

THE brilliant morning and evening glows have not yet left us. In connection with a letter of one of your correspondents of December 20, 1883, it may be interesting to add that the year 1783, which was characterised by a fearful eruption of Skaptar Jokul in Iceland, and by remarkable sky-colour phenomena similar to those we have lately had, was also the year in which the last great eruption of Asama Yama in Japan took place (see *Transactions of the Asiatic Society of Japan*, vol. vi. part ii. p. 327). Asama Yama is the greatest active volcano in Japan. In connection also with the unusual quantity of aqueous vapour with which the atmosphere has been charged, as proved by the spectroscopic observations of Prof. Michie Smith and others, and the facility that dust particles give for the formation of clouds, and therefore also of snow, it may be interesting to note that the beginning of the present year has been characterised by the greatest fall of snow that the oldest inhabitants here have known for thirty years. The minimum temperature reached this winter (-28° C. on the morning of December 23 in the neighbourhood of the college) is also the lowest for Kingston during the same period. Prof. Goodwin is now engaged in analysing the snow in order to find out whether similar impurities to those found in Europe and in Java are present.

D. H. MARSHALL

Queen's University, Kingston, Canada, January 13

Circular Rainbow seen from a Hill-top

In the *Philosophical Magazine* for January, 1884, p. 61, is an interesting article by Prof. Tyndall describing experiments made to produce circular rainbows by artificial light and artificial mist, his attention having been attracted to the subject by an observation made in the Alps on one occasion when the shadow of his body was projected at night time on to mist by a lamp behind him, and was seen to be surrounded by a luminous circle, or halo of light. I was so fortunate as to see lately identically the same effect produced with remarkable beauty and completeness in broad daylight from the summit of a Welsh hill. Staying last week for a couple of days at Pen-y-Gwryd, near Snowdon, in company with a friend, we walked one morning up the Glydr-Vach. The rain was steadily descending as we left the little inn, and the thick mist swathed the hill-sides in obliterating folds. Just as we reached the summit at noon a slight breeze thinned away the mist in front of the sun, and a burst of sunshine illuminated the hill-tops. Clambering on to the natural cairn which crowns the summit, we looked down into the valley, in which lies the small lake Llyn Idwal. Along the valley the wind drove masses of thin mist and scud, and on this we saw to our surprise the shadow of the summit with our own sharply-marked shadows projected on it. We waved our arms, and the mystic figures replied by waving theirs. Surrounding these immense shadowy figures we could see two concentric rainbows completely circular, the centre being the shadow of our heads. The colours of the inner rainbow were in the order of the primary bow, and the outer was a secondary and more faintly-tinted rainbow. During all this time the sun was shining brightly on our backs; when the wind cleared away the mist completely in the valley, the shadows and the rainbows vanished, but reappeared when fresh masses of vapour were blown into the line of our shadows. A very rough attempt at determining the angle subtended by the diameter of the primary bow seemed to show that it was much less than 90° , in fact not probably above 20° . This interesting appearance lasted only for a few minutes, as the wind drove up fresh mist in front of the sun, and the rainbow-circled phantoms disappeared. It would be interesting to know if any of your readers have ever observed a similar phenomenon. It has, I believe, been seen by balloonists when the altitude of the sun is great and a layer of mist and cloud lies beneath. Shadows thrown on mist are common; but this rainbow addition was new, not only to me, but to my friend, and his mountaineering experience has been very considerable.

J. A. FLEMING

Unconscious Bias in Walking

MR. LARDEN's letter in your issue of the 17th inst. (p. 262) regarding "circling to the left in a mist," and the replies of Messrs. G. H. Darwin and Hawksley, have opened an interesting question, and one which seems to be but imperfectly understood. The true explanation of this vexed question has for some years appeared to me to be that to which it is attributed by Mr. Hawksley, namely, inequality in the length of the legs. A

few years ago I made some investigations on the length of the lower limbs in man, the results of which were published in the *Journal of Anatomy and Physiology*, vol. xiii. p. 502 (1879). I found that of seventy well-authenticated skeletons which I examined, the lower limbs were equal in length in only seven instances, or in 10 per cent.; in twenty-five instances, or 35.8 per cent., the right limb was longer than the left, while in thirty-eight instances, or 54.3 per cent., the left limb was longer than the right. The left leg I found not only to be more frequently longer than the right, but the difference in length between the two limbs is greater on an average when the left is the longer. Inequality in length is not confined to any particular age, sex, or race, but seems to be universal in all respects. My observations corroborated those of several American surgeons made on the living subject. The result of one limb being longer than the other will naturally be that a person will unconsciously take a longer step with the longer limb, and consequently will circle to the right or to the left according as the left or right leg is the longer, unless the tendency to deviation is corrected by the eye. The left leg being more frequently the longer, circling should, if this theory of its being due to inequality of the limbs be correct, take place more frequently to the right than to the left. This is precisely what we find to obtain, and in this respect Messrs. Larden, Darwin, and Hawksley's observations agree with some I made myself on this question. The diameter of the circle formed by those circling to the right should, if my observations on the skeletons be correct, be less than that made by those circling to the left, since the difference in length between the two limbs is greater when the left is the longer.

To determine the comparative lengths of the right and left arms I made observations on fifty skeletons (the first fifty of those measured to estimate the length of the lower limbs), the results of which I hope to publish soon. In thirty-six of these skeletons, or in 72 per cent., the right arm is longer than the left; in twelve, or in 24 per cent., the left arm is the longer; and in two, or 4 per cent., the arms are of equal length.

On comparing these measurements of arm and leg in the fifty skeletons the right arm and left leg are longer than the left arm and right leg in twenty-three instances, or in 46 per cent.; the left arm and right leg are the longer in six instances, or 12 per cent.; the right arm and right leg are longer than those of the left side of the body in thirteen instances, or 26 per cent.; the latter are the longer in four instances, or 8 per cent.; while in the remaining four skeletons the legs are of equal length but the right arm is longer than the left in two instances, and the arms are equal in two cases, but the left leg is the longer in one of those and the right in the other.

Asymmetry of both upper and lower limbs, then, is the rule, and not the exception, as might naturally be supposed. Not knowing the histories of the persons whose skeletons I measured, I am unable to throw any light as to the connection between the proportions of the limbs and right- and left-handedness.

The particular causes of inequality in the length of the bones of the right and left sides of the body will probably always be more or less a matter of theory. The general cause is, as Mr. Hawksley states, owing to more rapid growth of the one limb than the other. I do not think in the majority of instances it can be attributed to "illnesses to which we are subject in early life," as he surmises. Asymmetry is almost invariably found throughout the whole skeleton, for example it is extremely rare to find a skull the two sides of which are absolutely symmetrical. In the limbs it is perhaps more easily attributable to the blood-supply being greater to one bone than to another. The nervous system may also have to be taken into account as a cause.

J. G. GARSON

Royal College of Surgeons, London, January 26

I AM left-handed and left-footed; that is, if there is anything to do that requires strength or skill, the left hand is always used; in football-playing, or anything requiring the use of the foot, the left foot gets the work to do.

I remember being once lost in the woods in America whilst trying to make a short cut home, and, after walking a good many miles, came upon my own snow-shoe track on its left side; thus my bias had been from right to left.

In a bitter cold day with thick snowdrift and a gale of wind on our "left front," as a soldier would say, some men were on a sledge journey on the Arctic coast in 1847. It was important