

THURSDAY, FEBRUARY 6, 1873

SEDGWICK

GEOLOGY has lost her veteran leader! While yet firm in intellect, full of kind and generous feeling, and occupied on the last pages of the latest record of his labours, in the ninth decad of a noble life, Sedgwick has gone to his rest. Under the shadow of this great loss we look back through more than half a century, and behold no more conspicuous figure in the front ranks of advancing geology than the strenuous master workman, the eloquent teacher, the chivalrous advocate of science, who has now finished his task. Severe illness, borne with fortitude, had gradually withdrawn him from scenes once brightened by his ever-welcome presence, but could not tame the high spirit, or cloud the genial sympathies which had won for him, more than for other men, the loving admiration of his fellows in age and followers in study. Rarely has a patriarchal life been crowned with such enduring and affectionate respect.

Born in 1785, of a family long resident in a secluded Yorkshire Valley under the shadow of Wharncote, the boy early acquired the hardy habits and imbibed the free spirit of the north, and the man retained till his latest hour, a romantic love of the bold hills and rushing streams. amidst which he first became an observer of nature. Every homestead and every family in his native dale of Dent were treasured in his memory, and one of the latest of his minor literary essays was to plead against the change of the ancient name of a little hamlet situated not far from his birth-place.

Educated under Dawson, at the well-known school of Sedburgh, while Gough and Dalton were residing at Kendal, he proceeded to the great college in Cambridge, to which Whewell, Peacock, and Airy afterwards contributed so much renown. Devoted to the Newtonian philosophy, and especially attracted by discoveries then opening in all directions in physical science, he stood in the list as fifth wrangler, a point from which many eminent men have taken a successful spring. He took his degree in 1808, became a fellow in 1809, was ordained in 1817, and for some years occupied himself in the studies and duties of academic life. His attention to geology was speedily awakened, and became by degrees a ruling motive for the long excursions, mostly on horseback, which the state of his health rendered necessary in the vacations.

It was not, however, so much his actual acquirements in geology as the rare energy of his mind, and the habit of large thought and expanding views on natural phenomena, that marked him out as the fittest man in Cambridge to occupy the Woodwardian chair vacated by Hailstone. Special knowledge of rocks and fossils was not so much required as a well-trained and courageous intellect, equal to encounter theoretical difficulties and theological obstacles which then impeded the advance of geology.

The writer well remembers, at an evening *conversazione* at Sir Joseph Banks's, to which, as a satellite of Smith, he was admitted at eighteen years of age, hearing the remark that the new professor of geology at Cambridge promised

to master what he was appointed to teach, and was esteemed likely to do so effectually. In the same year Buckland, his friendly rival for forty years, received his appointment at Oxford, where he had previously begun to signalise himself by original researches in palæontology.

At this time the importance of organic remains in geological reasoning, as taught by Smith, was not much felt in Cambridge, where a new-born mathematical power opened out into various lines of physical research, and encouraged a more scientific aspect of mineralogy, and a tendency to consider the phenomena of earth-structure in the light of mechanical philosophy. This is very apparent in the early volumes of the Cambridge Philosophical Society, established in 1819, with Sedgwick and Lee for secretaries. Accordingly, the earliest memoirs of Sedgwick, which appear in the Cambridge Transactions for 1820-21, are devoted to unravel the complicated phenomena of the granite, killas, and serpentine in Cornwall and Devon; and to these followed notices of the trapdykes of Yorkshire and Durham, 1822, and the stratified and irruptive greenstones of High Teesdale, 1823-24. In his frequent excursions to the north he was much interested in the varying mineral characters and fossils of the magnesian limestone, and the remarkable nonconformity of this rock to the subjacent coal, millstone grit, and mountain limestone; and at length his observations became the basis of that large systematic memoir which is one of the most valuable of the early contributions to the Transactions of the Geological Society. Begun in 1822 and finished in 1828, this essay not only cleared the way to a more exact study of the coal formation and New Red sandstones of England, but connected them by just inference with the corresponding deposits in North Germany, which he visited for the purpose of comparison in 1829.

To one of these equestrian excursions the writer was indebted for his first introduction to Sedgwick. In the year 1822 I was walking across Durham and North Yorkshire into Westmoreland. It was hot summer-time, and after sketching the High Force, in Teesdale, was reclining in the shade, reading some easily carried book. Came riding up, from Middleton, a dark-visaged, conspicuous man, with a miner's boy behind. Opposite me he stopped, and courteously asked if I had looked at the celebrated waterfall which was near; adding that though he had previously visited Teesdale, he had not found an occasion for viewing it; that he would like to stop then and there to do so, but for the boy behind him, "who had him in tow to take him to Cronkley Scar," a high dark hill right ahead, where, he said, "the limestone was turned into lump-sugar."

A few days afterwards, on his way to the lakes, he rested for a few hours at Kirkby Lonsdale to converse with Smith, who was engaged on his geological map of the district, and had just discovered some interesting fossils in the laminated strata below Old Red sandstone, on Kirkby Moor, perhaps the earliest observation of shells in what were afterwards called the upper Ludlow beds. The two men thus brought together were much different, yet in one respect alike: alike in a certain manly simplicity, and unselfish communication of thought. Eight years after this Adam Sedgwick was President of the Geological Society, and in that capacity presented to William Smith the first Wollaston medal. The writer

may be permitted the pleasure of this reminiscence, since from the day when he learned the name of the horseman in Teesdale, till within a few days of his death, he had the happiness of enjoying his intimate friendship.

Sedgwick had acquired fame before Murchison began his great career. After sharing in Peninsular wars, and chasing the fox in Yorkshire, the "old soldier" became a young geologist, and for many years worked with admirable devotion to his chief, and carried his banner through Scotland, and Germany, and across the Alps, with the same spirit as he had shown when bearing the colours for Wellington at Vimiera.

Important communications on Arran and the north of Scotland, including Caithness (1828) and the Moray Firth, others on Gosau and the eastern Alps (1829-1831), and still later, in 1837, a great memoir on the Palæozoic Strata of Devonshire and Cornwall, and another on the coeval rocks of Belgium and North Germany, show the labours of these intimate friends combined in the happiest way—the broad generalisations in which the Cambridge Professor delighted, well supported by the indefatigable industry of his zealous companion.

The most important work in the lives of these two eminent men was performed in and around the principality of Wales; Sedgwick, as might be expected, lavishing all his energies in a contest with the disturbed strata, the perplexing dykes, and the cleavage of the lowest and least understood groups of rocks; Murchison choosing the upper deposits exceptionally rich in fossils, and on the whole presenting but little perplexity as to succession and character. One explorer, toiling upward from the base, the other descending from the top, they came after some years of labour (1831 to 1835) in sight of each other, and presented to the British Association meeting in Dublin a general view of the stratified rocks of Wales.

Thus were painfully unfolded the Cambrian and Silurian systems, which speedily became, in a sense, the scientific property of the discoverers, and were supposed to be firmly separated by natural and unmistakeable boundaries. They were, however, not really traced to their junction, though Murchison stated that he had found many distinct passages from the lowest member of the Silurian system into the underlying slaty rocks named by Prof. Sedgwick the "Upper Cambrian;" while Sedgwick admitted that his upper Cambrian, occupying the Berwyns, was connected with the Llandeilo flags of the Silurian system, and thence expanded through a considerable portion of South Wales (Reports of Brit. Assoc., 1835). The Bala rocks were disclaimed on a cursory view by Murchison, the Llandeilo beds surrendered without sufficient examination by Sedgwick; thus the two kingdoms overlapped largely; two classifications gradually appeared; the grand volume of Murchison was issued; and then began by degrees a difference of opinion which finally assumed a controversial aspect, always to be deplored between two of the most truly attached and mutually helpful cultivators of geological science in England:—

"Ambo animis, ambo insignes præstantibus armis."

This source of lasting sorrow to both, if it cannot be forgotten, ought to be only remembered with the tenderness of regret.

Familiar as we now are with the rich fauna of the Cambrian and Silurian rocks, and their equivalents in Bohemia and America, it is not difficult to understand, and we may almost feel again the sustained enthusiasm which welcomed the discoveries which seemed to reveal the first state of the sea, and the earliest series of marine life, "primaque ab origine mundi," almost to complete the physical history of the earth. Starting with a general view of the structure of the Lake Mountains of the north of England, and the great dislocations by which they have been separated from the neighbouring chains (Geol. Proc. Jan. 1831). Sedgwick won his difficult way through North Wales to a general synopsis of the series of stratified rocks below the Old Red sandstone, and attempted to determine the natural groups and formations (Geol. Proc. May, 1838). Three systems were named in order—Lower Cambrian, Upper Cambrian, Silurian—the working out of which, stream by stream, and hill by hill, worthily tasked the energies of Ramsay and his friends of the National Survey for many useful years, after increasing ill-health had much reduced the field-work of the Professor.

But now he began to labour more earnestly than ever in the enlargement and setting in order of the collections which were under his personal charge. In 1818, these consisted almost wholly of the small series bequeathed by Dr. Woodward; now they have been expanded by the perpetual attention and generosity of Sedgwick, into one of the grandest collections of well-arranged rocks and fossils in the world. One of the latest acquisitions is the fine cabinet of Yorkshire fossils, purchased by Cambridge as a mark of loving respect for her great teacher in his fast decaying days.

In this work of setting in order a vast collection gathered from various regions, and from all classes of deposits, Prof. Sedgwick, with wise liberality, engaged the willing aid of some of his own pupils, and of other powerful hands brought to Cambridge for the purpose. Ansted, Barrett, Seeley, M'Coy, Salter, Morris, have all helped in this good work, and to their diligence and acumen were added the unrivalled skill and patience of Keeping, one of the best "fossilists" in Europe. Those who in this manner have concurred in the labours of their chief, one and all found in him the kindest of friends, the most considerate of masters—one who never exacted from others, and always gave to his assistants more than the praise and the delicate attention which their services deserved.

The ample volumes entitled "British Palæozoic Rocks and Fossils, 1851-5," by Sedgwick and M'Coy, must be consulted for a complete view of the classification finally adopted by Sedgwick; and further information is expected from the publication of a Synoptic Catalogue, to which Salter gave some of his latest aid.

Never was a man so universally welcome among the members, and especially the junior members of his own university. Wonderful was the enjoyment of a voyage to Ely with a happy crew of his pupils (1850). If one stopped at Upware, the oolite there uplifted became the topic of an amusing and instructive discourse; the great cathedral was visited in a more serious mood; the shores rang with the merriment of the returning boat; and the evening closed with a joyous banquet in the hospitable college rooms.

During his long tenure of a Fellowship in Trinity College, Prof. Sedgwick witnessed great changes in the mathematical training, and contributed as much as any man to the present favourable condition of Science in Cambridge.

To defend the University against hasty imputations, to maintain a high standard of moral philosophy, and a dignified preference for logical induction to alluring hypothesis was always in his thoughts. Hence the "Discourse on the Studies of the University of Cambridge," at first an eloquent sermon, grew by prefix and suffix to a volume which he himself likened to a wasp—large in front and large behind, with a very fashionable waist.

Under such feelings he spoke out against the "Vestiges of Creation" with a fervour of argument and declamation which must have astonished the unacknowledged author of that once popular speculation. Nor was he silent when the views of Darwin came to fill the void places of biological theory, against which he not only used a pen of steel but made great use of his heavy hammer.

The vigour—vehemence we may call it—of his pen and tongue in a matter which touched his sense of justice, morals, or religion, might mislead one who did not thoroughly know his truth and gentleness of heart, to suppose that anger was mixed with his honest indignation—

οὐ γὰρ μείλιχος ἔσκε . . . ἐν δαΐ λυγρῇ

But it was quite otherwise. In a letter addressed to the writer, in reply to some suggestion of the kind, he gave the assurance that he was resolved "no ill blood" should be caused by the discussion which had become inevitable.

He never failed in courtesy to the honest disputant whose arguments he mercilessly "contuded." Taken altogether, Professor Sedgwick was a man of grand proportion, cast in a heroic mould. Pressed in early life through a strict course of study, he found himself stronger by that training than most of his fellow geologists, but never made them feel his superiority. Familiar with great principles, and tenacious of settled truths, he was ready to welcome and encourage every new idea which appeared to be based on facts truly observed, and not unprepared or unwilling to stand, even if alone, against what he deemed unfair objection or unsubstantial hypothesis.

This is not the place to speak of his private worth, or to indulge in reminiscence of his playful and exuberant fancy, the source of unfailling delight to those who knew him in his happier hours. Unmarried, but surrounded by plenty of cheerful relatives, his last hours of illness were soothed by sedulous affection; his kindly disposition no suffering could conceal; his lively interest in passing events nothing could weaken. Ever

"Against oppression, fraud, or wrong,
His voice rose high, his hand waxed strong."

With collected mind, on the verge of the grave, he would express, with undiminished interest, his latest conclusions on his own Cambrian system, purely as a matter of scientific discussion, free from all personal considerations. It will be well if this mode of treatment be reverently followed by those who while speaking of Protozoic and Palæozoic Rocks, know enough to feel how much they have been benefited by the disinterested labours of a long and noble life.

JOHN PHILLIPS

PALMIERI'S VESUVIUS

The Eruption of Vesuvius in 1872. By Prof. Palmieri, Director of the Vesuvian Observatory. With Notes and an Introductory Sketch, &c. By Robert Mallet, F.R.S. (London: Asher and Co., 1873.)

THAT, in these days of rapid intercourse, the re-appearance of volcanic phenomena on the large scale in any part of the earth's surface should awaken a far more than mere local interest, was well illustrated in the case of the late great outbreak of Mount Vesuvius, during the continuance of which the telegraphic bulletins received from the fiery mountain became the subject of general inquiry and discussion in all parts of the civilised world; and even now that the eruption has entirely subsided, the publication of a translation by Mr. Mallet, of the report of the well-known Italian *savant*, Professor Palmieri, entitled "Incendio Vesuviano del 26 Aprile, 1872," will be welcomed as a valuable contribution to English scientific literature quite independently of its being a book likely to secure numerous readers amongst the non-scientific public also.

This report of Professor Palmieri, who so courageously stuck to his post in the Observatory on the side of Mount Vesuvius, when that building actually stood between two torrents of liquid fire, the heat from which cracked the glass in the windows and even scorched the very habitation itself, is one of the most important records of volcanic phenomena which we possess. Written in the most unassuming style, it does not go into theoretical points, but confines itself all but entirely to recording such facts as were considered by its author to be important or interesting from a scientific point of view, alluding only incidentally to the destruction caused by the lava and ashes on the morning of April 26. In point of fact it is to be regarded as a scientific rather than a popular description of the eruption. Although the professor specially excels in details, the main features of the different phases of the eruption are well described, and a vivid impression of the enormous force developed on such occasions is conveyed by his observation that on April 26 the volume of smoke, ashes, lava fragments and bombs projected upwards from the crater attained a height of no less than 1,300 metres (4,265 feet) above its edge.

The report itself contains a mass of data calculated to be of invaluable assistance in the future investigation of volcanic phenomena, and although it may be said that the conclusions arrived at from the study of this eruption, do not present us with any strikingly new or startling deductions, their great value lies in the corroboration or correction of those resulting from previous observations. Amongst these may be mentioned, the opinion now held by the professor, that to a certain extent eruptions may be predicted, which he bases upon the observations that when the central crater commences to be agitated, this is followed by a series of slight convulsions which terminate in a grand outbreak or eruption, after which the volcano first settles down again into a state of repose; the evidence brought forward to prove the crystallisation of the leucite out of the fluid lava and against its pre-existence in it, as has been assumed by some previous writers; the order of appearance of the acid vapours; the constant presence of certain metallic compounds and sublimes;