A PERMIAN CONGLOMERATE BED AT MARKINGTON.

BY REV. J. STANLEY TUTE, B.A.

There is in the parish of Markington a small bed of Permian Conglomerate, the existence of which seems to be worth recording. It consists of waterworn pebbles of Carboniferous Limestone and Sandstone, with angular fragments of Magnesian Limestone, embedded in a matrix of harder Magnesian Limestone. The thickness of this bed, where it is exposed, is about a yard, and its width a few yards, as far as it is traceable. The difficulty of tracing it further arises from its position. It occurs a little below the top of a steep bank about 50 feet in height, overgrown with a rather dense plantation, in which two out-crops appear. This conglomerate bed and another well-marked bed, upon which it lies, reaches to the bottom of the valley; and upon its eroded surface there runs the Markington Beck, a great part of which shortly disappears in swallow-holes and crevices of the Limestone. After passing underneath the hill, which is between Markington and Bishop Monkton, the stream bursts out in the latter parish.

That this conglomerate bed once extended further to the west is clear from the occurrence there of boulders of this rock among the other boulders of the drift. There is clear evidence at hand that the loss by denudation has been very great, probably to the extent of 200 feet or more. The well-marked limestone I have mentioned is easily recognized amongst the other Permian beds, and consists of smoothed lumpy blocks of greyish-brown limestone, containing many sparry cavities, and probably represents the Lower Limestone of the county of Durham, the beds of which are described by Mr. Howse as "thin, hard, and knobby, and the entire thickness fissured and intersected with numerous perpendicular fissures or backs."* It occurs also half-a-mile to the east, near Wormald Green, in a very fine section 200 yards in extent, as a bottom bed; but I have failed to detect any traces of the conglomerate bed there. The section is

* A guide to the collections of Local Fossils in the Museum, Newcastle.

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about 70 feet in thickness, and consists of the following strata :—
Boulder Clay from 5 to 15 feet thick.

Quarry Men's Terms.	{	Wormhole Beds	...	...	...	30	0*
		Crapley Beds	...	...	...	1	6
		White Bed, with a clay parting of 2in.	...	...	...	30	0
		Lumpy Bed	...	...	...	10	0

Where the outcrop of the conglomerate occurs this Lumpy Bed is certainly more than 50 feet in thickness. As no traces of the conglomerate are found in the quarry, I conclude that it is local in its origin ; and though the rocks contained in it have certainly been brought in Permian times from a distance at least of fifteen or twenty miles westward, the formation does not seem to have been glacial, but to have been the result of river gravel deposit cemented together by subsequent calcareous Permian deposits.

The Lumpy Bed seems to occur at Humbleton near Sunderland, and at Garforth near Leeds. In the latter place the beds abound with *Axinus obsurus*, which also occurs at the western edge of the lowest position of the Lumpy Bed, about a mile from the outcrop in Markington.

The so-called Crapley Bed is a marked feature in the Quarry, running through its whole length, at an angle of 6° N.E., and consists of a bed of White Limestone, separated from the beds above and below by thin beds consisting of broken fragments of limestone. the origin of which does not seem to be very clear.

* To this I drew the attention of the Society at a previous meeting.