

corroded debris, though likewise finally deepening, widening, and smoothing the basins in the solid rock.

The Hills and Hill-groups of Britain have all emerged during the gradual denudation of the country, and owe their prominence to the greater durability of their materials as compared with those of the surrounding lower grounds. They thus represent various stages in the general lowering of the surface. In many cases they consist of local masses of hard rock. Such is the structure of the prominent knobs of Pembrokeshire and of Central Scotland, where masses of eruptive rock, formerly deeply buried under superincumbent formations, have been laid bare by denudation. In connection with such eruptive bosses attention should be given to the "dykes" so plentiful in the north of England and Ireland, and over most of Scotland. In numerous instances, the dykes run along the crests of hills and also cross wide and deep valleys. Had the existing topography existed at the time of their protrusion, the molten basalt would have flowed down the hill-slopes and filled up the valleys. As this never occurs, and as there is good evidence that the dykes are not of higher antiquity than the older Tertiary periods, we may conclude that the present configuration of the country has, on the whole, been developed since older Tertiary time—a deduction in harmony with that already announced from other independent evidence.

Escarpmets are the steep edges of hills in retreat. The British Islands abound in admirable examples of all ages from early Palæozoic rocks down to Tertiary deposits, and of every stage, from the almost unbroken line of cliff to scattered groups of islet-like fragments. The retreat of our escarpments can be well studied along the edge of the Jurassic belt from Dorsetshire to the headlands of Yorkshire, likewise in the course of the edge of the Chalk across the island. Not less suggestive are some of the escarpments of more ancient rocks, such as those of the older Palæozoic limestones, the Old Red Sandstone of Wales, the Carboniferous Limestone and Millstone Grit of Yorkshire, and the Coal Measures of the Irish plain. Our volcanic escarpments are likewise full of interest—those of the Lower Old Red Sandstone along both sides of the Tay, of the Carboniferous system in Stirlingshire, Ayrshire, Bute, and Roxburghshire, and of the Tertiary series in Antrim and the Inner Hebrides.

#### SUN-GLOWS AND VOLCANIC ERUPTIONS IN ICELAND

IN reply to the inquiry despatched to me by NATURE with last mail, whether any remarkable sun-glow had been observed recently in Iceland, and which, I learn, has been observed in nearly all parts of the world, and whether any volcanic eruption had lately taken place in the island to which the same might be attributable, I beg to relate, as regards the first of these points, that on November 23, between 5 and 6 p.m., I noticed for the first time an unusual and striking purple intensity of the sky, a phenomenon which was also observed on the subsequent mornings and nights. I did not attach much importance to this phenomenon at the time, through the circumstance that I was told that sunrises and sunsets were generally attended by very intense auroræ here, and since then I have had so few opportunities of seeing the sky free from clouds that I have not observed any similar phenomenon. I learn, however, on inquiry here, that the same glow was observed once or twice before Christmas by several persons. On one occasion, January 30, the sky was perfectly clear several hours after sunset, but there was no unusual glow.

With regard to the second point, as to recent volcanic eruptions in the island, I have not much new information to transmit (NATURE, vol. xxix. p. 343). The only thing we know as to this is that a man has written a letter to an Icelandic paper stating that on October 8 and 9 last year he was at a farm about three geographical miles east-north-east inland from the well-known fishing village Seydisfjord, on the east coast, when he saw, on the first-mentioned day, in the direction of the unexplored gigantic volcanic mountain, the Vatnajökull, about 130 geographical miles in extent, in the south-eastern corner of the island, two columns of fire, and on the following morning, in the same direction, two columns of smoke. He adds that a similar phenomenon was observed on the farm two days previously. It is also reported to us here that ashes have fallen in Seydisfjord.

It is most probable that these eruptions have occurred in the same place where similar phenomena have been observed several times in recent years, viz. in the neighbourhood of the Kverf

Jökull, and that there are, in all probability, several volcanoes in activity in this district, which is utterly unapproachable to explorers.

There is, however, no reason to assume that eruptions of any magnitude have recently taken place in any other part of the island, as such an occurrence would soon have been reported by some means or another to us here.

If, therefore, the remarkable sun-gloves of which I read are attributed to terrific volcanic eruptions, the latter must be sought in other localities than Iceland.

SOPHUS TROMHOLT

Reykjavik, Iceland, February 1 (by mail February 8)

#### COMPOSITE PORTRAITURE ADAPTED TO THE REDUCTION OF METEOROLOGICAL AND OTHER SIMILAR OBSERVATIONS

IT has often been remarked that one of the main, if not the chief, of the difficulties the meteorologist has to contend with, is the enormous amount of preliminary labour which has to be expended in the not very pleasing task of forming the observations he may wish to discuss into tables, casting the columns of figures so obtained, and then computing the means. Should, as in many cases nowadays, his original material be in the shape of curves, e.g. barograms, thermograms, or anemograms, he has first to reduce these to figures by tabulation, before he can attempt any step towards their reduction.

The deterrent nature of these preliminary operations not unfrequently forms a complete bar to the entering upon most interesting investigations with a view to the advancement of the science, in the case of persons unable to devote sufficient time to such labour, which may almost be termed drudgery. To cite examples, a glance at the recently published papers in the *Proceedings of the Royal Society*, by Prof. Balfour Stewart (vol. xxv. p. 577) and by Mr. C. Chambers (vol. xxxiv. p. 231), in which they endeavour to trace a possible intimate connection between solar and terrestrial phenomena, will show the immense amount of calculation they had to perform in order to arrive at their results—how, for instance, preliminary means had to be taken of three days' observations and the result assumed to be a corrected value for the middle day of the three, then, after the whole series had been so treated, a second or even a third set of averages computed. The author has also a lively recollection of the excessively tedious calculations required to eliminate in a somewhat similar manner the effect of disturbances in the discussion of the Kew magnetic observations for the late Sir E. Sabine. With the view of arriving at results by a shorter cut, the author has been led to consider the possibility of employing a method suggested by an examination of the highly ingenious system of composite portraiture invented by Mr. Francis Galton, F.R.S., and utilised in his anthropological studies.

Mr. Galton's method of experiment is based upon the fact that certain groups of people possess certain physiognomical features in common. This agreement of feature is usually characterised by the term "family likeness." In order, therefore, to select this particular element from the others, and to obtain a picture in which it is most strongly defined; or, in other words, to form a characteristic portrait of the group of individuals, Mr. Galton employs a series of photographs. These, representing a large number of men or women, are first reduced to the same scale, and then projected successively upon a sensitised photographic plate, having been previously so arranged that the eyes or other salient feature shall always fall on the same portion of the plate.

In this manner a negative is eventually obtained which gives a print depicting a countenance which, although resembling but partially any one of the component portraits, gives a fair typical picture of the group of individuals. Among other results Mr. Galton has detected the likeness existing in various classes of criminals, and also in patients suffering from the same disease, as well as the more marked features transmitted through the different members of a family.

Since in meteorological investigations the desire is to select and to identify the one particular variable running through a group of phenomena, it has appeared to the author, arguing by analogy, feasible to perform this operation by a method somewhat resembling that just described. Supposing, for example,

<sup>1</sup> By G. M. Whipple, B.Sc., F.R.Met.Soc., F.R.A.S., Superintendent of the Kew Observatory, Richmond (from the *Quarterly Journal of the Meteorological Society*, vol. ix. No. 48).