the act of swallowing, which temporarily distends the tube. He can test its perviousness by holding his nose with his fingers and forcing air into the nasal cavity. Physicians are in the habit of placing an ordinary stethoscope over the ear, causing the patient to go through the act of deglutition, and listening for the "click" of escaping air. Mr. Boys will see, as a physicist, that, if the access of air on either side of the tympanum were free, increase or decrease of atmospheric pressure would make no difference.

14, Dean's Yard, February 10

W. H. STONE

WITH regard to the letter of Mr. C. V. Boys in NATURE of February 7 (p. 333), I should like to make a remark or two on the matter, in which I have had practical experience. I am in the habit of running between Rugby and London daily, and pass through six different tunnels on the route. The Leighton tunnel is divided into three parts, the down fast line being single, and the space between the rails and the walls of the tunnel very small. On entering this, if in the first three coaches next to the engine, a sudden expansion of the tympanum is felt. I have been led to account for this phenomenon as follows: The engine acting as a piston forces the air before it through the tunnel, and so causes a partial vacuum, which extends to the first three or four coaches. After that the air has had time to rush in and fill the empty space, and this explanation is rendered almost certain by the fact that at the end of the train of twelve or fourteen coaches no aural effects are observable, thus demonstrating that the sudden propulsion of the air through the tunnel is compensated for before the middle of the train has entered. In Kilsby tunnel nothing has been noticed by myself. I account for the pressure alteration in the above manner, the engine and the tunnel-mouth closely fitting, and so are fairly comparable to a piston within a cylinder. The effects decrease from the engine to the end of the train, and are practically unobservable in the last few coaches.

Rugby, February 9

GEORGE RAYLEIGH VICARS

Diffusion of Scientific Memoirs

ALLOW me a few final words on this curious case. I spoke of the *Trans. C. P. S.*, 1849-54, in which Stokes' papers were "buried," as "almost inaccessible." This expression was challenged by the ex-Secretary of the Society, and I replied that the question could be decided by statistics alone. I indicated what statistics were required, and waited some weeks for them. The present Secretary then gave me the less essential part of the desired information, and I proceeded to make the best I could of it. Now I am told that I misunderstood his object, and that he practically admits what his predecessor challenged.

I also stated that my copy of the *Proc.* was very imperfect, and that I had not received any *Trans.* I was then told that "publications" were given only on application. If so, I replied, I should have had all, or none. To this there is no answer.

P. G. TAIT

Coll. Edin., February 9

Wind Sand Ripples

SOME time ago, whilst reading an account in NATURE of very ingenious and interesting experiments by Prof. G. H. Darwin on sand ripples, my memory was recalled to some very beautiful sand ripples caused by the action of wind, seen by another person and myself on the west coast of Ireland, near Bundoran. The locality was a sand ridge twenty or thirty feet above high-water mark, and beyond the influence of either sea or river action; the ripples extended over a space of twenty yards or more. At the time there was a fresh breeze, with frequent squalls, blowing across this ridge. This ripples moved before the wind at the rate of about a foot in three or four minutes, but faster during the squalls, retaining all the time (I watched them an hour or more) perfect uniformity of shape and size. The distances were roughly measured by sticking up in the sand bits of wood at, as nearly as could be guessed, one foot apart, in a line with the direction of the wind. The ripples were about three inches from summit to summit, and the depth of trough three quarters of an inch.

The time was carefully noted with a watch. The forward movement of the ripples was evidently caused by the sand being drifted from their weather sides, and deposited on their lee, and thus there was a progressive movement to leeward, more or less rapid according to the increase or diminution of the wind force.

4, Addison Gardens, February 9

JOHN RAE

Animal Intelligence

THE following anecdote, received the other day from Russia, may possibly interest your readers:—"The following was narrated to me by Mohl's brother, on whose estate it took place. The carcass of a cow was laid out in the woods to attract the wolves, and a spring-trap was set. Next morning the forester found there the track of a bear instead of a wolf on the snow; the trap was thrown to some distance. Evidently the bear had put his paw in the trap and had managed to jerk it off. The next night the forester hid himself within shot of the carcass to watch for the bear. The bear came, but first pulled down a stack of firewood cut into seven-foot lengths, selected a piece to his mind, and, taking it up in his arms, walked on his hind legs to the carcass. He then beat about in the snow all round the carcass with the log of wood before he began his meal. The forester put a ball in his head, which I almost regret, as such a sensible brute deserved to live."

J. M. HAYWARD

Sidmouth, February 9

Circular Rainbow seen from a Hill-top

CLIMBING, several summers ago, with three friends among the Coolin Hills in Skye, I was fortunate enough to witness phenomena similar to those described by Mr. Fleming in last week's NATURE (p. 310). Our shadows were apparently thrown against the precipitous side of a deep corry, distant 200 feet or perhaps more. They vanished and reappeared as thin mists passed through the corry, the sun shining continuously. We could not see each other's shadows unless close. The distance apart at which they became visible I do not clearly remember, but know it was approximately as one of my friends, Mr. W. A. Brown, writes:—"So long as we kept a few yards apart each could only see his own shadow, but when two were within arms' length a double shadow was visible to each, and on getting still nearer the shadows merged into each other." My estimate of the angle subtended by the diameter of the rainbow is 15°, that of my friend 10°. He adds, however, "I may be very far out in this."

J. M. WHITE

Spring Grove, Dundee, February 5

REFERRING to Mr. Fleming's letter in NATURE of January 31 (p. 310), I would state that many years ago, before Pontresina, in the Grisons, was so resorted to as it is now, I walked up the Piz Languard early one fine morning with an old smuggler and chamois hunter—the terms are synonymous on the frontier—named Colani. On the summit of the peak is a ledge of rock, on which I lay down for twenty minutes' sleep. I had been asleep but a few minutes when Colani woke me, and, with excuses and an expression of fright on his face, begged me to come with him to see something which he had never seen in his life before. We moved to the western edge of the peak. Below us were some thin clouds of mist curling about like vapour from a large cauldron. On these clouds appeared a circular rainbow and within it, as though in a gilded frame, were two figures—in fact, the shadows of ourselves.

"There are two of them now," cried Colani, and it was not until I told him to take off his hat and wave it, as I did mine, and he saw the action repeated by the figures, that he began to feel assured they were not "Geists." It was not the "Arch St. Martin," a Romansch name for a rainbow, which had frightened him, though it was the first time he had seen a circular one, but the appearance of the dark solitary figure had awakened his conscience, for some of his smuggling adventures had not been without bloodshed. The details of the phenomenon were the same as those described by Mr. Fleming, with the exception, perhaps, that the figures were more vivid and the whole spectacle of longer duration, owing to an unclouded sun.

A similar appearance has lately been seen on the Tonjale Range in Nevada, by Mr. R. A. Marr, of the Coast and Geodetic Survey. I subjoin his description of it, taken from a recent number of the *Mail*.

T. R. MAYNARD

The Black Forest, February 7

"Suddenly, as I stood looking over the vast expanse beneath me, I saw myself confronted by a monster figure of a man standing in mid air before me, upon the top of a clearly-defined mountain peak, which had but the thin air of the valley below for a resting place. The figure was only a short distance from me. Around it were two circles of rainbow light and colour, the outer one faintly defined as compared with the inner one, which was

bright and clear and distinctly iridescent. Around the head of the figure was a beautiful halo of light, and from the figure itself shot rays of colour normal to the body. The sight startled me more than I can now tell. I threw up my hands in astonishment, and perhaps some little fear, and at this moment the spectre seemed to move towards me. In a few moments I got over my fright, and then, after the figure had faded away, I recognised the fact that I had enjoyed one of the most wonderful phenomena of nature. Since then we have seen it once or twice from Jeff Davis Peak, but it never created such an impression upon me as it did that evening when I was doing service as a heliotroper all alone on the top of Arc Dome."

The Storm of January 26

DURING this storm there was a remarkable depression of the barometer, it falling to 26·9, as shown in the accompanying chart. The lowest depression last year was 28·2 on Nov. 25. Lurgybrack lies in lat. 54° 56' N., and long. 7° 42' W. It is 225 feet above the Ordnance datum level. A nearly similar depres-

sion was observed at Letterkenny, 140 feet above the Ordnance datum level. The wind veered round from the north west by north and east to the south, and from the latter by west to north. The storm was succeeded by a fall of snow, which has now melted away.

G. HENRY KINAHAN

Lurgybrack, Letterkenny, Ireland, January 29

EARTHQUAKE DISTURBANCES OF THE TIDES ON THE COASTS OF INDIA

FOR some years past tidal stations have been established at various points on the coasts of India, from Kurrachee round *via* Cape Comorin and Adam's Straits to Calcutta, and on to Rangoon and Moulmein; also beyond these points, eastwards at Port Blair in the

Andaman Islands, and westwards at Aden; but not anywhere in the Island of Ceylon, which happens—unfortunately for the interests of science—to be outside the administration of the Government of India. At each of the tidal stations an observatory has been established, containing a self-registering tide-gauge, and all requisite meteorological instruments, with a clerk in charge who tends the instruments, sets the driving clocks to true time—usually received telegraphically from Madras—and sends in daily reports to the supervising officer. That officer exercises a general superintendence over all the tidal stations, inspects them periodically, collates and analyses the observations, and deduces from them the values of the “tidal constants” for each port or point of observation; these constants enable future tides to be predicted, and tide tables to be prepared for the guidance of mariners; they are also otherwise valuable, in that they have thrown light on the question of the earth’s rigidity, and on various other matters of scientific interest.

The operations have been carried on in connection with the Great Trigonometrical branch of the Survey of India. Major A. W. Baird, R.E., has been the supervising officer from their commencement in 1873 up to the present time, with the exception of an interval of a little more than a year, when he was on furlough in Europe, and Capt. J. Hill, R.E., first, and afterwards Major M. W. Rogers, R.E., officiated for him.

At certain of the Indian stations the registrations have twice indicated that the normal tides had been greatly disturbed by supertidal waves: first, on the occasion of the earthquake in the Bay of Bengal on December 31, 1881; and secondly, during the volcanic eruptions in the Island of Krakatoa, between Sumatra and Java, which occurred on August 27 and 28 last. The first disturbances do not appear as yet to have attracted much attention out of India; a full account of them is given in the General Report on the Operations of the Survey of India for 1881-82, and also in the *Proceedings of the Asiatic Society of Bengal* for March 1883. The second are now famous all the world over, not merely because of the havoc they are known to have produced on the spot and at the time, but also because of the effects they are believed to have produced on the condition of the atmosphere long afterwards and in far distant quarters of the globe. A report on the tidal disturbances at Indian stations which were caused by the eruptions at Krakatoa has been drawn up by Major Baird, and sent to me for communication to the Royal Society, and an abstract of it was read at the meeting of the Society on January 31.

I now propose to indicate certain points of similarity and others of dissimilarity between the recorded effects of the disturbing forces on the two occasions; for fuller details the reports themselves must be referred to.

The usual effect of an earthquake or volcanic eruption occurring at an island or under the bed of the sea is the transmission in all directions of an “earth-wave” and a “sea-wave”; the former travels with much greater rapidity than the latter, and may reach points which the latter does not reach; or it may die away and cease at points far short of those attained by the latter; which of the two will travel the greater distance depends generally on the structure and homogeneity of the strata through which the earth-wave is transmitted, and on the depth of water and configuration of the bottom over which the sea-wave passes.

On the occasion of the earthquake of December 31, 1881, the “centre of impulse” was situated under the bed of the ocean in the western portion of the Bay of Bengal; the shock of the earth-wave was very violent in the Andaman and Nicobar Islands, and along the entire length of the Madras coast up to Calcutta, and also far inland; it was followed by a succession of sea-waves which the tidal diagrams show to have arrived after the