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OBSERVATIONS ON THE DIRECTION OF THE MOTION OF CLOUDS.

LONG before the commencement of the important researches of Hildebrandsson and of Ley, upon the relations which exist between the paths of cyclonic areas and the directions of cirrus clouds, we had called attention to Goddard's cloud mirror, and urged its general use. But it is very difficult to induce people to obtain and to use any instrument except barometers, thermometers, rain gauges, and anemometers. And although Goddard's mirrors were exhibited in the 1851 exhibition, and are mentioned in the catalogues of two opticians, no one keeps them in stock, and we do not know of a single one being regularly used in the British Isles. Mr. Stevenson described another form of the apparatus in 1855 (and sent one to the Loan Collection), but we have never seen any results obtained with it published. M. Marié Davy has among his beautiful collection of meteorological apparatus at Montsouris another form, which is thus described in the work which we strongly recommended to our readers last month, viz., *Annuaire de l'observatoire de Montsouris pour l'an 1878* :—

“The direction of cirri being under investigation by M. Hildebrandsson, of Upsala, we have established in the park, a horizontal mirror upon which the 16 principal wind-points are engraved. In order to determine the direction of motion of a cloud, the observer so places his eye that the image of the cloud appears in the centre of the mirror at the intersection of the various engraved lines; he then places a small cone upon the mirror in such a position that the point of the cone is projected on the same central point, and thus secures a sufficiently exact line of sight. A few minutes afterwards, on bringing the eye to the same position, it is easily seen in what direction the cloud has moved. The effects of perspective being the same on the sky as on the mirror, do not affect the observation.”

We are glad to find that the subject is receiving further attention on the continent. In the *Zeitschrift* for January 1st, 1878, there is a very interesting note by Herr Linss, of Darmstadt on Braun's nephoscope and on cloud observations in general. (Ueber eine veränderte Einrichtung des Braunischen Nephoskops und über Wolken-

beobachtungen in Allgemeinen.) He begins by stating that he has not seen the report of the decisions of the meetings at Vienna and Utrecht, but is willing to improve his own observations in conformity with the decisions then arrived at. We do not think that he will gain much by perusing the reports; his ideas and his practice in this matter are far ahead of those discussed at the above meetings. He has up to the present time made three observations per diem, viz., 8 a.m., noon, and 4 p.m. He adopts Poey's classification, and uses an improved form of Braun's nephoscope (*Νεφος* a cloud, and *σκοπεῖν* to see), which seems superior to all three forms of cloud mirror above described, inasmuch as by it, the velocity of a moving cloud can be determined as well as its direction of motion.

Although Herr Linss's observations do not yet extend over a long period, he has already obtained some interesting results, for instance, that the apparent velocity of cumuli, palliocirri, and cirrocumuli is greater at 8 a.m. than at the two subsequent observation hours, and as there is no such increase in the velocity of the wind, he concludes that those clouds are lower at 8 a.m. than later in the day. He also found a constant relation between the angle which the path of the cirrocumuli and palliocirri formed with that of the cumuli and the change of the course of the latter during the subsequent four hours, whence he further found that the changes in the upper strata of the air occur at least four hours earlier than in the lower ones. From other observations he traces distinct connexion between the direction of cirri and the movement of depression centres, and also evidence of the more rapid advance of the upper portion of those depression centres—or, in other words, of the fact that the axis of a cyclone is not vertical, but that the upper end is in advance of the lower—being, we presume, merely another way of stating that the lower part of a depression centre is prevented by the greater density of the air, and by friction against the earth's surface, from moving so rapidly as the upper part.

We have given a mere outline of Herr Linss's paper, but we commend it to thoughtful men, and trust that, having shown how much a cloud mirror may teach, a few observers will try to learn.

BOOKS RECEIVED, AND SHORT NOTICES THEREOF.

ENGLAND.

Army Medical Department Report for the year 1876. 8vo. 1877.—Contains abstracts of mean and extreme results from twelve foreign stations of the British army, viz., Gibraltar, Malta, Scutari, Barbadoes, Jamaica (2), Bahamas, Bermuda, Singapore, Hong Kong, Natal, and Sierra Leone. There is no letter-press referring to Meteorology, nor even any remarks from any of the stations.

CHAMBERS, C., F.R.S., and CHAMBERS, F. *On the Mathematical Expression of Observations of Complex Periodical Phenomena, and on Planetary Influence on the Earth's Magnetism.* (From the Phil. Trans.

of the Royal Society.) 4to, 1875.—The nature of this very elaborate paper is sufficiently indicated by the title, and by the first paragraph, which is as follows:—"The writers purpose in the following pages to determine by Bessel's method a mathematical expression for a periodical phenomenon from observations which are affected by one or more other periodical phenomena; and to find criteria for judging of the extent to which the expression is affected by these other phenomena; also, having found an expression for a period of known approximation to the truth, to find from it the expression for the true period. In the course of these inquiries certain ambiguities which affect similarly Bessel's expression for a single periodical phenomenon, and the results here arrived at, will be remarked upon; and, finally, the results will be applied to determine the nature of periodic planetary magnetic influence in particular cases."

CHAMBERS, C., F.R.S., and CHAMBERS, F. *The Absolute Direction and Intensity of the Earth's Magnetic Force at Bombay, and its Secular and Annual Variations.* (From the Phil. Trans. of the Royal Society.) 4to. 1876.

CHAMBERS, F. *The Diurnal Variations of the Wind and Barometric Pressure.* (From the Proceedings of the Royal Society.) 8vo.—The general character of this paper, like that of Messrs. C. and F. Chambers, is fully explained by quoting the first and second paragraphs, and one from near the end of the paper.

"In a paper which was read before the Royal Society in 1873, and which was honoured with a place in the 'Philosophical Transactions' of that year, I discussed the diurnal variations of the wind and barometric pressure at Bombay, and deduced therefrom the fact that a system of diurnal wind-currents moves synchronously with the diurnal variation of barometric pressure. Reasons were given for believing that that system of diurnal wind currents is a universal phenomenon; and on that hypothesis I showed how the diurnal variations of the barometer could be explained as a result of those currents.

"I have lately examined closely the 'Discussion of the Anemometrical Results furnished by the self-recording Anemometer at Bermuda, which forms Appendix II. of the 'Quarterly Weather Report of the Meteorological Office, London,' July to September, 1872. Those results support the conclusions arrived at in my former paper in such a remarkable manner as to justify the re-advancement of some of them in a form which will prominently exhibit their relation to the diurnal variation of the barometer.

"Fig. 12, which is formed simply by the addition of the ordinates of figs. 10 and 11, so closely corresponds to those derived from actual observation of the barometer, and its range approximates so nearly to the actual diurnal range of the barometer in low latitudes, as to leave little room to doubt that the true explanation of the large features of the diurnal variation of the barometer is to be found in the diurnal variation of the wind."

Meteorological Office: Quarterly Weather Reports, January-March and April-June, 1875. 4to. 1877.

Meteorological Observations at Stations of the Second Order, for the year 1876. Part I., January to August. 4to. 1877.

Charts and Remarks to accompany Monthly Charts of Meteorological Data for nine Ten-degree Squares.

Respecting the first of these works, the only points to which we need

call attention is the commencement of the publication in extenso of the records of several private English and Irish stations, some offered to the office by the observers, and others supplied by the Meteorological Society. By accident there is no statement of the year of which data are given, in appendix 1A, from pages [57] to [75] inclusive, they evidently are the values for 1875. Concerning Captain Toynbee's fine volumes of Charts and Remarks, we have only space here to report them as vast storehouses of facts, very well arranged, except the notes upon meteors, which would have been more useful if sorted according to date of appearance. A discussion of the observations made at Ascension by the late Lieut. Rokeby, R.N., forms an appropriate appendix.

KAY, JAMES. *The Meteorology of Bute for the year ending Jan. 31st, 1877. With an Appendix containing Abstract of Observations taken from records kept at the Old Cotton Mills, Rothesay, from 1800 to 1875.* 8vo. Rothesay, 1877.—This is a valuable little pamphlet, the appendix containing three important tables. The first gives the fall of rain in every month for the present century, except those of the last two years. As printed, it reports the observations for April, 1842, to be missing; but the fact is the fall in that month was probably too small to be measured; several stations in the S.W. of Scotland report "no rain" for that month. There is only one drawback to this record, the gauge was moved once, and at present no one seems to know in what year—otherwise the record would have been invaluable—even now it is very precious. Table II. gives the mean temperature of each month from 1828 to 1875. It appears from the text that the temperature was observed hourly, day and night, for many years; and that the records 1840-75 are in possession of the Archæological and Physical Society of Bute, having been presented to it by Mr. Kay. Table III. gives the max. and min. temperature in each month from 1828 to 1875; the absolute max. was 85° , mean $46^{\circ}5$ (this value would be much higher but for low temperatures reported between 1835 and 1844); absolute min. 12° . The tables appear to have been very carefully printed, though there is one very prominent error on p. 19, where 80° in 1846 is reported as the absolute max., instead of 85° in 1847.

Report of the Kew Committee for the Year ending October 31st, 1877. 8vo.—We are glad to note two or three improvements in this report. In the first place, we see with satisfaction that the composition of the Committee is no longer concealed; there was certainly no reason why the Kew Committee should be a secret one, and those who discharge honorary but influential duties ought to be known, and to be ready to assume individually the responsibility for their actions. Secondly, we are glad that the report contains abstracts of some of the meteorological results obtained at the observatory. We think it open to question whether the existing arrangement should continue by which the work of the observatory, instead of appearing in one annual

report as is the case with all other observatories, is scattered about in separate papers in the Proceedings of the Royal Society. It prevents anybody realising the amount of work done at Kew, and it renders the annual report a terrible collection of skeletons. Moreover, we doubt the advisability of heavy investigations being conducted at the observatory, and at its cost, and then being communicated to the Royal Society by Mr. XYZ. Of course, Mr. XYZ duly acknowledges his obligations to the Kew Committee for the materials supplied, but we submit that the information should not be scattered but concentrated; and if Mr. XYZ likes to help the Committee by contributing a paper to their report, by all means let him do so, and thus he will tend to render the annual report less insignificant as compared with the work done in the establishment than has hitherto been the case.

Report of the Meteorological Committee of the Royal Society for the period of Seventeen Months ending 31st May, 1877. 8vo, 1877.—The Meteorological Committee being dead, we are reminded of the mottos "*Nil nisi bonum de mortuis*," and "*Le Roi est mort, vive le Roi*," for the extinction of the Meteorological Committee was concurrent with the appointment of the Meteorological Council, and we sincerely hope, and are inclined to believe that the change will lead to less war-like relations than those upon which we have been obliged to comment in past years, and to the adoption of more liberal views than have previously prevailed. No stronger indication of probable future peace could be afforded than by the fact mentioned by some of our contemporaries, that the Secretary of the Scottish Meteorological Society has accepted an appointment under the new Meteorological Council. This is burying the hatchet pretty deeply, and we are very glad to record it. We need not say more about the report than that it is chiefly an index to the data accumulated in the office.

The Natural History Journal. December, 1877. 8vo. York.

The Observatory. January and February, 1878. 8vo.

—Recent numbers of these periodicals having been reviewed we need only say that they maintain their good characters.

TOYNBEE, CAPT. H., F.R.A.S. *On the Great Hurricane, the Tracks of American Storms, and the Ordinary Winds of the N. Atlantic, in August, 1873.* 8vo. 1877.—Captain Toynbee is always at his best when dealing with Atlantic storms, and this short paper is another proof that such is the case. As he promises a larger work upon the same subject we reserve further remarks, except to quote a foot note from page 23,—“An instrument to record the height, direction from, [*sic*, probably should be “direction, form”] and speed of clouds would be a great boon to Meteorology.” We think so too; that is why we have often urged the use of Goddard’s Cloud Mirror, and we refer Capt. Toynbee to the first article of this number.

Watford Natural History Society Transactions. December, 1877. 8vo. Watford, 1877.—This vigorous young society continues to pros-

per, and the above number of the journal is rendered especially useful to meteorologists by the insertion of a short but very satisfactory series of instructions for taking meteorological observations by W. Marriott, Esq., F.M.S., Ass. Sec. Met. Soc.

HAMBURG.

NEUMAYER, Dr. *Deutsche Seewarte. Monatliche Übersicht der Witterung. June and July, 1876, and February, March, July and August, 1877.* Large 8vo.—A very able and full summary of the weather of north-western Europe, compiled by Dr. Neumayer (who was for many years Director of the Observatory at Melbourne, Australia). It is a valuable store of facts, and is also noticeable as, to the best of our knowledge, the only publication giving charts of the progress of storm centres, *i.e.*, charts on which the position of the centre of depression-systems are marked for each day, and the positions of those which can be identified are united by a strong line. For instance, on the morning of August 6th, 1877, a depression centre existed in the Atlantic about 20° W. and 54° N., the minimum being 29 in. ; on the 7th it had moved eastward to about 17° W., the minimum being 29·06 in. ; in the evening it was a little further S. and E. (about 14° W. and 52° N.), with a min. of 28·94 in. On the morning of the 8th it was near Cork, and the min. still 28·94 in. ; during the day it crossed the Irish Channel, and was over central Wales in the evening. Next morning (9th) it had passed some miles eastward of the Yorkshire coast, and had so “filled up” that the min. was 29·33 in. ; here it received a check, and was turned from its original easterly course and sent north-westwards, so that in the evening the centre was in Kincardineshire, and finally it was between the Orkney and Shetland Isles on the morning of August 10th. The utility of such a publication is so evident that we do not attempt to support it, all argument is superfluous.

HOLLAND.

HELLMANN, Dr. G. *Feuchtigkeit und Bewölkung auf der Iberischen Halbinsel.* Oblong 4to. Utrecht, 1877.—This is an excerpt copy of a valuable paper upon the humidity and cloud of Spain and Portugal, written by Dr. Gustav Hellmann, of Berlin, and published by Dr. Buijs Ballot in the Netherlands Meteorological Jaarboek for 1876. After a brief introduction and quoting the works whence he had obtained the data subsequently employed, Dr. Hellmann gives the mean hourly elastic force of vapour and relative humidity for each month for San Fernando, Lisbon, Coimbra and Madrid. This answers two purposes : it shows the general laws of hygrometric variations at four typical stations, and it shows to what extent it is possible to reduce observations, made say at 9 a.m. and 3 p.m., to true daily values. After these come a series of very solid tables, giving monthly elastic force of vapour and humidity at 18 stations for periods of about 12 years at each, and various abstracts formed from them. The cloud observations are given in similar detail ; but there are here a few

points we cannot pass even temporarily without notice—such, for instance, as the fact that the average number of days with wholly overcast sky which, at Valencia is only 42, and Seville and Palma does not exceed 50, is at eleven stations more than 100, and at Bilbao and Oviedo 158 and 164 respectively. These numbers agree very well with the mean amount of cloud, which is only 2·1 at Valencia, 3·3 at sunny Seville, but 6·1 at Bilbao and 6·6 (misprinted 6·7) at Oviedo, the latter being almost the same as the average for London, according to Mr. Glaisher. The monthly amounts are :—

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year.
London ...	7·7	7·4	6·6	6·1	6·1	6·1	6·9	6·5	5·9	6·9	7·2	7·4	... 6·7
Oviedo ...	6·6	5·7	7·0	6·2	6·0	7·0	6·5	6·8	6·1	7·0	6·0	6·8	... 6·6

Hence we see that the winter is slightly more cloudy in London, and the summer more cloudy at Oviedo. The most striking contrast with English weather is the large number of cloudless days—days with *unbedecktem Himmel*—of which Oviedo, thanks to its proximity to the mountains, had only 50, while Saragossa on the average of eight years had 199, and Valencia 260, of which an average of 53 occur in June and July. By the bye, can anyone state how many cloudless days occur annually in any spot in the British Isles? The hygro-metrical tables are of at least equal interest, and besides the tables Dr. Hellmann's remarks are well worthy of attention. We regret that we cannot afford more space for noticing this able and interesting memoir.

THE *ATHENÆUM* UPON METEOROLOGY.

BURNS sang—

“ Oh ! wad some power the giftie gie us,
To see oursels as others see us,
It wad frae mony a blunder free us.”

And we are always glad to hear the opinions of lookers-on respecting Meteorological progress—or the reverse. The *Athenæum* of March 9th prints in its largest type a long article upon Meteorology, the most important parts of which we now place before our readers without a word of comment. Perhaps some of our correspondents may favour us with their views upon it next month.

“ Notwithstanding the rapid extension of meteorological and magnetic observatories over the globe, and the consequent increase of the number of observers, we are—after a most careful study of all the published reports, and of the numerous papers which have been published of late years—driven to the conclusion that meteorology still remains a science of observation. An enormous, an almost overwhelming, number of meteorological tables have been published ; but we do not find that any important deductions have been made from these recorded observations. When Luke Howard, some seventy years since, published his researches on the climate of London, he was enabled to show that the atmospheric changes moved in cycles of about nine and eighteen years. When Sir William Herschel directed his attention to solar spots in 1800, he was sufficiently daring to indicate a relation between the number of these black spots and the prices of corn in the market. Years passed away, and, eventually, nearly all the meteorological returns, which had been obtained at great cost, by several of the Governments of Europe, were submitted for reduction to Prof. Dove, of

Berlin, who carefully worked out a result, which very nearly corresponded with the hypotheses of both Howard and Herschel.

"If we examine into what has been done since that time, we shall find that—if we except the development of the law of storms—it amounts to little more than a verification of the conclusions of the elder philosophers. It would appear that we have cultivated most zealously the powers of observation, and that we have produced a large, well-trained band of observers; but there has been no corresponding development of the reflective powers; we have not produced even a small band of meteorological philosophers. Exception will probably be taken to this by many of the members of meteorological societies. Those who are disposed to deny our assertion that, for the amount of induction exhibited, there is not a corresponding amount of deduction shown, will probably point to certain papers in the *Transactions* of the societies, and reports of committees as evidence against us. We have not made our remarks until we have diligently and thoughtfully sought for evidence; and we feel strong in our position. We feel some satisfaction in being supported in this view by the President of the Royal Society, who, in his Annual Address, expressed his hope that the means placed at the disposal of the Meteorological Committee may serve to establish meteorology on a scientific basis. The means for obtaining correct records of atmospherical phenomena are certainly considerably improved. We find in the last published Catalogue of the ill-starred Loan Exhibition of Scientific Apparatus a list of barometers, thermometers, rain-gauges, anemometers, hygrometers, ozonometers, and other instruments, which number nearly 200; and in other sections of the catalogue are numerous instruments which bear directly upon meteorological research. These instruments in their construction show a considerable amount of thought, and are admirable in many respects for their great delicacy and their striking ingenuity. The arrangements made by the committees of the meteorological departments of the several Governments of Europe and America, aided as as they have been by the electric telegraphs, and especially the arrangements made by the permanent committee of the Vienna Congress, all tend to the production of an invaluable series of returns in relation to ocean meteorology and weather telegraphy. The reports which we have placed at the head of this article—and they might have been very largely increased—show how closely we have linked together those points upon our globe which are important in meteorological research. The results of those arrangements hitherto have been the distribution of storm-warnings, which are not yet so trustworthy as they may certainly be rendered; and, in connexion with ocean meteorology, some valuable charts have been produced, especially those which represent the phenomena that the sailor may expect to meet with in the region of the Doldrums. * * * *

"These are all evidences of the excellent work which is being carried out. What we contend for is that we may go on multiplying observatories and observers, that we may publish still more voluminous reports, and discuss in our societies and congresses questions connected with the isolated phenomena observed, yet that these will not lead us to a knowledge of the laws which regulate the motions of the great atmospheric envelope of our planet.

"The atmosphere, a mixture essentially of two dissimilar gases, possessing peculiar physical and some remarkable chemical properties, is held in connexion with the solid mass of the earth by the exercise of a mysterious force. This is liable to disturbances under the influences of solar radiations; hence the great tides indicated by our barometers. The changes are, some of them, due, no doubt, to heat, which we use our thermometers to discover, and by which the 'weather conditions' are produced. And beyond these are electrical changes, now made out to be, as we know the earth's magnetism is, dependent upon disturbances in the sun. Consequently we require the powerful industry of a gifted mind trained into the habit of broad generalization, who shall bring together, out of the vast accumulations of observations which we can now place in his hands, the established facts which they hold buried, and from them draw those philosophical deductions which are required to advance meteorology to be a science, but little inferior in exactness to astronomy, with which it is so closely allied."

RAINFALL REPORTS.

To the Editor of the Meteorological Magazine.

SIR,—An error having been found in my Table of Days, and some delay resulting therefrom, I impose on myself the penalty of 10s., which I now remit.

I think it would be a good practice if observers would fine themselves for delay or for error. If observers would make for themselves some such rule as this, to pay 2s. 6d. for every fortnight after the end of the year which elapses before sending the report, and 2s. 6d. for each correction that is needed, the money raised by such voluntary fines would probably considerably facilitate the speedy and correct compilation of tables, &c.—Yours respectfully,

JOSH. H. HILL

Hull, February 22nd.

[We can, of course, express no opinion upon this suggestion, but it appears to us that we can hardly do wrongly by printing the letter precisely as we have received it, and submitting it to the consideration of the observers.—ED.]

THE MOON'S INFLUENCE ON THE WEATHER.

To the Editor of the Meteorological Magazine.

SIR,—Some of us have been accustomed to hear from our infancy the old saying—

“Saturday moon and Sunday full
Never was good, and never wull.”

And those who, like myself, have had to do with rivers have been taught to expect high floods at those times and seasons.

The last moon having been one, has again called my attention to the subject, and for proof of correctness or the contrary of this old country proverb, I have looked back for fifteen years for facts, and find as follows:—

Year.	Month.	Rainfall. in.	Year.	Month.	Rainfall. in.
1863,	April	1·01	1871,	January	1·48
1864,	June	1·25	1874,	October	0·82
1865,	February	1·64	1875,	July	4·62!!
1869,	August	0·45	1876,	August	3·09!
1870,	April	0·61	1878,	February	0·94

The above are returns for the four weeks following the new moon, the average per month being 1·59 in., the general average of the last fourteen years being 1·90 in. per calendar month. It will be seen by this account these occurrences are very occasional, sometimes not happening for four years, and never more than once a year.

While on this subject I am reminded of a conversation I had with a friend on the convenient topic of the weather. After a long continued wet season, I said, we shall have fine weather soon, for the next change in the moon is near midnight, and his response was “I am no lunatic.”—I remain, dear Sir, yours cordially,

Cambridge.

JAS. NUTTER.

HIGH TEMPERATURE ON FEBRUARY 17TH.

To the Editor of the Meteorological Magazine.

SIR,—My max. thermometer having on Sunday last, the 17th inst., registered the highest shade temperature ($58^{\circ}3$) ever recorded by me in February, and subsequently hearing from Mr. W. F. Denning that his instrument gave a reading ($59^{\circ}6$) on the same day, beyond any previously taken at Bristol since 1853, it struck me that these few lines on the subject (if not forestalled by some more skilful writer), might interest your readers, as likely to elicit from them whether the unusual excess was general on the day in question; or, if only partial, over what portions of the country it extended. The moon, moreover, having been at its full on the 17th, and in perigee on the 18th, those who believe in lunar influence on our atmospheric changes may possibly derive comfort, in the present case, from the coincidence as corroborative of their views.—I am, Sir, yours truly,

F. BONNYCASTLE GRITTON, F.M.S.

Eglinton Villa, Holt, Trowbridge, Wilts, February 21st, 1878.

P.S. By reference to "Greenwich Extreme Temperatures," I find that the Bristol max. above quoted has not been exceeded since February, 1869.

THE EARTHQUAKE OF JANUARY 28TH.

WE have some further information respecting the above. In the first place we may state that M. Marié Davy has examined the curves of the various self-recording instruments at Montsouris, but has found no trace of the disturbance; considering the extremely compact and solid mounting of most of the instruments, this is perhaps not remarkable. At present there is no seismograph at that observatory. Indeed, to the best of our knowledge, there is not one anywhere in the north-west of Europe; the British Association were going to do something in the matter at Comrie, in Perthshire, and one would naturally suppose that M. Perrey, of Dijon, who is one of the greatest authorities upon earthquakes, would have started such an apparatus, but we believe, as we have said, that there is not one at work anywhere.

The *Bulletin International de l'Observatoire de Paris* for February 1st reports the shock to have been felt at many places in northern France, especially in the adjoining departments of Seine-Inférieure and Calvados, *e.g.*, Rouen, Havre, Caen, &c.; but it was also felt in the extreme south at Tarbes in the Hautes Pyrénées, and in the extreme east at Thionville in Alsace.

Our attention has been called to the following statement in the *Times* of March 5th:—

SUBMARINE VOLCANOES.

"*West Cowes, Isle of Wight, March 3.*—The master of the D. M'B. Park,

British bark, arrived here from Batavia, reports as follows:—‘Jan. 29, at 7 a.m., in lat. 4 20 N., long. 21 45 W., saw several submarine volcanoes throwing large columns of water about 100 ft. into the air, while the sea was in great commotion; there was a very strong undercurrent. The weather at the time was very cloudy, with rain, and nearly calm. The sound was as of distant thunder.’”

The approximate contemporaneity is interesting, but as the above-mentioned time represents January 29th, 8h. 27m. a.m. Greenwich time, it is nearly twenty-four hours *after* the shock we have been discussing.

THE AMERICAN STORM WARNINGS.

In our January number we said (p. 183) that we should like to see an official report upon the recent efforts made by the *New York Herald*. Almost exactly that which we desired is furnished by an extremely able paper by Mr. R. H. Scott, F.R.S., in the *Nautical Magazine* for the present month. It is a long article, occupying nearly thirty pages; but while we refer those specially interested in the subject to the original article for the detailed investigation, we select some parts of the general narrative, which will be interesting to every one:—

“The announcements of storms coming from America, which have occasionally appeared in the newspapers during the past year, have naturally attracted much attention on the part of the public. I, therefore, venture to submit to the readers of the *Nautical Magazine* the following notice of the outcome of a private enquiry which I have conducted into the results of these warnings, for the space of eleven months, ending with December, 1877.

“The idea that the storms of Western Europe were directly connected with West India hurricanes has long been entertained, and in 1853, Martin, in his ‘Memoir on the Equinoctial Storms of March–April, 1850’ (Harrison, Pall Mall), gave a chart of Atlantic Storm Tracks from the period in question. Dove, in his first edition of his *Gesetz der Stürme*, published in his *Klimatologische Beiträge*, part I., 1857, while contending that most European storms exhibit characters entirely different from those of Tropical Cyclones, argues that some of our disturbances originate in West India hurricanes, which, when they have recurved on entering the Temperate Zone, have continued their course in a north-easterly direction over the Atlantic; but he says, ‘It is evident that the connection between a storm in the Temperate Zone, and the original Cyclone in the Torrid Zone, to which it owes its origin, need not necessarily be traceable, as a continuously advancing minimum, in the lower strata of the atmosphere.’

“This was pretty nearly the actual state of the question when Professor Daniel Draper, in his report of the Central Park Observatory of New York for 1872, stated that in his experience, out of eighty-six atmospherical disturbances expected to cross the Atlantic, only three seemed to have failed. This statement was quoted without further comment by Sir G. B. Airy in his Presidential address to the Royal Society in 1873, and thereby derived such additional weight that it seems advisable to examine it more in detail.

“The rule given by Professor Draper in his report for 1873 is as follows:—

“If a low barometer with an easterly wind be prevailing here, the mean travel of this wind per day for twenty-four hours before, and twenty-four hours after the time of the low barometer, is to be divided into 4,200; this will give the number of days that it would require for the storm to cross.’

“In analysing this statement we find two points on which some further explanation is required.

"Firstly, what is implied by the 'travel' of the wind?

"The phrase is not usual in this country, but I presume from the context, that it means 'the distance travelled by the wind,' or in other words its velocity per twenty-four hours. In fact 'velocity' is used for 'travel' in the discussion of storm eight (Report for 1873). However, the existence of any proved connection between the velocity of the wind in a storm and the velocity of translation of the storm as a whole is not recognised by European meteorologists, and so we must only suppose that Mr. Draper applies the term 'travel' to this motion of translation of the entire disturbance.

"Secondly. Information is desirable as to the precise test applied to the disturbance at this side of the Atlantic. Mr. Draper speaks of 'storms.' This word, in our phraseology, would imply Force 9 of Beaufort's Scale, a strong gale, with a velocity of over fifty-five miles an hour. I can only remark that as a fact, during the period investigated, this velocity was not reached on nearly all of the eighty-three occasions cited at either of the two observatories, Valencia and Falmouth, the returns from which alone Mr. Draper consults as indications of British weather. In fact, if we take the period, February 1 to April 10, 1872, during which Mr. Draper counts eleven of his predictions to have been fulfilled, examination of our anemograms shows that on only two occasions was the velocity of fifty miles reached at either of the observatories cited by Mr. Draper, while that of fifty-five miles was not registered anywhere during the time in question.

"I shall, therefore, dismiss this subject with the remark that Mr. Draper was, to say the least, over sanguine in his statements.

"Coming now to actual attempts to transmit useful intelligence by telegraph across the Atlantic. The first practical proposal for such a service, as far as I am aware, was made to me in August, 1867, by Mr. John C. Deane, at that time Secretary to the Anglo-American Telegraph Company, and through his instrumentality a station was organized at Heart's Content in Newfoundland, and the first report arrived January 13th, 1868. We received the telegrams *gratis* for the space of nearly four years (up to November 1st, 1871) through the great liberality of the Anglo-American Telegraph Company, but we could not turn them to practical use, partly owing to the circumstance that the site of the station was chosen as a sheltered nook where no storm could possibly hurt the cable, so that the wind felt at the head of the bay, and reported to us, bore little relation to that blowing outside. This fact came prominently into notice at the time of the disappearance of the S. S. *City of Boston*, in February, 1870. More particularly, however, was it difficult to use these telegraphic reports, on account of the circumstance, that though storms may sometimes cross the Atlantic from shore to shore, they change their character *en route*; some increasing and others dying out, so that it is all but impossible to predict which storm, out of several starting from the States, will reach us. Professor Loomis, a very high authority on American weather, supports this view very strongly in the following words, taken from the *American Journal of Science and Art*, for January, 1876:—

"'When storms from the American continent enter upon the Atlantic Ocean they generally undergo important changes in a few days, and are frequently merged in other storms which appear to originate over the ocean, so that we can seldom identify a storm in its course entirely across the Atlantic.'

(To be continued.)

THE WEATHER IN FEBRUARY.

At the beginning of the month a large and deep barometric depression was shown in the north of Sweden. On the 2nd, readings were highest over Ireland, but were comparatively uniform over the whole of these Islands.

From the 3rd to the 9th the weather was very dull, gloomy and foggy, but dry and quiet. On the 4th the mercury fell in the extreme north, as well as in Norway, and a large depression had apparently advanced from the westward to the north of Scandinavia, while in the south pressure was increasing slowly. A large area of high readings (30.5 in.) lay over England and Ireland. The wind blew a hard gale from the westward at Christiansund, but at all other places it was light in force, from south and west in the W. and N., and from the north and east in the E. and S. Next day a fresh depression appeared in the south of Scandinavia, causing the mercury to fall quickly there, and to a less extent everywhere else with the exception of England, France, and the Netherlands. The area of high readings still lay in the above-mentioned position, but was extending. The weather continued very dry and the sky was clear.

From this day till the 8th the changes in the condition of the atmosphere were unimportant; but on this day a rapid fall of the mercury occurred over Lapland, and extended in a less degree all over Sweden, but in all other places the changes were inconsiderable. Gradients were rather steep over Scandinavia and north-westerly winds strong to a gale were reported there, but on our coasts the area of high pressure still remained, and light airs were experienced. By the evening pressure was decreasing on all our coasts, and the morning after it was found that the mercury was falling everywhere, except over Scandinavia.

On the 10th the pressure decreased over the whole of Western Europe, the change over Great Britain being rather brisk. Readings were highest (30.2 in.) over central France, lowest (29.6 in.) over Sweden, but a slight depression appeared to be lying over Ireland. On the following day the mercury was falling in the S. and rising in the N., so that a band of very uniform pressure existed over these islands and France. Within this band readings were a little above 29.9 in., and thence they decreased to 29.8 in. at Valencia, and to 29.6 in. in Sweden.

On the 12th pressure began to increase over all Western Europe; the change had, however, been much greater in the east than in the west, so that while a large area of high and uniform readings was shown over Great Britain and the North Sea, moderate gradients were formed on our western coasts.

From this time until the 17th the changes in the weather were few and unimportant. On the 17th and following days numerous depressions advanced to our neighbourhood, but though causing the barometer to oscillate considerably, they did not affect the wind to any great extent. From the 17th to the 21st the course of the disturbances was from south-west to north-east along our western coasts, and south-westerly winds with warm weather prevailed; but on the 21st a large anticyclone was formed in the south-west, which subsequently extended northwards over England, so that light westerly breezes with dry, but dull, weather was general. On the 22nd, temperature rose to an exceptional height over Scotland, the maxima at Aberdeen and Thurso being 59° and 58° respectively.

Atmospheric pressure for the remainder of the month was very unsteady, though no serious disturbance reached our shores. Readings were highest over France, while areas of low pressure travelled in a north-easterly direction along our north-western coasts, and passed on to Norway at the same time that small subsidiary depressions crossed these islands. Wind was consequently southerly to south-westerly generally, and though moderate or fresh in force on most days, increased to a slight gale on some occasions. Temperature at the end of the month was very high for the time of the year; it varied from 54° at Valencia and Biarritz to 39° at Aberdeen. Mist was very prevalent on the last days of February, and rain was general in Western Europe.

H. E. M.

FEBRUARY, 1878.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which 41 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Max.		Min.		In shade	On grass.		
				Dpth	Date.			Deg.	Date.			Deg.	Date.
		inches	inches.	in.									
I.	Camden Town	1.49	+	.27	.41	13	11	59.7	17	25.7	8	5	10
II.	Maidstone (Hunton Court)...	1.20	—	.02	.34	27	10	...	...	...	...	...	...
III.	Selborne (The Wakes).....	2.84	+	1.13	.73	12	18	53.0	17	24.5	1	7	12
IV.	Hitchen	1.28	+	.02	.34	13	17	55.0	17	25.0	7	11	...
V.	Banbury	1.61	+	.18	.41	13	15	57.0	17	23.0	8	12	...
VI.	Bury St. Edmunds (Culford)...	1.23	—	.19	.24	13	12	58.0	17	24.0	7, 8	9	13
VII.	Norwich (Sprowston)	1.07	...	...	.26	12	12	...	...	...	...	...	...
VIII.	Bridport	2.30	+	.24	.54	28	9	...	...	...	...	...	...
IX.	Barnstaple	2.23	+	.15	.73	27	14	58.0	17	28.0	2	...	...
X.	Bodmin	2.81	+	.02	.93	12	14	57.0	17	23.0	1	3	5
XI.	Cirencester	1.94	+	.33	.51	12	12	...	...	...	...	...	...
XII.	Shifnal (Haughton Hall)	1.23	+	.34	.37	12	12	55.0	17	24.0	1, 8	7	14
XIII.	Tenbury (Orleton)	1.53	—	.04	.47	12	14	61.7	17	22.3	1	8	11
XIV.	Leicester (Town Museum)	1.24	...	...	.34	12	13	59.2	17	25.5	1	5	14
XV.	Boston	1.36	+	.15	.32	14	13	58.0	17	26.0	9	5	...
XVI.	Grimsby (Killingholme)	1.03	...	...	.29	14	10	57.0	17	29.0	1, 8, 9	6	...
XVII.	Mansfield	1.35	...	...	.45	12	11	58.6	17	24.6	1	10	13
XVIII.	Manchester (Ardwick).....	.81	—	1.03	.33	13	8	58.0	17	26.0	1	9	...
XIX.	York .....	.98	—	.40	.78	15	5	57.0	1	26.0	9	...	...
XX.	Skipton (Arncliffe)	2.21	—	1.46	.48	28	12	...	...	...	...	...	...
XXI.	North Shields .....	.96	—	.57	.39	14	15	55.0	17	30.2	1	5	6
XXII.	Borrowdale (Seathwaite).....	11.74	+	.36	3.32	28	12	...	...	...	...	...	...
XXIII.	Cardiff (Crockherbtown).....	3.07	...	...	.87	27	16	58.5	17	26.5	1	4	...
XXIV.	Haverfordwest	3.85	+	.99	.98	11	14	56.0	17	26.5	7	3	9
XXV.	Aberdovey	1.66	...	...	.65	28	13	57.0	18*	27.0	1	3	...
XXVI.	Llandudno	1.13	—	.22	.40	28	11	63.4	17	29.3	1	3	...
XXVII.	Dumfries (Crichton Asylum)...	2.38	+	.05	.58	28	13	55.4	18	24.8	4	10	11
XXVIII.	Hawick (Silverbut Hall).....	1.40	...	...	.29	17	12	...	...	...	...	...	...
XXIX.	Glasgow (Cessnock Park)	2.32	—	.55	...	...	...	...	...	...	...	...	...
XXX.	Mull (Quinish)	2.11	...	...	.52	28	15	...	...	...	...	...	...
XXXI.	Loch Leven .....	...	...	...	...	...	...	...	...	...	...	...	...
XXXII.	Tyndrum (Ewick)	5.80	...	...	...	...	...	...	...	...	...	...	...
XXXIII.	Arbroath	1.26	—	.59	.40	14	10	55.0	22	28.0	2	5	...
XXXIV.	Braemar	1.13	—	.85	.38	14	9	54.2	22	23.2	2	8	20
XXXV.	Aberdeen .....	.73	...	...	.22	14	11	59.1	23	25.8	1	3	20
XXXVI.	Gairloch	2.04	...	...	.33	7	28	...	...	...	...	...	...
XXXVII.	Portree	4.75	—	5.48	.65	6	21	...	...	...	...	...	...
XXXVIII.	Inverness (Culloden) .....	...	...	...	...	...	...	...	...	...	...	...	...
XXXIX.	Dunrobin	1.39	—	1.13	.22	7	13	55.0	21	25.0	25	6	...
XL.	Sandwick	1.98	—	.50	.33	27	20	50.4	20	31.0	26	2	6
XLI.	Caherciveen Darrynane Abbey	3.06	...	...	.55	28	20	...	...	...	...	...	...
XLII.	Cork	3.38	...	...	.80	26	9	...	...	...	...	...	...
XLIII.	Waterford	3.04	+	1.01	1.06	13	14	56.0	21	26.5	1	4	...
XLIV.	Killaloe	2.63	—	.27	.84	12	13	57.0	27+	23.0	1	5	...
XLV.	Portarlington	2.11	+	.08	.73	12	20	55.0	27	26.0	1	7	...
XLVI.	Monkstown, Dublin	1.63	—	.01	1.02	12	9	58.0	17	21.0	1	6	...
XLVII.	Galway .....	...	...	...	...	...	...	...	...	...	...	...	...
XLVIII.	Waringstown	1.81	...	...	.35	15	17	57.0	17	28.0	1	3	8
XLIX.	Edenfel (Omagh)	1.49	...	...	.31	28	18	54.0	17+	27.0	1	5	...
L.	Ballyshannon	1.39	...	...	.24	12	11	...	...	...	...	...	...

* And 19, 25.

+ And 28.

+ Shows that the fall was above the average; — that it was below it.

METEOROLOGICAL NOTES ON FEBRUARY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail S for Snow.

ENGLAND.

SELBORNE.—A mild, but very foggy and cloudy, month; prevailing wind N.W. the first half of the month, but on the 13th it changed suddenly to S.W., and continued from that quarter for the rest of the month.

BANBURY.—Very foggy during the first part of the month.

CULFORD.—A month of very mild weather for the season, the mean temp. being $42^{\circ}\cdot 1$, and vegetation is consequently in a very forward state. Polar winds prevailed during 7 days. Heavy fog on the 9th.

SPROWSTON.—Dry and very mild month, with no S, and only two or three slight frosts.

BODMIN.—So mild a winter has never before been known; average temp. of the month, $44^{\circ}\cdot 9$.

SHIFNAL.—Sharp frost on the 1st, then dull and misty with high bar. till the 12th (7th and 8th excepted), when $\cdot 37$ in. of R fell in the night; misty again till the 17th, when bar. stood at 55° , the rest of the month mild and pleasant, with occasional showers bringing on vegetation, which was till then backward in spite of the open winter. Snowdrops in flower on the 13th, crocus on the 24th.

BOSTON.—Mean temp. 1° above the average, weather being very mild at the end of the month.

GRIMSBY.—Very fine month, with high temp. and high bar; vegetation perilously forward, but the ground in better condition for farming operations than at this season last year. Crocus and snowdrop in flower on the 8th; hazel shedding pollen on the 24th; apricot in blossom on the last day of the month.

MANSFIELD.—Foggy and gloomy month.

NORTH SHIELDS.—Lunar halos on the 11th and 16th.

WALES.

ABERDOVEY.—The weather was, with the exception of a few fine, sunny days, generally foggy, calm and damp, with less R than the average. Mean temp. $44^{\circ}\cdot 5$.

LLANDUDNO.—Fine month on the whole, mean temp. rather more than 1° above the average, R just about the average; slight frost on three nights only.

SCOTLAND.

DUMFRIES.—First half of the month was dry and cold. There was a considerable snowstorm about the middle of the month, and the latter half of the month was wet and unsettled; bar. and mean temp. above the average; winds generally moderate, chiefly from W. and S.W. during the latter half of the month.

HAWICK.—High winds on 15th, 16th and 17th. Lark first heard on the 23rd. The month has been very mild and spring-like; gooseberry bushes and the fruit buds of apple and pear trees are threatening to expand, prematurely it is to be feared, for spring frosts may yet come and nip these tender buds and blossoms. Farm work is in a forward state.

BRAEMAR.—The finest February ever known in this district. Thrush heard on the 8th.

ABERDEEN.—The mildest February that is on record; remarkably dry and quiet.

PORTREE.—On the whole a fine month, generally mild; gales on the 17th, 20th and 28th; S on the 25th and 26th; frost from the 11th to 15th. Fruit bushes and garden shrubs in full bud; grass quite green; sheep and cattle healthy and thriving well on the pastures.

DUNROBIN.—Mostly mild and fine, with very little frost.

IRELAND.

DARBYNANE.—Fine and very mild month, winds generally light and variable; gales from S.W. on 16th, 17th, 19th, 27th and 28th. Rhododendrons in flower on 20th; first primroses on 24th.

KILLALOE.—An unusually fine month for the time of year ; some heavy E the close, and temp. very high, the max. being 57° and min. 49° on the last day Hawthorn coming into leaf.

WARINGSTOWN.—Mild, fine, and favourable for farming operations.

EDENFEL, OMAGH.—The rainfall less than that of any month since May, 1876, and the temp. on only five nights was at, or below, freezing. Southerly winds and balmy airs prevailed.

BALLYSHANNON.—The month has been unusually mild and spring-like ; not the slightest frost ; rainfall considerably less than the corresponding period in 1877 (4·30 in.)

SUPPLEMENTARY TABLE OF RAINFALL IN FEB., 1878.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see Met. Mag., Vol. XI., p. 28., but the list is under revision.]

Div.	Station.	Total Rain.	Div.	Station.	Total Rain.
		in.			in.
II.	Acol	1·06	XI.	Solva	1·93
„	Littlehampton	2·34	„	Castle Malgwyn	1·71
„	Hailsham	2·13	„	Nantgwilt, Rhayader ..	3·18
„	St. Lawrence, I. of W....	2·18	„	Carno	2·11
„	Strathfield Turgiss	1·55	„	Rhug, Corwen	1·23
III.	Addington Manor	1·66	„	Port Madoc	1·85
„	Oxford	1·26	XII.	Carsphairn	4·10
„	Northampton	1·58	„	Melrose	1·50
„	Cambridge	1·13	XV.	Gruinart	2·05
IV.	Sheering	1·40	XVI.	Grandtully .....	...
„	Diss	1·24	XVII.	Tomintoul	·41
„	Swaffham	1·47	„	Keith	·43
V.	Alderbury, Salisbury ...	...	XVIII.	Dalwhinnie	2·30
„	Compton Bassett	1·68	„	Auchnasheen	5·08
„	Dartmoor	5·00	„	Springfield, Tain	·70
„	Teignmouth	2·35	„	Glenfinnan	7·49
„	Langtree, Torrington ...	2·60	XIX.	Watten	1·83
„	Cosgarne, St. Austell ...	2·37	XX.	Glenville, Fermoy	2·77
„	Taunton	1·38	„	Tralee	2·49
VI.	Bristol	1·72	„	Tipperary	2·23
„	Sansaw	·92	„	Newcastle W., Limerick	1·26
„	Cheadle	1·81	„	Kilrush	1·83
„	Bickenhill Vicarage	1·18	XXI.	Kilkenny	2·20
VII.	Coston, Melton Mowbray	1·75	„	Kilsallaghan .....	...
„	Bucknall	1·23	„	Twyford, Athlone	2·03
VIII.	Walton, Liverpool	1·62	„	Mullingar, Belvedere ...	2·02
„	Broughton-in-Furness ...	4·00	XXII.	Ballinasloe	1·77
IX.	Stanley, Wakefield	·82	„	Kylemore	4·83
„	Mickley, Ripon	1·43	„	Carrick on Shannon	1·47
„	Whitby	1·09	XXIII.	Rockcorry	2·03
X.	Gainford	1·29	„	Warrenpoint	2·31
„	Unthank	2·89	„	Newtownards	2·33
„	Shap	2·99	„	Bushmills	1·28
IX.	Llanfrecdfa	4·72	„	Buncrana	1·34