

and maintained that the striæ observed in chalk are to be regarded as slickensides caused by disturbance and movement of the rock. He described the appearances in detail, and mentioned the occurrence of similar striations in various rocks.

Discussion.—Mr. Whitaker said that some of the specimens on the table sent by Dr. Ward showed slickensides, but that in certain cases the fibrous structure runs through the whole substance.

Mr. W. T. Blanford stated that he had seen a similar structure in an undisturbed white clay resembling pipeclay, so that he thought the appearance could not be produced by motion.

The President remarked that the structures brought forward appeared to be of two kinds: first, slickensides pure and simple; and secondly, fibrous structure, the latter probably due to chemical action, either by an incipient formation of aragonite, or by the formation of that mineral and its subsequent partial decomposition.

CORRESPONDENCE.

ON THE CHESIL BANK.

SIR,—I am glad of the opportunity, given by Mr. Kinahan's question, to explain what I mean by a "drowned valley." I apply this term to an inlet of the sea, which occupies a valley originally subaerial, and excavated by subaerial causes, but into which the sea has subsequently run, owing either to a subsidence of the land, or, if such a thing be admitted as possible, by a raising of the level of the ocean at the locality. There are many causes which, to my mind, seem to point to the latter as having really happened.

In many parts of the English coast old cliffs may often be traced where high ground meets alluvial tracts of salt marsh. I believe them to have been formed during the period of the formation of the Scrobicularia Clays which overlie the submerged forests. These cliffs do not indicate the mode of *formation* of the bays, which have since become alluvial tracts, but are merely traces of their slight enlargement after the sea had gained access to their areas.

The order of events has been:—1. Excavation of the valleys by subaerial causes. 2. Growth of forests now submerged. 3. Depression; and formation of Scrobicularia Clays and low cliffs—probably the period of the 30 feet raised beaches. 4. Slight re-elevation, and silting up of some of the estuaries (not of all), bringing them into their present condition.

The reason why I affirm that there were never marginal cliffs to the Fleet is, because I have seen no vestiges of them. The gently undulating surface of the ground declines gradually to the water's edge; and I have collected fossils from the outcrop of the beds at the edge of the Fleet, where, if there had been formerly cliffs, we ought now to find tumbled talus. Mrs. Bristow's characteristic sketch, in Vol. VI. of the *MAGAZINE*, gives an exceedingly good idea of the ground, it being premised that all shown is upland. There is no alluvial ground shown in it. The only alluvial tract is a small part at the extreme head of the estuary, which in the sketch is hidden by a projecting mound. Referring to the questions opened by Colonel

Greenwood and Mr. Kinahan with regard to the transportation of the pebbles which form this beach: Colonel Greenwood, if I understand him rightly, considers the pebbles to travel along the beach, being moved onwards by waves under the influence of the wind, and consequently on the average travelling in the direction of the prevailing wind. I have, I am afraid to say how long ago, noticed this action on the Chesil Beach. I have seen the waves rolling in from the Atlantic (for we are not here in the presence of narrow seas, as Mr. Kinahan appears to think) take up the pebbles from one spot, and dash them down again some little distance to the leeward. They no doubt travel along the Beach under this action. But does it follow that that is how they came there? I say, no. If it were, how could the larger stones be at the end most distant from the main land?

Some of the most violent storms on this coast come somewhat from the south of south-west, so that their action is, I suspect, rather to carry the pebbles by wave-action towards the north-west end of the Beach, and probably their attrition, as they move onwards, partly accounts for their gradual decrease in size as we follow them in that direction.

Among the pebbles are a few, chiefly at the southern end, from Portland; but the larger proportion consists of Chert from the Upper Greensand of the west of Dorset and of Devon, and of other pebbles, which appear to be derived from the Trias of the same district. This shows that they have come across the west bay. Sir Charles Lyell explains the case thus:¹ "The force of the sea increases southwards, and as the direction of the bank is from north-west to south-east, the size of the masses coming from the westward, and thrown ashore, must always be largest where the motion of the waves and currents is most violent." It seems then that the currents must store up an accumulation of pebbles beneath the bay, within reach of the shore, which, on occasions of unusual wave-action, are cast up in masses upon the beach.

O. FISHER.

WHY ARE THE LARGEST STONES FOUND AT THE EAST END OF THE CHESIL BANK?

SIR,—It has puzzled many observers to find that, contrary to expectation, the largest shingle is at the east end of the Chesil Bank, though it is well ascertained that the whole mass of pebbles have travelled from the westward—the usual inference being that the further the pebbles have travelled the smaller they become.

As bearing on the mechanical problems involved in this striking phenomenon of nature—which, seen in its whole extent from an elevation, resembles nothing so much as a large railway embankment—the fact is extremely interesting, and admits to my mind of a very simple explanation; for the individual stones merely follow the law applying to the whole bank, which increases in height and

¹ Principles, vol. i. p. 539. 1872.