

moving. A moment's thought reminded me that a pool in such a beach of loose pebbles was out of the question, and convinced me that for the first time in my life I saw a Mirage. The hour proved to be exactly noon, Greenwich time. My friend, on having his attention called to it, saw a similar "pool" on his terrace. On trying a series of experiments, we found that when we were quite erect the phenomenon was barely visible, and would never have commanded attention, but that as the eye was brought nearer and nearer to the surface the "pool" grew larger and larger; that in ordinary cases each observer could see it on his own terrace only, but that when he brought his eye to the outer edge of one terrace the "pools" on it and on that next below were visible at the same time, and were almost blended. As we advanced so did the Mirage. At 12.20, local time, when the sun was, of course, a very few degrees west of south, it bore N. 33° W., magnetic variation being allowed for. The apparent water, like the real water in the adjacent sea, was a dark blue. We left the beach at two o'clock, and noted that the "pools" were as distinct as ever; and, being then some distance from Portland, we observed a similar phenomenon in that, the opposite, direction.

Lamorna, Torquay, Sept. 10th, 1870

W. PENGELLY

External Configuration of the Earth

UNDER the heading of "Volcanic Action *v.* Denudation," I observe in the last number of NATURE (Sept. 8th), a letter from Mr. A. H. Green, in which that gentleman finds fault with the conclusion arrived at in the following quotation, apparently extracted from some, to me unknown, report of my lecture on volcanoes, the original of which is given in the *Geological Magazine* for July 1870; in instituting "a comparison between the relative magnitude of the operations of internal and external forces in determining the main external fractures of our globe, we must grant the first rank to the internal, volcanic, or cataclysmic agencies, since, had it not been for their operations, our globe would have remained without any visible land for the river to traverse, or the rain and ice to disintegrate and wear away;" but as immediately afterwards Mr. Green himself adds, "the latter part of this statement, cannot, of course, be called in question," these very words, alone, seem to me tantamount to a complete admission that he can have no basis whatever for disputing the deduction that the internal agencies must be placed in the first rank; be it remembered, also, that his quotation is merely a summing up of the evidence brought forward in the course of the lecture.

What I maintain—and I imagine every unbiassed person, whether scientific or not, if but endowed with a reasonable amount of common sense, will agree with me,—is, that when comparing the relative importance of the two very opposite forces which have combined to model the external surface of our globe, in all times down to the present, the precedence must be given to that agency which is admittedly, not only the primary one, but also the one which actually called the other into existence.

In answer to Mr. Green's similes, and as he says that, in a case like this "it is hard to attach any definite meaning to the idea of rank," I may assist him by simply asking, for example, whether any reasonable person, after contemplating, say St. Paul's Cathedral, one of the most prominent features of our metropolis, could possibly think of ranking the architect who originated it below the stone-mason, or sculptor who, directed by him, afterwards altered so vastly the external appearance of the rough shell of the edifice as it first rose from the ground.

Every one, whether geologist or not, admits that the most striking features in the world's physical geography are the mountain ranges which rise up and look down upon the plains below, formed from their own *débris*; and when it is remembered that these mountains are but so many grand proofs of the intensity and activity of those internal forces which not only elevated them, but, in most instances also, even supplied the larger portion of the rock substance which builds up their entire masses, does it not seem strange that any question of rank should arise, when comparing them with those external forces (denudation, &c.) which, of very necessity, can only be great in proportion as the anterior internal forces developed the conditions necessary for calling them into existence, and provided materials for them to operate upon?

DAVID FORBES

11, York Place, Portman Sq., W., Sept. 12th, 1870

The Meteor of 15th August

IN NATURE, page 357, you give notices and sketches of the Meteor of 15th August, and invite further description.

The particulars stated by the Duke of Argyll, and specially the very exact location assigned to the Meteor by your Portrush correspondent, render it probable that a tolerable approximation may be made to the exact position as regards height, &c.

To this end, and in supplement of notice accompanying diagram second, NATURE, page 357, the following details are important.

The Meteor's apparent position is recovered by means of its very close proximity to summits of the Binn hill, near and to the north of this place, with assistance of the six-inch Ordnance maps.

Local Time of first appearance 8^h 50^m 8^h 55^m P.M. 15 Aug.Altitude, uncorrected for refraction, 7^h 35^m 25^s" 8^h 31^m 30^s"Azimuth, west of north, 66^o 2' 3" 67^o 23' 10"

Observer's position, exactly in line of High-water level,

In Latitude 56^o 3' 51" North, Longitude 3^o 12' 45" West.

The apparent size of the Meteor partly explains these pairs of limits, within which the nucleus at least may be located.

GEO. J. P. GRIEVE

Kirkbank, Burntisland, Sept. 12th

GEOLOGICAL DISCOVERY IN LIVERPOOL

ALL geologists visiting Liverpool for the approaching Meeting of the British Association for the advancement of Science will be glad to hear of the recent discovery of some new beds in the coal measures near Liverpool, which are exceedingly prolific in fossil remains. The new line of railway between Liverpool and St. Helen's runs at one place not far from Rainhill, through Thatto Heath, where a long cutting was rendered necessary. This cutting is through beds all belonging to the carboniferous strata—a thick coal seam, and the accompanying beds of shale and fireclay being all cut through. The fireclay contains abundant remains of all the varied plants of this epoch, with a few marine shells, *Anthrocostia* in some places. There is a large collection of these fossils now on exhibition in the Derby Museum, collected by the Rev. H. H. Higgins, who has shown great energy in the matter, and who has most generously presented his collection to the museum. This collection well merits the attention of all geologists, especially those interested in fossil botany. The plants found are in the most perfect state of preservation, and they are by no means difficult to meet with. They are chiefly *Sigillaria*, *Calamules*, *Lepidodendron*, *Neuropteris Loshii*, *N. nervosa*, and *N. gigantea*: some of the species, the rarer *Asterophyllites* and *Sphenophyllum*, together with many others, being not yet accurately determined. Throughout the clay are found scattered nodules of ironstone, which, on being broken up, are found to contain fossil remains, generally ferns or *Equiseta*. There have, however, been two exceedingly valuable finds lately made, two fine specimens of the wings of Neuropterous insects having come to light. One of these is in the possession of the Rev. H. H. Higgins; and the other, measuring some 3 to 3½ in. in length, is in the possession of Mr. E. Clemenshaw, of Merton College, Oxford. Both of these will be exhibited at the approaching meeting. They were both found in the ironstone nodules, and are very interesting, as only one other specimen, we believe, is known from the English coal measures. Not far from this cutting is a small coal pit, from which many interesting fossils are to be obtained. These are chiefly fish-remains, teeth, jaws, scales and bones, and a few rare ferns. The ease with which the blocks split into thin laminæ render these fossils easily found, and they are in a good state of preservation.

This locality is easily reached by train from Lime Street Station to Rainhill, from which place it is distant some twenty minutes' walk. The navvies on the line are very obliging, and have all the finer specimens, with which they are very willing to part for a few coppers or some tobacco,

J. P. EARWAKER