

paper "On the Forests of the Coal Period," in which he remarks that the plants "grew in extensive level plains. . . . The moist atmosphere (*not at all likely to have been charged with more carbonic acid gas than that of our own day*)¹ would encourage the growth of cellular parasites, etc." The second reference is to a paper by Dr. H. Woodward, "On Old Land Surfaces," in which, after quoting some remarks by Dr. Sterry Hunt to the effect that the atmosphere of the Coal period contained, as originally suggested by Brongniart, a "comparatively large amount of carbonic acid," he adds in a footnote, "Later experiments have, however, proved that plants, like animals, are at once poisoned by an excess of carbonic acid." Now the first reference appears to me only the expression of an opinion, and in the second, although experiments are mentioned, the reference is not given. I know of no such experiments, and if your reviewer or any of your correspondents can refer me to any, I shall feel very much obliged. The only experiments bearing on the subject, and which show that plants can live, flourish, and grow rapidly in an atmosphere with an excess of carbonic acid, I have quoted (p. 120), and I know of no others. Excuse the length of this letter, but I am anxious for information on this point, and should be glad of confirmation or otherwise on this subject, which is one of much theoretical interest.

DARENT-HULME, SHOREHAM, SEVENOAKS,
10th April, 1888.

JOSEPH PRESTWICH.

SPURIOUS FLINT IMPLEMENTS.

SIR,—Will you kindly allow me space in the *GEOL. MAG.* to inform its readers who may be collectors of Flint Implements, that there are at the present time being manufactured in London worked flints, which are stated to be genuine, but which are nothing of the sort, and at the same time to say that some of these manufactured flints have been sold to gentlemen for a high price, who are considered authorities on the subject, and I trust that should any of my readers meet with such as appear doubtful they will use their best endeavours to expose and stop such a fraud.

GEO. E. EAST.

241, EVERING ROAD, UPPER CLAPTON, E.

ALPINE RIVERS AND BUNTER PEBBLES.

SIR,—Prof. Bonney's paper on the "Rounding of Alpine Pebbles" is a valuable contribution to a chapter of physical geology; but there are one or two considerations to which I do not think he has given sufficient recognition. (1.) Weathering of *débris* on the mountain-sides, which often gives a certain initial rotundity to fragments of rocks. (2.) The scouring action of sand in a mountain river. So far as I can recall my own Alpine observations, I am inclined to think that where the coarser detritus is most completely rounded, so that the pebbly form is generally produced, it has been in cases where a large proportion of sandy detritus was present also. On the other hand, I have generally found that at the mouths of

¹ The Italics are mine.

Alpine gorges where a stream has had a rapid descent, so that all, or nearly all, the sandy materials have been carried away and mutual attrition has been the chief agency called into play, the pebble-form has been the exception rather than the rule.

I look upon the *variety* of the contained fragments of the Bunter strata as one of their most important physical characters. This is not only true of such great pebble-deposits as the Budleigh Salterton Pebble-bed, and those of Sutton Park, near Birmingham; but it is even more marked in the Nottingham type of these beds, in which generally the facies presented to us is rather that of a *coarse pebbly sandstone* than that of a pebble-bed. In these we find very well-rolled pebbles of quartz and quartzite; but we also find fragments of such rocks as Millstone-grit, Coal-measure Sandstones, Yoredale Sandstones, Magnesian Limestones, along with occasional fragments and rolled masses of red Permian Marls, which, with those enumerated, can be traced to the denudation of the Pennine Highlands. These, together with the intercalated (often lenticular) marly bands formed in littoral pools, or in channels of contemporaneous erosion, are no doubt riverine in their origin; and, so far as I can recollect, are not generally worn into anything like pebbles. This certainly cannot be accounted for by their relative hardness. Facts of a similar nature in the Severn and Upper Trent country, and in Cheshire, have been recorded by Prof. Hull. I regard the strata of the Middle Bunter, where rolled detritus chiefly occurs, as a series of shore and bay deposits, in which riverine detritus from the ancient land is to be found mingled with pebbles (large and small), the latter owing their shape mainly to the action of a tidal surf and the scouring action of shore-sand. The occurrence of quartzite pebbles of Silurian rocks with (occasionally) casts of fossils of the French type (as recognized by Salter) in the Salterton pebble-bed (to the extent of something like 90 per cent.), the occurrence of similar pebbles with (occasionally) casts of Silurian forms in the Warwickshire Bunter, coupled with observations on the work which Mr. Lee has actually done upon hard rock-fragments as they are driven along shore by the roll of a tidal surf (e.g. between Clovelly and Westward-Ho), seem to me to tell rather of shore-action than of river-action as the main factor concerned in the production of the Bunter pebbles. The "pebbly sandstone" type of the Middle Bunter is that which represents the normal facies, the pebble-beds proper being quite local. The two types, however, pass laterally into one another; and the main factor concerned in their differentiation was probably the local trend of the shore-line in relation to the general direction of the tidal flow. Prof. Hull's memoir, "The Permian and Triassic Rocks of the Midland Counties of England," is a mine of facts which bear out this view.

A. IRVING.

WELLINGTON COLLEGE, BERKS.