in the plane of the sails, "it is possible, by a slight mental effort, to change the apparent direction of rotation, and back again."

A similar effect I have often observed, but it seems in no way dependent on the will. Look, for say 30 seconds, steadily at the revolving disks of an anemometer; they will soon reverse their apparent direction, whether you wish it or not. Continue still to gaze, and that reversed direction will be changed back.

All whom I have asked to try this experiment felt the effect to be involuntary. The changes take place not gradually or confusedly, but distinctly and with decision. The fact is plain; the explanation not so simple. HERCULES MACDONNELL.

4 Roby Place, Kingstown.

Earthquake Tremors.

PERMIT me to say that Mr. John Perry, in his criticism (October 2, p. 545) of my "Method of observing the Phenomena of Earthquakes," has assumed that the phenomena observed were due to vertical displacement; whereas they were probably due to a swaying of the building in which the observations were made.

This assumption seems also to have been made in the case of the man mentioned by Mr. Wire in your last issue (p. 593).

Marine Villa, Shanklin, I.W., H. G. DIXON.
October 18.

A Ball of Fire.

AT about 12.5 last night I was going through the street at Milverton, and saw a bright light about south of me. I saw also a bright ball of fire appear through a break in the clouds proceeding with great rapidity, at about the height of 45°, in a direction which I estimate to be from south to north-north-east; it disappeared behind a church, and I saw nothing more. I am told this may be of interest, and therefore forward the account to you. CHARLES RANDOLPH.

Milverton, Somerset, October 17.

HYDRAZOIC ACID—A NEW GAS.

A NEW gaseous compound of nitrogen and hydrogen has been obtained by Dr. Theodore Curtius, the discoverer of amidogen, and its nature and properties were described by him in the Chemical Section during the recent scientific meetings at Bremen. The composition of the gas is HN_3, and its constitution $H-N\langle^{N}_{N}\rangle$. It is, in fact, the hydrogen compound corresponding to the well-known diazobenzene imide of Griess, $C_6H_5N\langle^{N}_{N}\rangle$, the three nitrogen atoms being united in the form of a closed chain. The gas dissolves in water with great avidity, forming a solution which possesses strongly acid properties, and dissolves many metals, such as zinc, copper, and iron, with evolution of hydrogen gas and formation of nitrides, the metal taking the place of the liberated hydrogen. The derivation name of the gas, azoimide, is somewhat unfortunate in view of its strongly acid nature, and Prof. Curtius proposes the name "Stickstoffwasserstoffsäure." Perhaps the nearest English equivalent, open to the least objection, is hydrazoic acid—a name which will serve to recall the many analogies which this acid bears to hydrochloric and the other halogen acids.

In studying the reactions of his recently-discovered hydrazine (amidogen) hydrate, $N_2H_4 . H_2O$, Dr. Curtius found that benzoylglycollic acid, $C_6H_5CO-O-CH_2COOH$, was decomposed by two molecules of hydrazine hydrate, with elimination of water and formation of benzoylhydrazine, $C_6H_5CO-NH-NH_2$, and hydrazine acetic acid, $NH_2-NH-CH_2COOH$, in accordance with the equation—

$$C_6H_5CO-O-CH_2COOH + 2N_2H_4 = C_6H_5CO-NH-NH_2 + NH_2-NH-CH_2COOH + H_2O.$$

Under the influence of nitrous acid benzoylhydrazine forms a nitroso compound, $C_6H_5CO-N\langle^{NO}_{NH_2}$, which spontaneously changes into benzoyl-azo-imide, $C_6H_5CO-N\langle^{N}_{N}\rangle$, with elimination of water.

$$C_6H_5CO-NH-NH_2 + NO-OH = C_6H_5CO-N\langle^{NO}_{NH_2} + H_2O.$$

$$C_6H_5CO-N\langle^{NO}_{NH_2} = C_6H_5CO-N\langle^{N}_{N}\rangle + H_2O.$$

Benzoyl-azo-imide decomposes, upon boiling with alkalies, with formation of benzoate of the alkali and the alkaline salt of the new acid.

$$C_6H_5CO-N\langle^{N}_{N}\rangle + 2NaOH = C_6H_5COONa + Na-N\langle^{N}_{N}\rangle + H_2O.$$

When this sodium nitride is warmed with sulphuric acid, hydrazoic acid, $H-N\langle^{N}_{N}\rangle$, is liberated as a gas. The gas is decomposed by hot concentrated oil of vitriol; hence diluted acid requires to be employed, and the gas can thus only be collected in a moist state. HN_3 possesses a fearfully penetrating odour, producing violent catarrh, and dissolves in water with an avidity reminding one of hydrochloric acid. The solution also bears a surprising resemblance to aqueous hydrochloric acid; for, on distillation a concentrated acid first passes over, and afterwards a more dilute acid of constant composition. The aqueous solution possesses the odour of the free gas, and is strongly acid to litmus. With ammonia gas, hydrazoic acid gas forms dense white fumes of the ammonium salt, N_4H_4 or $NH_4-N\langle^{N}_{N}\rangle$, a compound which is completely volatile below 100°, and which crystallizes, but not in crystals belonging to the cubic system, in this respect indicating its different constitution to ammonium chloride. The aqueous solution rapidly evolves hydrogen in contact with zinc, copper, iron, and many other metals, even when largely diluted. As in the case of hydrochloric acid, the silver and mercurous salts are insoluble in water, the others being generally readily soluble. As the acid possesses feebly reducing properties, solutions of many of its metallic salts, the copper salt for instance, yield precipitates upon boiling of compounds of the lower oxides of the metals. The barium salt, BaN_6, crystallizes from solution in large brilliant anhydrous crystals. With silver nitrate the aqueous solution of the acid or a soluble salt yields a precipitate closely resembling silver chloride in appearance. Silver nitride, $Ag-N\langle^{N}_{N}\rangle$, does not, however, darken when exposed to light, and is further distinguished from silver chloride by its fearfully explosive properties. During the course of his description at Bremen, Prof. Curtius placed a quantity of this salt less than 0·001 gram in weight upon an iron plate, and then touched it with a heated glass rod. A sharp and loud detonation resulted, and the plate was considerably distorted. The mercurous salt, Hg_2N_6, is likewise very explosive. The metallic salts are readily converted into

ethereal salts by reacting upon them with the haloid ethers. The phenyl salt thus prepared, $C_6H_5N\langle{}^{N}_{N}\rangle$, is in every way identical with the diazobenzene imide, so long ago prepared by Griess.

A. E. TUTTON.

PROF. S. A. HILL.

THE last Indian mail of September brings us the sad news of the death of Prof. S. A. Hill, one of the best-known of that small band of scientific workers, to whom we owe our present knowledge of Indian meteorology. He has been struck down suddenly, in the full maturity of his powers, and in the prime of life, after a few days' illness which gave no reason to anticipate so fatal a result. The son of a clergyman in the north of Ireland, Mr. Hill, after studying in the London School of Mines, and taking the degree of Bachelor of Science in the London University, was appointed, in 1876, to the Professorship of Physical Science in the Muir College, Allahabad, and, shortly after his arrival in India, received the additional appointment of Meteorological Reporter to the Government of the North-West Provinces, in succession to Mr. John Eliot, now the head of the Meteorological Department of the Government of India. In these combined offices, Prof. Hill has laboured for nearly fifteen years. In such spare hours as he could dispose of amid the exacting duties of his educational appointment and the administrative work of his office, in a climate which is but little favourable to mental or physical exertion, he devoted himself assiduously to those original investigations which have made his name familiar to the meteorologists of Europe and America. On subjects dealing with questions of terrestrial physics, he published numerous papers of high value and much originality in the Indian Meteorological Memoirs, the Journal of the Asiatic Society of Bengal, the Austrian *Zeitschrift für Meteorologie*, and the *Meteorologische Zeitschrift;* and an elaborate memoir on some anomalies in the winds of Northern India, in the 178th volume of the Philosophical Transactions. In this memoir he boldly endeavoured to map out the distribution of atmospheric pressure over India, at a height of 10,000 feet above sea-level, and showed how this distribution, differing greatly from that at the earth's surface, explains much that is otherwise anomalous in the winds experienced at the lower level, and especially the dry land-winds which play so conspicuous, and occasionally disastrous, a *rôle* in the meteorology of India. To the pages of this journal he was also a not infrequent contributor.

Having regard to Prof. Hill's high powers and his single-minded devotion to the work, of whatever kind, that lay before him, it is somewhat sad to read the following passage in an obituary notice in the Allahabad *Pioneer*, evidently written by one who knew him well. It need hardly be said that the Government referred to is that of the North-West Provinces and Oudh; not that of India, nor of Bengal, the relations of which to their scientific officers are known to be of a very different character. The writer says :—"Many of our readers who will recall their late friend's clear and accurate mind, his knowledge and his powers of application, will feel with a sense of bitterness that men of his capacity are not meant for the service of a Government, which is not only always ready to pass them over for a joint-magistrate who has been unlucky in his promotion, but will maintain that the latter is the best man. Mr. Hill was, officially speaking, the most unfortunate man of an unfortunate service [the educational service of the North-West Provinces]; but, no doubt because he had a talisman always with him in his devotion to science, he was never embittered by his ill-luck. With none of the eccentricities of a disciple of science, but with all the modesty and virtue of that character, he will pass away from us respected by all, and much more than respected by all those who were privileged to know him with intimacy."

H. F. B.

JOHN HANCOCK.

AT the venerable age of eighty-four years this well-known British naturalist has passed away, and it would be an injustice to his memory not to recall in these pages the effect of his life-work on the zoology of this country. He seems to have inherited his natural history tastes from his father, who was in business in Newcastle in the early part of the century, but was apparently devoted to natural history pursuits; and, in company with other kindred spirits, was intent on working up the natural history of Newcastle and the immediate neighbourhood. Unfortunately the father died at the early age of forty-three, in September 1812, leaving a widow and six children, of whom the eldest was only eight years of age. Mrs. Hancock, however, carefully preserved the collections which her husband had formed, and it was doubtless due to her affectionate interest that three of her children—Albany, John, and Mary—pursued the study of natural history with such success. The subject of this notice, John Hancock, seems to have turned his attention to ornithology in particular, and as early as 1826 he commenced the study of the artistic mounting of animals, which, as Mr. Bowdler Sharpe has said, has made John Hancock's name a password wherever the art of taxidermy is mentioned. Those who remember the celebrated groups of mounted animals which Mr. Hancock sent to the Great Exhibition of 1851, will testify to the revulsion of feeling which his beautiful work created, and every real naturalist felt in his heart that in this way alone could art and nature be combined in a Museum, and the public properly instructed in a due realization of the beauty and symmetry of form which animals possess in nature—beauties which are not reproduced in a Museum gallery once in a hundred times. That Hancock's influence should have been so little felt by the authorities of the British Museum is a reflection upon the officers of this institution, who ought to have utilized the genius of their countryman in making the collection of British animals in the National Museum a model for all nations to envy and copy. Anyone who knew John Hancock, his untiring energy and his unassuming amiability, will vouch for the fact that, if the British Museum had wished to have a collection of native birds naturally mounted, and worthy of this institution, he would have been only too delighted to aid in the achievement of such a task. As it is, the Museum of his native town, which really seems to have appreciated his genius, possesses a collection of birds of which any nation might be proud, and now that he is gone, those Museums (like the one at Leicester, for instance) which have series of birds mounted by this true lover and *connoisseur* of birds in nature, are to be congratulated. Of late years it is true that our National Museum has trodden the path indicated by Hancock, and a vast improvement in its taxidermy has been the result; but it will be a long time before any Museum can show such a beautiful series of birds as that which John Hancock has mounted for the Museum of his native town. An excellent biography of this esteemed naturalist has been published in the *Newcastle Daily Chronicle* of October 13.