

SUB-WEALDEN EXPLORATION.

THIRD QUARTERLY REPORT.

ARNOLD HOUSE, BRIGHTON,

May 23th, 1873.

The prospects of this undertaking at the time of our last report were not very encouraging; our exchequer was exhausted, the progress slow, and, but for the fortunate discovery of gypsum, the promoters had little cause for congratulation. Now, however, it must fairly be admitted that we have great cause for encouragement.

Exploration by boring is essentially a matter of expectation and of hope. As the delight of the angler or sportsman depends, not on former triumphs, but on what he momentarily hopes to secure, and as the traveller (forgetting past danger and difficulty) is buoyed up by the anticipation of what lies before him, so, in this undertaking of purely scientific discovery, we must ever be hopeful for the future rather than exultant upon the past.

On March the 18th, the date of our last report, the depth reached was 163 feet only; the stratum crystalline gypsum; progress about 8 feet a week; new tools specially designed and adapted for this bed had just been supplied. An appeal for help to raise £200 more accompanied the second report. The Hon. Sec. diligently circulated the reports, and was greatly cheered at the encouraging response met with. Professor Darwin, F.R.S., was one of the first, not only to repeat his own subscription, and to express his great interest in the prosecution of the enterprise; but also to obtain new subscriptions from many members of his family. John Hawkshaw, Esq., C.E., promised another £50; and, within three weeks, as will be seen by the appendix, an amount was obtained fulfilling the conditions which enabled the Treasurer to make his second call of £1,000. The Right Hon. the Earl of Ashburnham (whose promised aid had been conditional) very readily and kindly consented to the suggestion that the time and manner of payment should be a donation of £50 on the attainment of every 200 feet, and the first instalment has been received. His Grace the Duke of Devonshire has sent a second payment completing his princely subscription of £250.

Meanwhile, the bore had reached 180 feet, still in gypsum. It was visited on March 22nd by Messrs. Topley and Etheridge, who were much pleased, and who (having noticed a proportion of grains of sand among the washings of the *débris*) anticipated that on the following day a new stratum would be discovered. A fortnight's ominous silence followed. A letter of enquiry to Mr. Bosworth elicited the response that "he had tried the new chisel, and that it, like the other tools, had broken in the bore; that, in addition to this difficulty, the extractor had been dropped in trying to get out the broken tool." Mr.

Bosworth got up the extractor ; but the chisel (which had broken short and lay across the bore) involved another two days of arduous anxiety ere a clearance could be effected ; and poor Mr. Bosworth writes—"It is very discouraging ; I begin to think I shall never have the pleasure of writing to you a letter that can give either of us any satisfaction." One of the objects contemplated involved the test for subterranean temperature ; and Professor Everett, of Belfast, wrote at this juncture advising that the experiment should be made without further delay ; and he sent one of the new thermometers (designed by Professor Phillips, of Oxford, and made by Messrs. Negretii and Zamba) for the purpose. Mr. Bosworth continues—"This unfortunate accident gave me ample opportunity to test the thermometer, which appears to do its work well, and to give reliable results." Carefully conducted experiments showed the well and brook water at 51°, and 20 hours in the bore at 168 feet showed 68½°.

Another fortnight passed away (making three weeks in all), expenses being largely incurred, and not one foot of progress had been made. The position of your Hon. Sec. thereby became involved in such serious responsibility that he determined to summon the Central Committee ; and to be guided entirely by their advice ; for he dreaded lest some over-zealous subscriber should charge him with attempting to obtain money on false pretences if, on the plea that money had been promised to carry on the bore to 1,500 feet, he were to ask that the promise should be fulfilled by the payment of the subscription, when, in truth, the last three weeks' experience seemed to suggest that further progress was entirely barred.

It is the prerogative of modern science not only not to be deterred by difficulty, but to look with laudable unbelief at the facts every time the word—"Impossible!" is pronounced. It believes (as Professor John Ruskin eloquently asserts) "that all things are possible to well directed labour," while it reverently acknowledges that it can only

conquer
By obeying Nature's powers.

To I. R. Capron, Esq., F.G.S., of Guildford, belongs the credit of first suggesting the idea that it might be practicable to extract tools and pieces of broken steel by application of an electro-galvanic magnet. The idea was immediately referred to Professor John Tyndall, F.R.S., who most promptly and cordially gave his opinion that the project was feasible, recommending Messrs. Tisley and Spiller as mechanicians, and promising to give further assistance and advice, if requisite. A most ingenious and novel application of the well-known principle was designed, and there is no reasonable doubt whatever but what it would succeed if the machine were made and properly applied. Why, then, has this course not been adopted ? For the following reasons :—

I.—The exchequer was empty.

II.—The cost was serious.

III.—The committee had been summoned on the general position of affairs, and to their decision it was referred.

By kind permission of Professor Ramsay, who presided, the following members of the committee met in Jermyn street, on Friday, 25th April—Sir Philip Egerton, Bart., M.P., R. Godwin-Austin, F.R.S., Joseph Prestwich, F.R.S., John Evans, F.R.S., Robert Etheridge, F.R.S., H. Woodward, F.G.S., H. Bristow, F.G.S., John Hawkshaw, C.E., Esqrs., and Mr. Willett. S. Owens, Esq., and S. Beckles, Esq., F.R.S., were added to the committee. The report of the boring operations since March 15th was made; the finance report was received; the treasurer was authorised and directed to collect the second £1,000 promised in furtherance of the Sub-Wealden project; and the existing arrangements with Mr. Bosworth, the engineer, were discussed, relative to the rate of progress made and the expenditure incurred. Sir Philip Egerton, Bart., bore testimony to the satisfactory nature of Mr. Bosworth's work in a deep boring in Cheashire. It was proposed by John Hawkshaw, Esq., seconded by J. Prestwich, Esq., that it was desirable that the work should henceforth be carried on by contract, and that tenders be obtained from Mr. Bosworth, from the Diamond Boring Company, and, if possible, from Mr. Docwra, Messrs. Amos and Easton, &c. This resolution having been adopted, it was considered by the Committee inexpedient to incur the expense of the galvano-magnet. The cores produced were pronounced most satisfactory, and, with respect to the fears of the Hon. Sec., Mr. Hawkshaw considered "that he had cried out before he was hurt." The Hon. Sec. heard this with satisfaction, remarking "that it was of no use to cry out afterwards."

On Saturday, April 26th, a series of the cores was exhibited by Robert Etheridge, Esq., F.R.S., and Mr. Willett, at the Soirée of the Royal Society in Burlington House, where they attracted a considerable amount of attentive interest. The machinery of the Diamond Boring Company was also exhibited with specimens of the cores produced by that process, which are most admirable (for the diameter), and resemble a long round ruler. The attendant paid us the compliment, after examination of our specimens, to remark, "I wish we could produce cores like those; we hope to do so, however, in time." A *savant* remarked, after inquiry as to the depth and *modus operandi* of extracting tools, "I could puzzle you if I were to drop an 18lb shot down the hole—that would stop you altogether." "It need not stop us a day," was the reply. "Why, how could you get it out?" "That would be no difficulty. I should draw it with a galvano-magnet." He paused, "That might do it," he said, "I never thought of that." The Royal Society, having contributed to our funds, will, it is to be hoped, on being satisfied that we are thus advancing the true cause of practical science, be induced to grant us another and a larger contribution, should it be found requisite to apply to them. An encouraging letter

was received from C. B. Vignoles, Esq., C.E., stating that he had inspected with great interest the cores exhibited at the Royal Society's Soirée, and sending a donation of £10.

But to revert more immediately to the account of the work we have in hand. It should have been stated in the report of the committee meeting of April 25th that Mr. Bosworth was directed to continue the works as heretofore, *pro tem.*; and soon afterwards he reported that all obstructions had been removed; and that the work was progressing favourably; and that the last gypsum was passed through, and a band of ash-grey sandstone, interspersed with large nodules of chert, was reached. The water in the bore sank immediately 40 feet; and the well which had hitherto supplied the engine ran dry. Some considerable delay was caused by the necessity of supplying the engine from the stream below in pails by hand labour, and we were compelled to revert to the plan originally proposed (and for which reason the spot chosen was at first selected, viz., of drawing our supply direct from the stream through a tube fixed for the purpose. This plan is now working satisfactorily. On May 23rd, the committee reassembled to consider the tenders for continuing the work by contract. Three parties competed. One estimate, to carry the bore to 1,500 feet for over £5,000, was perforce declined on financial grounds. The attention of the Committee was most earnestly given to the remaining alternatives of starting afresh and adopting the admirably rapid process of the Diamond Boring Company, or accepting the tender of Mr. Bosworth to continue the bore at the diameter of 9 inches from its present depth of 213 feet to a depth of 413 feet for the sum of £190. After mature deliberation, the latter method seemed most desirable; as, although much slower, experience has proved that by it a depth of nearly 1,500 feet has already been reached, whereas there is not on record any instance of 1,000 feet having yet been reached by the former process. The large expenditure which had been already made in plant and machinery for Mr. Bosworth's plan also added weight to the motives which actuated the committee in this decision. Our best thanks are due, amongst many others, to Professor Rupert Jones, F.G.S., for his kind and ready assistance in examining the cores microscopically for their fossil contents.

In conclusion, our work cannot be said to have been needless or futile. It is something to have come upon a bed of gypsum of nearly 50 feet in thickness, and in many parts of absolute purity, within 200 feet of the surface. Professor Ramsay states, "No such beds have hitherto been discovered in Europe;" and Mr. Etheridge remarked that, in his opinion, "this is the most remarkable geological discovery that has been made in England for twenty years." The supposition that salt beds might also be near has been hitherto negatived, for through the kindness of W. H. Smith, Esq. (one of the Committee, appointed by the Brighton Natural History Society for the chemical examination of any

substances obtained by the Exploration), water taken from the base of the bore is, by analysis, shown to contain not more than 2 grain per gallon. The sandstone we are now perforating (which is silicious enough to scratch glass, and which cuts the steel chisel as a file would soft iron) has rendered a change of tools necessary. It is suspected that this stratum may prove the dividing horizon between the Purbeck and Portland series, and we hope ere long to exhibit specimens of characteristic Portland fossils; or, what would be better still, fossils from some subjacent strata. By the adoption of the system of contract, our expenses for the next few months cannot be very large, while by the prompt fulfilment of the generous promises of our numerous subscribers, as will be seen by reference to the following list, all anxiety for the present has been removed from the mind of the Treasurer. To save disappointment to every one interested in the work itself, and desiring to visit Netherfield, notice is given that admission to the works is not permitted without an order, to be obtained only from the Honorary Secretary; and orders will not be issued except to subscribers, as it is manifestly unjust that parties equally well able to afford it, should, without subscription, obtain prior information to subscribers themselves. Frequent trespassing in the woods disturbs the game, and would be also an unnecessary annoyance to the proprietor, J. C. Mappin, Esq., who has so liberally assisted us by a lease and subscription and uniform hospitality to the Hon. Sec.

“Two Thousand Feet; or Palæozoic Strata,” is our motto, and fresh promises for the third thousand pounds will be most thankfully received. Every subscription is paid into the Bank in the name of the subscriber, and all payments are made by banker’s cheque, so that the bank account is virtually the cash account of the undertaking.

This report has been further delayed in transmission from the compulsory rest enjoined on the Hon. Sec., by his medical attendant. The correspondence grows with the growth of the number of the subscribers; clerical and other errors are admitted, regretted, and will be avoided for the future as far as possible; to curtail the printing expenses several errata of minor importance have been intentionally preserved in until the old stock of reports shall have become exhausted;—the encouragement has been great and beyond all expectation, the complaints very few, and those, for the most part, readily satisfied. Let it be remembered that “it is much easier to find fault than to do better.” I have done, and will continue to do, my best for ultimate success; but if, among all the circle of our supporters or our critics, there should be anyone desirous of relieving me of my task, it will be most cheerfully and readily relinquished into his hands.

HENRY WILLETT,
Honorary Secretary.

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