

I shall proceed, therefore, to treat briefly of these subdivisions, beginning with the highest, and referring the reader, for a fuller description of the lithological character of the whole group, as it occurs in the north of England, to a valuable memoir by Professor Sedgwick, published in 1835.*

Crystalline or concretionary limestone (No. 1).—This formation is seen upon the coast of Durham and Yorkshire, between the Wear and the Tees. Among its characteristic fossils are *Schizodus Schlotheimi* (fig. 444) and *Mytilus septifer* (fig. 446).

Fig. 444.



Schizodus Schlotheimi, Gelnitz.
Crystalline limestone, Permian.

Fig. 445.



The hinge of *Schizodus truncatus*, King.
Permian.

Fig. 446.



Mytilus septifer, King.
Syn. *Modiola acuminata*.
James Sow.
Permian crystalline limestone.

These shells occur at Hartlepool and Sunderland, where the rock assumes an oolitic and botroidal character. Some of the beds in this division are ripple-marked; and Mr. King imagines that the absence of corals and the character of the shells indicate shallow water. In some parts of the coast of Durham, where the rock is not crystalline, it contains as much as forty-four per cent. of carbonate of magnesia, mixed with carbonate of lime. In other places,—for it is extremely variable in structure,—it consists chiefly of carbonate of lime, and has concreted into globular and hemispherical masses, varying from the size of a marble to that of a cannon-ball, and radiating from the centre. Occasionally earthy and pulverulent beds pass into compact limestone or hard granular dolomite. The stratification is very irregular, in some places well-defined, in others obliterated by the concretionary action which has rearranged the materials of the rocks subsequently to their original deposition. Examples of this are seen at Pontefract and Ripon in Yorkshire.

The brecciated limestone (No. 2) contains no fragments of foreign rocks, but seems composed of the breaking-up of the Permian limestone itself, about the time of its consolidation. Some of the angular masses in Tynemouth Cliff are 2 feet in diameter. This breccia is considered by Professor Sedgwick as one of the forms of the preceding limestone, No. 1, rather than as regularly underlying it. The fragments are angular and never water-worn, and appear to have been re-cemented on the spot where they were formed. It is, therefore, suggested that they may have been due to those internal movements of the mass which produced the concretionary structure; but the subject is very obscure, and after

* Trans. Geol. Soc. Lond. Second Series, vol. iii. p. 37.