

fluminalis has not been found. Several species of Mollusca have been found in the Clay, but the most abundant fossil is the *Pentacrinus sub-basaltiformis*.—Mr. Hudleston noticed that the gravels exposed at the Law Courts site in the Strand were much more ferruginous than those at Battersea, and that the Clay immediately underlying the gravels was altered in colour and character to a much greater depth at the former than at the latter section.—Mr. A. Bell thought the *Cyrena fluminalis* would never be found in these beds at Battersea, as it belongs, he considered, to beds of a different age.

CORRESPONDENCE.

THE SOURCE OF VOLCANIC PRODUCTS.

SIR,—In the last number of the GEOLOGICAL MAGAZINE, the writer of a notice on the re-issue of Mr. Scrope's work on Volcanos observes, that the strongest argument in favour of a *common source* for all volcanic matters is the one brought forward by Mr. David Forbes, "That the volcanic rocks, taken from any quarter of the world, possess an absolute identity in chemical and mineralogical composition."

Now, admitting the fact that basalts, trachytes, obsidian, etc., are essentially the same, from whatever part of the world they may be collected, and that the statement would be equally true of the older rocks, I am quite at a loss to perceive in what way such facts are more favourable to one rather than to the other of the two prevailing views.

Those views are, either, that volcanic matter is now being ejected from the still fluid central portion of the globe; or, that the molten matter exists in pockets or reservoirs, at varying but still moderate distances from the outer surface. On the latter supposition, the molten matter would be supplied by the fusion of surrounding and underlying rock-masses, or by the repeated falling-in and re-fusion of previously erupted materials, none being actually forced up from an imaginary central mass of fluid.

Now, it will scarcely be denied that the rocks forming the accessible portions of the earth's surface are the same all the world over, and have been so from the commencement of the Laurentian series at least; how much longer no one can say. Limestones, sandstones, shales, and other fragmental rocks, are everywhere the same, and there is no evidence to show, or reason to suppose, that the materials forming the earth's crust at still greater depths differ from each other in different parts of the world. It should be remembered that the elements entering into the composition of rock-masses are extremely limited in number, almost universally distributed, and occur in the eruptive equally with the stratified series; the former may well have been derived from the fusion of the latter, just as these, undoubtedly, owe their origin in many cases to the abrasion and degradation of older igneous masses.

It would appear, therefore, that a general uniformity of composi-

tion in volcanic products would necessarily result from either source of supply, and that if the central-fluid theory is to be maintained, it must be for other and less fanciful reasons than those hitherto adduced. I quite agree with the remark that it has been rather *assumed* that geologists believe in a fluid interior with a solid crust. They probably believe nothing of the kind, for, like other inquirers accustomed to scientific investigations, they are not disposed to adopt a belief, unless it be grounded on well-ascertained facts; and as there now exists but little faith in mere opinions of great authorities, it would appear that in the present phase of the question, the most satisfactory state of mind would be one of pure scepticism.

S. ALLPORT.

CORRELATION OF THE SCOTCH AND ENGLISH DRIFTS.

SIR,—As I have probably devoted more time to the examination of the drifts of the N.W. of England than any other observer, a few remarks from me seem to be called for by Mr. James Geikie's article in your last number. While very willing to acknowledge the great value of his contributions to Post-tertiary geology, I cannot agree with him in regarding all the drifts of the above area as subordinate varieties of one great formation; for the more these deposits are investigated, the more one becomes convinced of the classificatory value of the well-defined and more or less persistent sub-divisions they present.

The blue clay of the W. Riding of Yorkshire, Cumberland, and N. Wales, is not only distinct in colour, and in the character of most of its included stones, from the other clays, but it must have been subjected to great denudation, leaving a deeply-undulating or hummocky surface, before the lower brown clay was deposited. The latter (though it embraces a considerable variety) differs in its general colour, composition, and relative proportion of local and erratic stones, the number of large boulders, etc., from the upper clay; and its surface generally undulates as if it had been extensively denuded; while the surface of the upper clay is in most places a dead flat. The gravel-and-sand formation between the two clays is not a series of intercalations, but as persistent a deposit as either of the clays. It has to a great extent been derived from local rocks, and the number of erratic stones it contains is much smaller than in the clay above or below. Its surface must have been deeply denuded before the upper clay was deposited, as Professor Hull and Mr. De Rance have shown. In the neighbourhood of hills it generally rises up from beneath the upper clay, and forms a series of knolls or ridges. There are few sand-and-gravel knolls that are not capped with decided Upper Boulder-clay,¹ or show indications of having once been more or less covered with this clay. I do not believe that in the area under consideration there are any sand or gravel knolls overlying decided Upper Boulder-clay, though they may occasionally come above a subordinate clay bed of the middle drift, or a thin bed

¹ In the neighbourhood of Oswestry there are striking instances of high and abrupt gravel-and-sand knolls capped with upper boulder-clay.