

stone" is either the Dolomite repeated by faulting or a part of the Eastern Gneiss.

4. The "igneous rock" of authors ("Logan Rock" of Professor Heddle) is usually the Hebridean Gneiss brought over the Quartzolomitic group by enormous overthrows.

I hope to submit to the Geological Society, in the course of the spring, detailed and, I think, very decisive proof of the results at which I have arrived.

C. CALLAWAY.

WELLINGTON, SALOP.

THE HIGHEST POINT IN NORFOLK.

SIR,—What is the locality and the height of the highest point in Norfolk? Quoting Mr. Penning¹ in my paper "On the Chalk Masses in the Cromer Drift,"² I, incautiously perhaps, stated its height at 650 feet, the locality being in the chalk escarpment of West Norfolk. Mr. Searles Wood says he does not think the "Cromer lighthouse hill (248 feet) is exceeded by any point in Norfolk to the extent of more than a few feet."³ Mr. Whitaker, in his late clever presidential address to the Norwich Geological Society, says after some very complimentary allusions to my paper, "I may notice the repetition therein of a strange error, the endowment of the Norfolk Chalk with a highest point of 650 feet."⁴

With a view of settling these discordant opinions, for it is to be borne in mind the "endowment" was not the result of my "munificence," being simply a quotation from the work of one of Mr. Whitaker's fellow-labourers, I applied to the Director-General of the Ordnance Survey, who kindly informs me they "are unable to give certain information as to the highest point in Norfolk," but states that the highest point *levelled to* is 6725 links North-east of Aylmerton Church, and 331·4 feet above O. D. The "point," therefore, remains still an unsettled and knotty one.⁵

This is a question of fact on which it is desirable to be correctly informed, but for aught it has to do with my theory of the transport of the Chalk Boulders, might have been omitted. The lesser heights are all that are required for my ice rafts, which could not have "stranded on a submarine bank" if launched into 600 feet of water.

T. MELLARD READE.

OBITUARY.

E. B. TAWNEY, M.A., F.G.S.

DIED DECEMBER 30, 1882; AGED 42.

WE have recently lost by the death of Edward Bernard Tawney one of our very best all-round geologists. From physical weakness and a retiring disposition he did not throw himself much to the front, and so few knew what work was being done by that

¹ Q. J. G. S. xxxii. 191.

² *Ibid.* xxxviii. 233.

³ *Ibid.* xxxviii. 684.

⁴ Proc. of the Norwich Geol. Soc. 1882, p. 209.

⁵ The English Encyclopædia (1855), article Norfolk, says, "The highest ground in the county is probably on the North-west side, where the chalk downs appear."

indomitable spirit. His influence was only beginning to be widely felt, but in a paper here, or a controversy there, he showed his power, and how he had made himself acquainted with all that had been done by others in the subject of which he wrote and spoke. That he had no small share of the ability and originality of his talented family he gave abundant proofs in early life. His father—a clergyman who had distinguished himself at his school and college of which he became a Fellow—died when Edward Tawney was still young, and he therefore lived much with relations, some of whom were men of science. His uncle, Dr. Bernard, who was his guardian, encouraged him much in his work, giving him now a book, now a microscope, and so his attention was turned to Natural Science, the Reports of the Royal School of Mines tell with what success. He became an Associate, gaining diplomas in Mining and Geology. But he went through the course of study in several other branches, and highly distinguished himself in all. He won a Royal Scholarship, also the Duke of Cornwall's Scholarship. He was awarded the Edward Forbes medal for proficiency in Natural History, and in Mining he gained the Delabeche medal.

He then enjoyed some years of leisure, in which he carried on original research, travelling at home and abroad, and contributing many valuable papers to various scientific publications. In the Journ. of Geol. Soc. for 1866 we find a paper on the Western Limit of the Rhætic Beds in South Wales, and on the position of the Sutton Stone. In this we observe the same careful working out of the sections bed by bed, and the same painstaking determination of the exact species found in each zone, that always characterized his work. He had a marvellous faculty of seeing and of sticking to the point in any discussion in which he took part. All he thought of was whether the evidence was conclusive or not; whether a fact was proved or unproved. The individuality of the speakers he lost sight of, and mentioned them by name when he had to refer to their views only as a man would move about the wooden chessmen with which he was playing. He could be severe when unfair reasoning or the *argumentum ad hominem* was brought in by those who differed from him in opinion, while he felt that he was only bringing in hard facts, bearing directly upon the subject-matter before them, and hurting only those who felt that they were being proved to be wrong—and were endeavouring to gain a temporary advantage but avoiding the real point at issue, or by trying to throw ridicule on their opponents.

In 1870 he contributed a paper on the occurrence of *Terebratula diphya* in the Alps of the Canton de Vaud, referring the rock from which he procured it to the Jurassic. This paper gave rise to an interesting communication from Mr. Davidson on the range and affinities of that and some allied forms. In the same year he published, in the Transactions of the Devonshire Association for the Advancement of Science, Literature and Art, a paper "On the Occurrence of Fossils at Smuggler's Cove, Torquay," in which he speculates upon the correlation of the North and South types of

some of the Devonian Rocks, and in 1872 he wrote a short note "On the Occurrence of *Zoophycus scoparius* (Thioll.)," a plumbe-shaped alga "in the Inferior Oolite of Dundry." In the same year he accepted a post in the Bristol Museum, and by the time the British Association visited Bristol in 1875, he had got the Museum into a very different state from that in which he had found it. The specimens were arranged and a large proportion named. All this time he was carrying on his researches in the rocks of that most varied district, and the results of his original work and of his extensive reading were embodied in a succession of papers communicated to the Bristol Naturalists' Society. He contributed to the excellent guide which was published under the sanction of the local executive committee of the British Association, the Introduction to the Chapter on the Physical Geography and Geology of the district, as well as the articles on the Coal-measures and New Red Period, and that on the Inferior Oolite.

In the Proceedings of the Bristol Naturalists' Society also we find, under the head of "Museum Notes," a paper on the Dundry Gasteropoda, read in 1873, in which he describes and figures at least nineteen new species.

In the same year he offered to the same Society a review of the Coal Question, a subject of exceptional interest in that district, and then being much discussed. Also a paper "On the Use of the Divining Rod in the Neighbourhood of Bristol," in which he gives, in conjunction with a friend, the results of some experiments they had persuaded a *diviner* to make before them.

In the course of his work in the Bristol Museum he found that the Lias fossils of various zones had all got mixed up together, and, in order to rectify the errors arising from this confusion, he set to work to examine the district and collect the fossils of each horizon, and as the result of his examination, he read before the Bristol Naturalists' Society, in 1874, a valuable paper "On the Lias in the Neighbourhood of Radstock." In the same year he communicated to that Society some "Notes on Trias Dykes."

There had long been much difference of opinion about the age of the Cannington Park Limestone. The views of previous writers were founded almost entirely upon lithological and stratigraphical evidence. Tawney, however, was at last able to collect a sufficient number of fossils from the limestone to consider that the question was settled, and in 1875 he read before the same Society his paper "On the Age of the Cannington Park Limestone and its Relation to the Coal-measures South of the Mendips." He referred the rock to the Mountain Limestone, thus making it probable that if any coal-bearing strata should be found above the Cannington Park Limestone further south, it would be of the Welsh or Coal-measure type, rather than of the less valuable Devon or Culm-measure type.

In 1875 he read a paper on Professor Renevier's Geological Nomenclature and Table of Sedimentary Rocks, and gave a comparative table of English equivalents. He thus showed that he was watching the progress of geology all over the world, and preparing

himself for work in a more important sphere, where, however, it was cut off all too soon.

In 1878 he read a short note on the supposed Inferior Oolite at Branch Huish, Radstock, in which he showed, by lists of fossils collected by himself, that the upper beds of the section had been erroneously referred to the Inferior Oolite. About the same time he described "an excavation at the Bristol Waterworks Pumping Station, Clifton," through *Infra Lias*, *Rhætic*, and *Keuper*.

He next took part in the inquiry into the nature and origin of the Archæan Rocks, and examined the St. Davids sections in company with Dr. Hicks and another friend. His views on the classification of this group he published in a paper "On the Older Rocks of St. Davids," read in February, 1878, before the same Society, to which, as we have seen, he had already communicated so much good original work. While he was hammering along the South Wales coast he accepted the offer of a post at Cambridge, and from that dates a new era in his life and work. He now, as Assistant to the Woodwardian Professor, had charge of one of the largest collections in the kingdom, and soon made himself master of all the contents of each part of the Museum in turn. This work was just beginning to bear fruit in a series of papers under the head of Woodwardian Laboratory Notes, in this MAGAZINE, of which only a few had appeared.

In these he published the result of the microscopic examination of the rocks collected by Professor Sedgwick, and others which he had procured himself in his rambles in Wales over Sedgwick's ground, when verifying his localities and sections; but he was cut off in the commencement of his work, and with him swept away those stores of knowledge, that keen intellect and that matured judgment from which we might have hoped so much. He has, however, left his mark in the Museum where Salter and M'Coy did some of their best work. But he also gave much of his time to teaching, and from this too we may hope the world will reap some benefit hereafter. His unusually varied acquirements enabled him to conduct classes in Palæontology and Petrology, as well as in Stratigraphical and Dynamical Geology.

There are, perhaps, few sections so likely to attract amateurs and, as such, the early observers in Geology as those exposed along the cliffs of the Isle of Wight. The succession of different formations and different groups of organic remains is so obvious that no one can help attempting a classification. Any new work must therefore go into great detail and involve the most careful determination of species and varieties and a wide knowledge of homologous sections, for the general grouping was settled long ago. However, an able paper was read before the Geological Society, in which a new reading of some parts of the Headon Hill Section was proposed, and upon this was founded a revised classification and nomenclature of the whole. It required the most intimate acquaintance with Tertiary fossils to take part in this question.

Tawney took the matter up, and with Mr. Keeping, who went over most of the work with him and had been for years familiar with

the sections, laid before the Geological Society a masterly review of the whole question, maintaining the general correctness of the classification of Edward Forbes and the Survey.

He also read a résumé of his views on this subject before the Cambridge Philosophical Society.

The controversy was carried on with much force and vigour; some said it was occasionally too personal, but most thought that they would not have learned so much on a somewhat involved question if there had been a less clear statement of the points referred to, and a less clear quotation of the views commented on. The scientific world was much the wiser for the discussion, which had the effect of eliciting most valuable information. That question may be considered to have been set at rest, but he was engaged upon some details required for the fuller working out of the correlation of the series at the time of his death. However, the work was far advanced, and it is hoped that it will be shortly published.

He was a good linguist, and read with ease scientific papers in French, Italian, and German. This, with his wide range of knowledge and his strong critical faculty, made him a valuable contributor to the Geological Record, of which he was sub-editor. It also gave him great facility of correspondence and conversation with foreign geologists, whether in carrying on his own studies or in connexion with the International Geological Congress of the British Committee, of which he was general secretary.

His worth was soon recognized at the University, and on Dec. 4, 1879, an honorary M.A. degree was conferred upon him—the public orator referring in flattering terms to his educational and scientific successes, and alluding to the distinguished career of some of his relatives. He was at the same time made a member of Trinity College, allowed to put himself in commons and granted the ordinary privileges of a Fellow of the College. He commonly dined in hall till lately, when he complained much of the climate, and did not go out at night. In December he went to Mentone, accompanied by the Professor of Mineralogy, and put himself under a foreign medical man. At first it was hoped that the warmth and fresh air, which he was now able to get out and enjoy, were doing him good; but in a few days he complained of great weakness, and on Dec. 30, before he had been out a week, he passed quietly away in sleep.

He was followed by the Secretary of the Geological Society of France, of which he was an esteemed member, and by the Professors of Mineralogy and of Geology at Cambridge, to the tomb in the rocky cemetery that overhangs the town and looks out on the Mediterranean beyond; among the rocks that only a few days before he had been hammering for fossils.

To the scientific world, and especially to the University whose interests he had identified with his own, his loss can hardly be repaired.

Those who knew him well saw beyond that keen critical mind the warm heart ever prompting him to do unostentatiously acts of consideration and kindness.

T. MCKENNY HUGHES.

Fig. I

× 8.

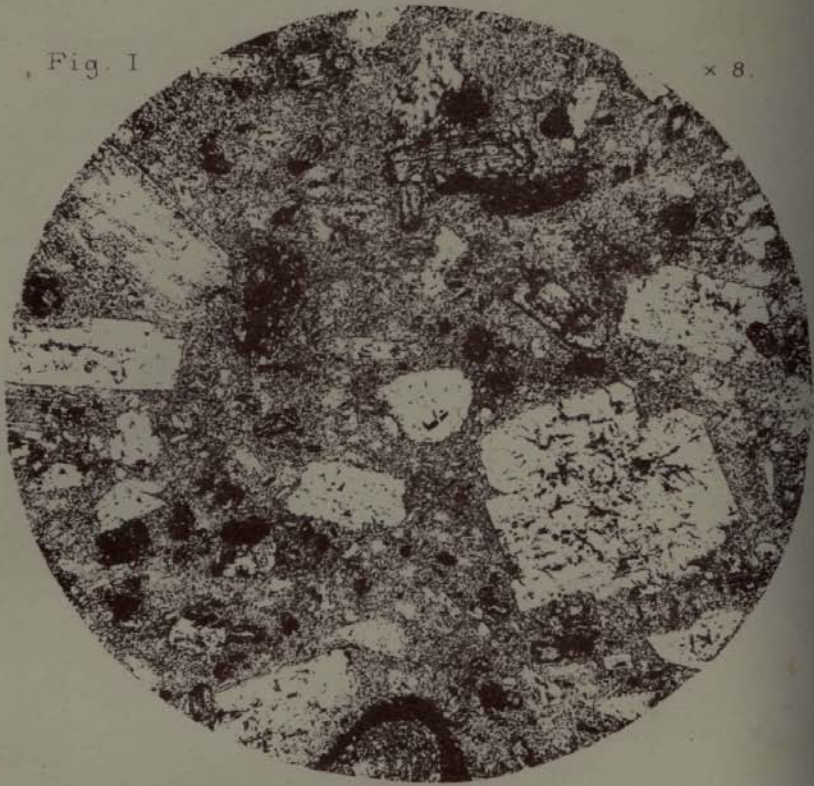


Fig. II

× 16

