

accredited dictum of science as are the other doctrines of the correlation of the physical forces and of the correlation of the vital and physical forces which have been its necessary predecessors."

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Prismatic Ice—Sandstone Boulder in Granite.

THE "two phenomena" observed on Dartmoor by Mr. C. Spence Bate and Mr. W. Morrison, and described by the former in *NATURE* of the 31st ult., have been previously noticed.

The late Rev. Dr. Scoresby, F.R.S., published a paper "On Columnar Crystallisation of Ground Ice," in the *Edinburgh New Philosophical Journal* for January 1850 (vol. xlviii.), and illustrated it with a plate containing eighteen figures. A presentation copy of this paper is now before me.

The so-called *sandstone boulders* in granite are by no means rare. They occur in various parts of Devon and Cornwall. I first noticed them at Shapton, near Bovey Tracey, in Devonshire, and have subsequently seen them in several other localities, but nowhere in such abundance as at Sennen Cove, near the Land's End, in Cornwall. There are several good specimens in my private collection. The following description of them occurs in a paper on "The Age of the Dartmoor Granites," which I read to the British Association at Manchester, and to the Royal Geological Society of Cornwall in 1861, as well as to the Devonshire Association in 1862. "Nodules, apparently segregative, sometimes occurring in the substance of the ordinary granite, might, from the fineness of their grain, be almost mistaken for sandstone; indeed, I not long since heard them appealed to as proofs of the metamorphic origin of granite. 'Here,' said the appellant, 'are unaltered remnants of the old sandstone rocks, which, with these exceptions, metamorphism has converted into granite. I do not quote this for the purpose of endorsing it, but simply to show the general dissimilarity of the nodules to granite proper. Excepting their darker colour, they reminded me much of the granite veins which pass through the older granite of Goatfell, in the Isle of Arran; nevertheless, they are not veins but nodules, and capable of being extracted as such from the granitic mass containing them. . . . They consist of very fine grains of quartz and schorl in about equal quantities, or with the latter somewhat preponderating.'"

Irrespective of the origin of the nodules, it is no doubt "clear that when this granite was formed, the temperature of (the surface of) the earth must have cooled down to below the boiling point of water," for the granite, as has long been established, is of post-carboniferous age; or, in other words, was formed after the rich faunas and floras of the Silurian, Devonian, and Carboniferous periods had successively passed away, to say nothing of the pre-Silurian organic eras.

WM. PENGELLY

Torquay, April 2

The Transits of Venus in 1874 and 1882

IN the paper on this subject by P. L. S., there occurs a remark which is calculated to convey a mistaken impression. He states that "an Antarctic station is only required for the transit of 1882, and there is ample time to make a preparatory Antarctic expedition to ascertain" whether a suitable station can be found. The reverse is the case. No Antarctic expedition can be of any service in 1882, so that in a preparatory expedition the lives of our seamen and men of science would be uselessly risked. On the contrary, there are several Antarctic stations suitable for observing the transit of 1874; and I have shown that the comparison of observations made at such stations with observations made in Siberia would give the most effective means of determining the sun's distance available before the 21st century.

I may remark here, that the choice of stations for observing the transits of 1874 has been founded on calculations admittedly inexact, and it would be to the credit of English astronomy that the whole matter should be re-examined while there is yet time for a change to be made. In saying this, I am not by any means insisting upon the views put forward in my own papers on the subject; though the only error pointed out by the Astronomer Royal in my charts and calculations consists in the fact that they aim at an unnecessary exactness. But the utilisation of the

coming transits is a matter too important to be endangered for any personal considerations whatever. If errors have been made it behoves men of science to see that those errors shall not be suffered to prejudice the cause of scientific progress.

RICHARD A. PROCTOR

Euclid as a Text-book

I REGRET that Mr. Wormell has imported so much of a personal nature into his reply to my former letter. Personality and unintentional misrepresentation appear to me to be its predominant features. Unintentional, I say, for I know little of the writer beyond the fact of his being the author of two or more admirable text-books, and that he is a distinguished member of the London University.

Though I feel that the columns of *NATURE* ought hardly to be taken up with such matter, yet, in self-defence, I am compelled to say a few words. As I have neither time nor inclination for controversy, I hope that the discussion, if continued, will be entirely *ad rem*, and not diverge into personalities. Owing all my geometrical ability (*quod sentio quam sit exiguum*) to a twenty-three years' acquaintance with Euclid, and having had, as a teacher, to use that author for the last fourteen years, it would not be strange if I were a favourer of the old system, which I am not to the extent Mr. Wormell seems to think.

My plan of teaching geometry under the old system was to overcome Euclid's deficiencies by *viva voce* explanation, and, offering slight assistance, to get my classes to work a number of geometrical exercises. With my sixth class I have generally got well through three or four hundred such exercises as are given in Todhunter's edition of the Elements.

This is not the same as sending out boys who have merely "committed Euclid to memory," and certainly my pupils have found no great difficulty in the matriculation papers. Pupils thus prepared have taken first, second, third, and other high places in the examination, which places, I think, were in a measure due to their "flooring" the geometrical papers—with the exception, perhaps, of a "rider;" also, during the time I have held my present post, my pupils have carried off the Andrews Entrance Exhibition at University College each year, with one exception, when the finest geometer I have had was beaten. This is not the place for chronicling successes in other examinations.

I did not state that it was advisable for students to read Euclid only; what I did say was to the effect that I had heard of boys who were doing this with the idea that such a course would "pay" best. Mr. Wormell charges me with using an "infelicitous and ungenerous expression." That I willingly retract, as it has struck myself as being uncalled for; but Mr. Wormell must have read my purposely concise letter hastily, for I nowhere say that I desire a change in the syllabus; the syllabus is excellent, and I quite agree with him in the remarks he adds about the "unflinching courage in the reform of English methods of education" as far as regards the matter under discussion. But what is possible is, that the examiners, being chosen from the older universities, may overlook this distinction; until now, I have had to regard the papers from the old point of view, in which light they have suited me exactly; Mr. Wormell has viewed them from the modern stand-point, and bears the like testimony; this being so, it must be admitted that the examiners have well carried out the syllabus. That I should "impeach the integrity" of such men as the present examiner, from whom I have always experienced the greatest kindness, or the late examiner, one of the most successful teachers of my own university, would be absurd, were it not that it pains me to have it supposed. To return, I do not want quite such a change as Mr. Wormell thinks; the difficulty in my case has not yet arisen, for I have not yet sent in pupils whose training has been wholly confined to the new Geometry, and I wished to have the change made, if any were necessary, before sending them in. The difficulty will not be so great when we have obtained a thoroughly good modern text-book; ours is a very good one, but there are blemishes which will doubtless be removed in a new edition, and to adapt it to the matriculation scheme more propositions than at present must be proved, as I think, independent of proportion. I applied the term "Euclidean type" to the recent examination paper, because the questions are given in the exact words of Euclid; I would have this changed; they follow in the order assigned in the Elements, and perhaps my experience of

* See *Geologist*, 1863, p. 15; Trans. Roy. Geol. Soc. Com., vol. vii., p. 425; or Trans. Dev. Assoc., 1862, p. 50.