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.

sectional area as is it approaches Portland. It is evident that the force of the insetting tidal current, assisted by the prevailing wind, must increase in angular intensity as it approaches and is deflected from the hollow of the bend of the bank produced by the promontory of Portland. At this point also will the wind waves have the greatest power. It is also easy to understand that the amount of material cast up above high water will vary as the energy of wave action varies, and consequently the largest stones will be thrown up at the point of intensest action. As the shingle of all sizes travels eastward along the beach the smaller stones are cast up first, the larger ones being weightier have less lateral upshore movement, and so travel further. In fact I conceive the phenomenon must necessarily follow from the application of the known mechanical law of the inclined plane—the greater weights travelling up a more extended and therefore lesser gradient, until they come within the range of waves sufficiently powerful to cast them upon the bank itself.

It is quite clear to me that the whole bank is the result of causes now at work, and which have continued with remarkable uniformity since the last relative change of level of land and sea. With Mr. Fisher I agree that the irregular shingle-banks and inclosed lagoons on the coast of Ireland, mentioned by Mr. Kinahan, are not at all parallel phenomena.

Heath House, Blundellsands,
Liverpool, *April 7th*, 1874. T. Mellard Reade, C.E.

HYBODUS, A COAL-MEASURE FISH.

Sir,—While examining a work by Pictet this morning, entitled "Traité de Paléontologie," I stumbled upon the following remarks in the second volume, p. 256; he is speaking of *Hybodus*: "Beaucoup d'autres sont connues seulement par leurs dents. Deux espèces sont citées dans les terrains carbonifères. Ce sont les *Hybodus carbonarius* et *vicinalis*, Giebel de Wettin."

His authority for this statement is Giebel, in his work on the "Fauna der Vorwelt." I was much surprised, and yet gratified, to find that my opinion of *Hybodus* being a Coal-measure Fish, arrived at quite independently, should be corroborated by so eminent a palæontologist. Of course my statement that *Hybodus* had never been described previously to my paper as a Coal-measure Fish is erroneous; but considering that Agassiz, Owen, Huxley, Pander, Munster, M'Coy, Newberry, etc., etc., do not refer to the work, nor to the fact in any way, I consider myself quite justified in making it. However, Giebel and I have arrived, quite independently, at the conclusion that the teeth of *Hybodus* are to be obtained in the Coal-measures, and we coincided so far that, in a list of Palæozoic Fishes I am preparing, I had actually named our English Coal-measure *Hybodus*, *H. carbonarius*. This name, however, I must withdraw, if my species does not resemble his; but, unfortunately, I have not any means of comparing their characteristics: for Giebel's work is not among the