also a species common to the Yorkshire oolites.* These Virginian coal-measures are composed of grits, sandstones, and shales, exactly resembling those of older or primary date in America and Europe, and they rival or even surpass the latter in the richness and thickness of the coal-seams. One of these, the main seam, is in some places from 30 to 40 feet thick, composed of pure bituminous coal. On descending a shaft 800 feet deep, in the Blackheath mines in Chesterfield county, I found myself in a chamber more than 40 feet high, caused by the removal of this coal. Timber props of great strength supported the roof, but they were seen to bend under the incumbent weight. The coal is like the finest kinds shipped at Newcastle, and when analyzed yields the same proportions of carbon and hydrogen, a fact worthy of notice when we consider that this fuel has been derived from an assemblage of plants very distinct specifically, and in part generically, from those which have contributed to the formation of the ancient or paleozoic coal.

The fossil fish of these Richmond strata belong to the liassic genus *Tetragonolepis* (*Æchmodus*), see fig. 411, and to a new genus which I have called *Dictybyge*. Shells are very rare, as usually in all coal-bearing deposits, but a species of *Posidonomya* is in such profusion in some shaly beds as to divide them like the plates of mica in micaceous shales (see fig. 422).

Fig. 422.



a. *Posidonomya*, or *Estheria* †

b. Young of same.

Oolitic coal-shale, Richmond, Virginia.

In India, especially in Cutch, a formation occurs clearly referable to the oolitic and liassic type, as shown by the shells, corals, and plants; and there also coal has been procured from one member of the group.

* See description of the coal-field by the author, and of the plants by O. J. F. Bunbury, Esq., Quart. Geol. Journ. vol. iii. p. 281.

† Possibly, as suggested by Prof. Morris (Geol. Journ. vol. iii. p. 275), these delicate bivalves may prove to belong to the crustacean genus *Estheria*.