Mr. Blanford inquired whether the ancient traps are not distinct in their origin from true lavas. In India large districts are formed of volcanic rocks much more recent than those of Wales, and probably of different composition. These Indian flows are of great horizontal extent, but of small thickness.

Mr. Forbes stated that the Indian rocks in question, which he had examined, were not distinct from our basalts in composition and structure, which showed that they were not poured out under water.

Mr. Ward replied as follows :—To Mr. Rutley ; that the *flow* described as occurring in some of the altered ash-rocks was *not* a decided crystalline flow, but one merely of the finer ashy material around the larger fragments, and frequently along the bedding planes. To Mr. Forbes and Mr. Koch ; that the analyses brought forward had been made from specimens carefully collected in the field, and might be considered as representing the average chemical composition ; the author used the word *ash* as denoting all material shot out from a volcano ; in this case the ashes were mostly subaerial. To Mr. Bonney ; that although the analyses of the Cumberland lavas were very similar to those of porphyrites, the microscopic structure of the latter, as described by Zirkel, did not at all correspond with that of the Lake-district rocks. To Mr. Blanford ; that the Cumberland contemporaneous traps were as much entitled to the name of lavas as any modern Vesuvian flow.

CORRESPONDENCE.

GLACIATION IN WEST SOMERSET.

Sir,—A few days ago, while waiting for a train at Taunton station, I took the opportunity of examining some of the specimens of glaciated sandstone, described by Mr. Lucy, in the Geological Magazine for June, page 256, and which he has deposited in the Museum of the Somersetshire Archæological Society. The appearances presented by them are certainly unlike any form of striation save that attributed to glacial action. My reason, however, for writing this is merely to note what Mr. Lucy has omitted to explain, and that is, that the rock striated is not the New Red Sandstone, which does occur near Porlock, but the so-called Devonian sandstone, and which is, as the late Mr. Jukes considered, identical with true Old Red Sandstone.

Horace B. Woodward.

Newton Abbot, *2nd Oct.*, 1874.

EXISTENCE OF CARBONIFEROUS ROCKS IN THE HIGHLANDS OF SCOTLAND.

Sir,—It will probably interest many of the readers of the Geological Magazine, to be informed that rocks of Carboniferous age exist in the *northern* side of the great Grampian axis of the Highlands. While engaged in prosecuting my studies among the Secondary Rocks of Scotland, during the past summer, I found, in the district of Morven, a very interesting patch of strata of sandstone, shale, and coal, yielding the remains of a number of common Carboniferous plants. The true character of these plant-remains was confirmed by an examination of some of the specimens, which Sir Charles Bunbury was so kind as to make.

Although this patch of rocks, occurring in so unexpected a locality, is of very small extent, yet it is of very great interest to geologists, for the following reasons.

First.—It supplies evidence of the former existence of Carbon-

iferous strata far beyond what had hitherto been regarded as their northern limits in these islands.

Second.—It affords a new and very striking illustration of the enormous denudation which must have preceded the outpouring of the Tertiary lavas of Scotland, and of the remarkable series of accidents to which the preservation of many vestiges of the geological formations in the Highlands are due.

Third.—It gives the geologist a base to the grand series of Poikalitic (Permian and Triassic) rocks in the Highlands.

Fourth.—It affords us, moreover, another link towards the completion of the 'Geological Record' in the Highlands; which now embraces representatives of *all the great geological formations except the Upper Silurian.*

I must of course postpone the description of these interesting beds, and of their wonderful relations to the surrounding rocks, together with the discussion of the considerations which their occurrence suggests to the geologist, till the publication of the third part of my memoir, "On the Secondary Rocks of Scotland."

JOHN W. JUDD.

ÅSAR.

SIR,—Will you allow me, a foreign hammerer, to advance in your MAGAZINE a theory on the above-named subject.

Sweden (and all Scandinavia) was once covered by a sliding ice-sheet, moving towards a lower level. In our days we have no such thing; the ice-sheet disappeared by being melted away; indeed, some of it may have been carried off and floated away by a rise in the level of the sea, but not all, for this might require a rising of the sea equal to $\frac{9}{10}$ the thickness of the ice (1000—7000 feet?) + the elevation of the ground, or a rising of several thousand feet. I refer to the last sheet of land-ice, but I do not deny an earlier melting and the existence of icebergs, floating-ice, etc., nor do I deny a submergence of the land.

This ice-sheet disappeared, I venture to suppose, by melting away. Nor is such general melting of glaciers any strange thing, for we may find it so in the Alps, in Greenland, etc.; only, of course, the increase is usually equal to the decrease of the ice.

The melting probably always goes on at the bottom of a glacier —that at the surface mostly during summer-time.

At the bottom of a large and vast ice-sheet or mer-de-glace, such as that supposed to have covered Sweden, the melting will hardly be uniform all over, but may be heightened, where the ice passes depressions in the ground and valleys, especially those with running waters; along such places, the ice being greatly reduced in mass, there may be a flowing towards it from one or both sides of the ice-sheet, to compensate this loss and want of stability; probably here much detritus was accumulated, either at the bottom, or in the ice, or upon its surface; and this surface may have had depressions, sometimes with running waters and even lakes, and in these depres-