discusses the land-ice and submergence hypotheses, and concludes that his observations distinctly strengthen the grounds for believing in a submergence of the land to an extent of not less than 1400 feet.

An Appendix contains details of nineteen mechanical analyses of tills, sands, and gravels, and a bibliography of papers, observations, and theories of the high-level drifts of Moel Tryfaen.

CORRESPONDENCE.

READE'S THEORY OF MOUNTAIN BUILDING.

SIR,—Mr. Jukes-Browne seems to holds peculiar, not to say exacting, views of the way scientific controversy should be conducted.

Having replied to Mr. Davison's criticisms on a fundamental principle, without a rejoinder from him, though nearly a year has since elapsed, I am now invited to go on answering him until some unnamed but "good physicists" are satisfied. I need hardly say that this is a labour I must decline. At the same time, I am ready to meet fairly any good physicists who are prepared to speak in their own names.

T. MELLARD READE.

March 9th, 1892.

ON A FAULT WITHOUT A THROW.

SIR,—The north-western part of the Wirral—the district forming the western horn of Cheshire—is very extensively faulted. The prevailing direction of the faults is north and south, but at places east and west faults are met with. These abut against the north and south faults and are generally terminated by them.

A remarkable characteristic of many of these east and west faults is that although they possess slickensided faces and there is evidence of great movements, there is little or no throw.

A very good example is now exposed near Caldy Grange Grammar School, West Kirby. There is a fine flank exposure of a north and south fault just behind the school. It was described by Mr. O. W. Jeffs in 1887 (Proc. Liverpool Geol. Soc. vol. v. p. 247). He mentioned three east and west faults which terminated against the main fault. Since that time another east and west fault has been exposed and was described by Messrs. Beasley and Lomas before the Liverpool Geological Society in February, 1892. This fault has been traced westwards from the main fault for about a third of a mile, and in one part forms a ridge of fault-rock beautifully slickensided about 6 feet wide and rising like a wall above the surrounding Upper Bunter to a height of 6 to 8 feet.

A transverse section is seen in a little cutting west of the Waterworks, and the beds are continued across the fault without the slightest displacement.

Similar east and west faults have been noticed at Storeton and other places, but, so far as I can ascertain, no satisfactory theory has been advanced to explain their peculiarities.

In the Caldy Grange fault the Keuper has been faulted down against the Bunter. It does not follow that the Keuper would move

at the same rate or at the same time along the whole distance of the north and south fault. If we grant differential motion, the matter is explained. The Keuper might slip to a certain point and fracture there, then the other portion falling would slickenside the face, and a throw equal to that of the main fault might leave no residual throw.

J. Lomas, Assoc. N.SS.

OBITUARY.

HENRY NORTON, F.G.S.

By the death of Henry Norton, of Norwich, we have to record the loss of an enthusiastic student of Norfolk geology, and one of the most learned men of the present century. He was the son of William Norton, Esq., of Old Buckenham, and in his youth was articled to Messrs. Mitchell & Clarke of Wymondham, and afterwards set up practice as a solicitor in Surrey Street, Norwich. Possessed of ample means, he relinquished his profession to devote himself to travelling in the East and throughout Europe. Once, no doubt because of the eccentricity of his conduct, he was apprehended in Vienna as a spy. For many years Mr. Norton devoted himself to the study of Sanskrit, Syriac, Chinese, and other Eastern languages, in which he became so proficient that he was able to read the works of Eastern philosophers and savants in their own tongue. He was also a good Scandinavian and German scholar. Of late years he applied himself a great deal to the study of modern science and philosophy, and more especially to the geology of Norfolk.

He joined the Norwich Geological Society when it was first established in 1864, and became a Fellow of the Geological Society of London in 1875.

He examined in great detail the sections at Pakefield and Kessingland, and read before the Norwich Society a paper in 1876 (published in the 'Norfolk Chronicle' for May 6). A subsequent communication on the 'Forest Bed of East Norfolk' was issued separately (reprinted from the 'Norwich Mercury' of May 5, 1877); and in this paper he boldly and acutely discussed the evidence that had been published on the subject of stumps of trees being rooted *in situ* in the Cromer Forest Bed. He showed that the published evidence was inconclusive. In 1877 Mr. Norton contributed some notes on species of *Hydrobia* from the Freshwater Beds of Runton and Mundesley (Proc. Norwich Geol. Soc. vol. i. p. 16). In 1879 he read a paper embodying great research on the Atlantis Island, coming to the conclusion that it was in reality the continent of Africa (Proc. N.G.S. vol. i. pp. 75, 80). In 1880 he communicated to the same society (*Ibid.* p. 110) notes on the Palæontology of the Ancients (Greeks and Romans); and also an explanation of the word "Paramoudra" (*Ibid*, p. 132).

He died in February last, in his 80th year. [Some further particulars of his life were given in the "Eastern Daily Press" of February 24.]