

As for the Piora schists, I am sorry to have misunderstood Dr. Stapff, but think he would have done better to refer to my letter as published in the *GEOLOGICAL MAGAZINE* (1892, p. 90) instead of to an abstract of it, necessarily condensed. He will find my words to be "If I am right in understanding Dr. Stapff to assign the Piora schists to the Carboniferous system," etc. The fact is that I had great difficulty in coming to a conclusion both as to the exact position of the divisions which he had drawn in his published sections and paper, and as to how much was covered by the terms which he employed. The terminology of petrologists at present is rather unsettled, so that we do not seldom find difficulties of this kind arising in regard to details. But if the Piora schists are part of a series extending "from the Carboniferous to the Jurassic age," I fear that I must leave the remainder of the sentence partly quoted at the top of page 160 otherwise unaltered.

My remark as to the inadequacy of photographs to decide whether organisms occurred in the Altkirche marble applies equally to the "sand grains" in the Guspis gneiss. That a gneiss may be of sedimentary origin I do not deny, but I doubt whether it would be possible to recognize with certainty the original clastic grains, unless they had been so large as to make this term inappropriate. For instance, I have examined many quartz-schists, in which I suspected certain grains to indicate the position of original constituents, but have met with only one case which I felt would satisfy a sceptic (discovered by Mr. J. Eccles last summer), and here they were pebbles rather than grains. But I have seen many cases where a structure, due to the crushing of a crystalline rock, wonderfully simulates that of an ordinary elastic rock, so, as I have been more than once led into error in this matter, the proverb holds good, "once bit, twice shy."

T. G. BONNEY.

DR. ALEX. BROWN ON *SOLENOPORA*.

SIR,—In Dr. Brown's article on the structure of *Solenopora* there is a slight error in the horizon given for the Yorkshire specimens which should be corrected, especially as the rock in question was for some time considered to be the equivalent of the Great Oolite. The Malton specimens are obtained from the Corallian, and they are also very abundant throughout the Ayton-Brompton Coral Rag.

GEOLOGICAL SURVEY,
LEICESTER.

C. FOX STRANGWAYS.

MR. WATTS'S PAPER ON THE TARDREE PERLITE.

SIR,—On thinking over the subject of Mr. Watts's interesting paper read before the Geological Society on March 21st last, in which he endeavoured to prove—by means of very beautiful magnified sections of the Tardree trachyte—that the perlitic structure is sometimes continued from the glassy magma into the enclosed crystals of quartz, it seems to me that the essentially distinct molecular structure of the two mineral substances was not sufficiently taken into account, and that it is only on a recognition

of these structures that an explanation of the phenomena can be found. I quite admit that some of Mr. Watts's sections showed that the perlitic shrinkage fissures of the glass-magma did pass into, and through, the quartz-crystals; but it is not to be inferred from this that the quartz-crystals had perlitic structure, as I shall endeavour to show. Let us consider for a moment the process of consolidation from the molten state. It is clear that the silica consolidated before the glass-magma; and in forming distinct crystals it obeyed the law of its molecular constitution, which obliges it to take the form of a hexagonal prism terminated by a pyramid. On the other hand the amorphous (or non-crystalline) magma is governed by an entirely different set of molecular forces and tries to form a series of concentric globules, somewhat as basalt on cooling often forms globular masses with concentric envelopes. The globular is the primary form of a cooling body. It is clear that the molecular constitutions of the quartz-crystal and of the non-crystalline magma are essentially different, and this distinction finds its result in the diverse forms and structures of the two. If this be admitted it will not be difficult to account for the apparent perlitic fissures traversing some of the quartz-crystals, as shown in some of the specimens. Though these have had priority over the magma in consolidation, yet they were necessarily highly heated and somewhat soft owing to the liquid state of the enclosing magma; and this being so, as the perlitic fissures were being developed in the latter they would exert a pull upon the parts of the quartz-crystals in contact, the force developed by contraction in the case of each globule of the magma tending to draw the mass towards its centre. The quartz being (as has been observed) in a somewhat soft condition would be unable to withstand this force, and in such cases it would give way; and fissures would be produced continuous with one or more in the enclosing glass-magma; but this does not prove that the quartz itself has a perlitic structure.

EDWARD HULL.

22nd March, 1894.

ON THE POSSIBLE MARINE ORIGIN OF THE LOESS.

SIR,—One of the difficulties that faced me in my paper on the "Submergence of Western Europe"¹ was the want of evidence to prove distinctly that the land had been under the sea. As, however, all the physical evidence concurred to show that the various forms of the Rubble-drift indicated a transient disturbance, I concluded that the submergence had been of too short a duration to allow of the establishment of a marine fauna in the area submerged. It was therefore with much satisfaction that I found the other day confirmation of a very unexpected character in a paper published in the last number of the "Bulletin de la Société Belge de Géologie."² In treating of the Loess I described a portion of it as of fluviatile origin,

¹ Phil. Trans. for 1893, p. 903.

² *Ibid.* March 1894, p. 118.