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THERMOMETER STANDS.

IN previous numbers we have described the various forms of thermometer stand ; we now proceed to consider the arrangements made for their impartial trial, including—(1) Their construction ; (2) The position chosen for their erection ; (3) The instruments employed upon them ; (4) The mode of observation.

(1) The construction was most carefully superintended, not the slightest deviation from the designs of the authors, either in substance, angle or dimensions being allowed. They were made of seasoned wood, and reflect much credit on the carpenter employed. The Kew Stand (A) is the original one so long used at Kew, and most kindly lent by the Kew Committee of the British Association. Pastorelli's (H) was supplied by Mr. Pastorelli ; and Stevenson's (F) was purchased of Messrs. Brydon and Son, of Edinburgh, who have the exclusive manufacture.

Having given separate scale drawings of all the stands, it is only necessary just to explain that their arrangement is as follows :—

- A Kew Stand.
- B James's Stand.
- C Lawson's Stand (which also carries the aspirated thermometer.)
- D Stow's Stand.
- E Martin's Stand.
- F Stevenson's Stand.
- G Glaisher's Stand.
- H Pastorelli's Stand.
- I The 13 ft. Thermometer.

(2) Their position is correctly indicated by the accompanying engraving, except that the artist has somewhat drawn on his imagination for the hills in the background. The enclosure is about 140 ft. long (*i. e.*, from E. to W.) by 20 ft. broad (*i. e.*, from N. to S.) The sketch is taken looking to the S. ; at the west end will be seen the poles sup-

porting the 13 ft. thermometer (1), which together with the guide-ropes which support it, has had to be rather increased in size, in order to render it visible. Mr. Griffith's own stand is in its original position in the garden at the back of the spectator, and so is Morris's, which is on the wall of the house; the position of these two stands is shown in the frontispiece to *British Rainfall*, 1868.

(3) The instruments employed on each stand are—

A Standard Maximum.

Minimum.

Dry Bulb Thermometer.

Wet " "

They are in every respect identical—even the threads of cotton to supply the wet bulbs being counted, and the muslin being of the same size and fineness for each; both the muslin and the conducting threads are changed monthly. We shall have more to say concerning the management of wet bulb thermometers on a subsequent occasion. All the thermometers were supplied by Mr. Casella, and reflect much credit upon him. Through the kindness of the Kew Committee their index errors have all been determined at Kew, and subsequent experiments, which we need not detail, have shown that the errors so determined were astonishingly correct. As mercurial thermometers are liable to change unless very old when originally tested, it is intended to re-verify all the thermometers at the close of the experiments, and thus to ascertain if any, and what, change has taken place.

(4) The mode of observation consists of one reading daily of all the self-registering thermometers, and three readings daily—viz., 9 a.m., 3 p.m., and 9 p.m.—of all the dry and wet bulb thermometers; and at certain periods of hourly observations of the dry and wet bulb thermometers on all the stands for twenty-four consecutive hours. This involves the reading and entering of more than 500 separate observations. The confinement, regularity, punctuality, and self-denial involved in undertaking these observations single-handed, is only equalled by the accuracy with which Mr. Griffith takes and enters the observations: One illustration of his care may be mentioned: if the stands were always read in the same order—say, Kew first and Morris last—the 9 a.m. reading of Kew would be below that of Morris, because *both* could not be read at 9 a.m., one must be a minute or two before the hour, the other a like period after it, and during the interval the temperature would on the average have risen. It is therefore Mr. Griffith's custom to begin with a different stand each day, in regular order, thereby neutralizing this possible source of error.

We do not intend on this occasion to discuss the observations

already made, but we may mention that they are most puzzling; sometimes the thermometers on all stands will be, when corrected for index error, within $0^{\circ}\cdot2$, another time they will differ several degrees, and these differences are not due to one cause alone, such as capability of protecting the thermometers from sun; if so, the difference would vary with the amount of solar radiation, which is not by any means regularly the case. One disturbing cause is rain; we may give an instance. On a recent occasion Mr. Griffith was taking term-day observations, *i.e.*, consecutive readings each hour for 24 hours. About 8 a.m. a driving shower came from the west; at that hour of course James's and Glaisher's stands were facing about W.N.W., the rain therefore reached the bulbs, and it was two hours and a half before they were again dry. If the shower had come from the S.E. instead of the W., they would have been as dry as those on (say) Martin's. The thermometers in Stevenson's stand would have been thought (at any rate we thought) quite safe from rain reaching them, but in practice this is not the case; the rain falls on the louvre boards, hangs on their edges, is blown upwards, and so finds its way on to the thermometers. Mr. Griffith says they are almost as often wet as the others. Irrespective of the readings of the instruments, we have a singular but very useful guide as to the exposure of the instruments in the rate at which the varnish on their frames perishes; the wood and the varnish, and the date of making being identical, the comparison is not uninteresting. The Kew stand *seems* unduly to diminish the daily range of temperature, and also to retard the occurrence of the maximum and minimum. But we must not be betrayed into a discussion of their merits until the observations have been longer continued, and more fully discussed.

RAINFALL AT HARBOUR LIGHTHOUSE, PORT ELIZABETH, CAPE OF GOOD HOPE.

1867.		1868.	
January	·47	January	·26
February	1·37	February.....	3·87
March	1·71	March	1·59
April	1·31	April	1·89
May	2·74	May.....	·80
June	4·60	June	·65
July	1·92	July	3·95
August	3·10	August	1·25
September	3·91	September	·35
October	2·65	October	1·28
November	9·27	November	2·58
December	·72	December	1·50
Total	33·67	Total	19·97

—From the *Eastern Province Herald*.

TIME INTERVAL.

As the period when thunderstorms are most prevalent is fast approaching, it may be well to direct attention to the desirability of more frequent observations of the above element, to facilitate which the following table has been prepared. The observer will only have to note by a seconds' watch the time between the flash and the thunder, and against the number of seconds he will find the distance in miles.

TIME-INTERVAL AND EQUIVALENT DISTANCE.

sec.	miles.	sec.	miles.	sec.	miles.	sec.	miles.	sec.	miles.	sec.	miles.	sec.	miles.
1	·2	11	2·3	21	4·5	31	6·6	41	8·7	51	10·8	61	12·9
2	·4	12	2·5	22	4·7	32	6·8	42	8·9	52	11·0	62	13·1
3	·6	13	2·8	23	4·9	33	7·0	43	9·1	53	11·2	63	13·3
4	·9	14	3·0	24	5·1	34	7·2	44	9·3	54	11·4	64	13·6
5	1·1	15	3·2	25	5·3	35	7·4	45	9·5	55	11·6	65	13·8
6	1·3	16	3·4	26	5·5	36	7·6	46	9·7	56	11·9	66	14·0
7	1·5	17	3·6	27	5·7	37	7·8	47	10·0	57	12·1	67	14·2
8	1·7	18	3·8	28	5·9	38	8·1	48	10·2	58	12·3	68	14·4
9	1·9	19	4·0	29	6·2	39	8·3	49	10·4	59	12·5	69	14·6
10	2·1	20	4·2	30	6·4	40	8·5	50	10·6	60	12·7	70	14·8

METEOROLOGY IN INDIA.

IN 1867 the Government of Bengal appointed a meteorological reporter to make reports on the phenomena of weather, similar to those published in the Punjab and North-western Provinces, and to carry on a system of storm-warnings for the protection of the port of Calcutta, which had been duly sanctioned. The observers, from whom he derives his information, are generally assistants in the telegraph department, stationed at different places round the Bay of Bengal, and some other localities in communication with Calcutta. They note the barometric pressure, the humidity of the air, the direction and force of the wind and rainfall; and these particulars they flash twice a day—at 9:30 a.m. and 4 p.m.—to the head office in Calcutta, which is attached to the office of the Surveyor General of India. Similar reports are transmitted by the observatory at Madras; the daily registers of the Calcutta Observatory are consulted, and from all these a tabular report is drawn up and sent, after careful examination, to the Master Attendant of the port, and to the newspapers. In critical states of the weather, additional pains are taken to communicate the information more frequently. This system is a good one, and we were prepared to hear that it works well, and that the reporter was thereby enabled to give to the shipping in the port a fore-warning of some hours of the approach of the violent cyclone of November last. May we not hope that from this comparatively small beginning, a system of storm-warnings may be developed, which shall embrace the whole range of coast from Japan to the Red Sea? The committee, under whom the reporter works (for there is a Meteorological Committee in Calcutta as

well as in London), express themselves as fully alive to the importance of a knowledge of the normal laws of local meteorology, in order to derive full value from the telegrams, but they find this knowledge nowhere available. They have been able to collect a few scattered records, but with the exception of these, as they state, the meteorology of Bengal and its coasts remains but little known; and no trustworthy data can be looked for until continuous and careful observations shall have been made during a course of years. They are working to this end by preserving all the reports which they receive, and embodying them in a systematic summary. They are also taking pains to ensure accuracy on the part of the observers, and have given notice that all instruments issued in future will first be tested in the head office at Calcutta. Taken in connection with the grand system of meteorological observations now so actively carried on over a large part of India, this system of storm warnings cannot fail to be attended by the happiest results. Already its records may be consulted with advantage, as set forth, with tables, in the Report just published for 1867-68.—*Athenæum*.

ANOTHER EARTHQUAKE.

ON March 15th a decided shock of earthquake was felt in the south of Lancashire and Yorkshire. It was rather stronger than most of those which have recently occurred, cracking a wall, throwing down a chimney, also a clock and sundry crockery. One most noticeable feature is the marked agreement in the time; one observer says 6h. 4m. p.m., five observers say 6h. 5m., one says 6h. 7m., one 6h. 9m., two 6h. 10m., and one (evidently wrong) says 6h. 30m. Omitting him, there is only 6 minutes between the earliest and latest. We will not be so conceited as to imagine that our recent remarks as to the imperative necessity of observers keeping their clocks right has induced this improvement, but we trust the example set by these north country people will be even a stronger inducement than any words of ours.

A PILLAR OF FIRE (?)

On Saturday morning, between four and five o'clock, a ball—or more properly speaking, a pillar of fire—passed from east to west over the City of Carlisle, and was plainly visible for fully a score of miles around. It resembled an ordinary gate-post in size and shape, and seemed as though it were prevented from falling by some invisible connecting cord. It travelled in a westerly direction, and was plainly visible at Cumberdale, and at Glasson, 10 miles distant from Carlisle. At Glasson, a respectable yeoman watched the pillar intently, and he says that it caused a great heat, while another person in the same locality says that the fiery substance seemed to pass within a score of yards of him, and that the heat was almost overpowering. It exploded in the air, and immediately after the report, resembling the sound of the discharge of cannon, a singular brightness lit up the heavens.—*Manchester Examiner*, April 7th, 1869.

PRE-INSTRUMENTAL METEOROLOGY.

To the Editor of the Meteorological Magazine.

SIR,—Will you allow me to raise the above subject for discussion in your pages? I cannot help thinking that very much is to be learned from old chronicles; although some of them were doubtless guilty of exaggeration, yet “in the multitude of counsellors,” &c., and so if anything like a comprehensive collection was made, these faults would soon be detected. You stated (*British Rainfall*, 1868, p. 58) that one of your deceased correspondents had been comparing farm registers some two centuries' old with contemporary rain returns, and had found a close accordance. I wish to suggest a similar course on a large scale, believing that many most important results could thereby be deduced. I wish some one to volunteer (I have not time myself) as superintendent, and I wish all your readers, each so far as in him lies, to assist. Vague suggestions generally produce poor results; I would therefore venture to suggest details, and that will be best done by an example. I recently borrowed from a friend a pamphlet, entitled “Annals of the Diocese of Lichfield, Past and Present, being a Supplement to the Lichfield Church Calendar, 1861;” therein I find a series of extracts from the oldest register of Ashley Church, two of which will serve as types of the whole:—

“1614, Feb. 28th.—Predicta hiemalis intemperies a vicesimâ die Januarii ad decimam quartam Martii.”

(A wintery severity of weather, as predicted, from the twentieth day of January to the fourteenth day of March.)

“1634, June 23rd. — Circiter occasum solis mirandus tonitruï fulguris et grandinis increbuit horror una cum pluvie immensâ copiâ circa Shrawardine in comitatu Salopiæ perierunt segetes plurimæ grandine demissæ longique labor periit initus anni.”

(About sunset there prevailed a wonderful and terrible storm of thunder, lightning, and hail, together with an immense quantity of rain, around Shrawardine, in the county of Salop. A great deal of corn was destroyed, being cut down by the hail, and the undertaken labour of the long year was lost.)

My idea is, that each of your readers should, before copying any extracts, send a line to the superintendent, and ask if the book they propose to search has already been undertaken by anyone else; this would avoid waste of labour. The superintendent or secretary should have some cards printed after this style:—

DEAR SIR,

The work you mention has been searched.

Yours very truly,

It would take very little time to fill in the word “not,” when required; and by keeping an alphabetical list of books searched, it would be easy to be sure whether the “not” should be inserted or omitted. All persons making extracts should write on one side of the paper only, and they should be very careful to give correctly the title, date, volume, and page whence each separate extract is made. The duties of the secretary would simply consist in sending the above-mentioned cards, and in filing the extracts in the order of their date.

It would obviously be inexpedient to think of printing them until the collection approached completion.

I hope that it will not be asking too much if I request that you will receive offers of assistance in this matter, and I trust that none of your readers will refrain from offering their aid through mistaken ideas of the greater capability of others. It is pre-eminently a work in which all can and all should help, so far as in them lies.

I am, Sir, your obedient Servant,

K. C. T.

[Our sole comment on this proposal is hearty approval, and earnest hope that the scheme so ably promoted by K. C. T. may be carried to a successful issue. We have no shadow of doubt as to the value of the results to be obtained in the manner suggested. The work of the "superintendent or secretary" would not be great, and the main requirements being habits of regularity and arrangement, we trust several of our readers will volunteer their services, and we are sure they will be well repaid by the consciousness of useful labour. We are not certain whether "Extra-Instrumental Meteorology" should not be substituted for "Pre-Instrumental," for the following reason, which however we only give from memory :—Oundle Church, Northamptonshire, has a fine lofty spire, so have many other churches, but Oundle Church has certainly been struck by lightning three times, and probably more. Why? Possibly the presence of iron ore in the district accounts for it; but if so, may not a careful chronicle of such like "accidents" reveal other unexpected facts? Had the frequent damage of this church been known, might not the so-called recent discoveries of iron ore have been anticipated? If the chronicle is to touch such questions as these, it must not stop short at the date of the introduction of meteorological instruments, but must be brought down to the present time. The subject is of great importance.—ED.]

PREDICTIVE METEOROLOGY.

To the Editor of the Meteorological Magazine.

SIR,—I beg to send you the following extract from the *Gardeners' Chronicle* of Saturday last, as perhaps you may not have seen it, and I thought it might be interesting to some of the readers of the *Meteorological Magazine*.—I remain, Sir, your obedient Servant,

J. BRYAN.

Audley End Gardens, Saffron Walden, Feb. 24th, 1869.

"THE WEATHER.—As the present year is affording another illustration of the remarkable law pointed out by Mr. Brumham (*Pro. Met. Soc.*, Vol. IV. p. 89) it may be worth while to direct the attention of your readers to it. It is as follows :—'When the mean temperature of December is more than 2° above that of November, the remainder of the winter, or rather the winter quarter (consisting of January, February, and March), will always have a mean temperature consider-

ably above the average.' The following are all the instances in the last 97 years relative to this rule :—

Year.	Mean Temperature of November.	Mean Temperature of December.	Year of Winter.	Difference of mean of January to March, from the mean of 97 years, which is 38·5.
	deg.	deg.		deg.
1789	38·7	41·6	1789—90	+ 2·5
1795	40·7	44·8	1795—96	+ 2·8*
1827	41·5	44·1	1827—28	+ 2·7†
1842	42·8	45·0	1842—43	+ 1·1‡
1851	37·9	40·4	1851—52	+ 2·9
1862	39·8	43·6	1862—63	+ 4·1||
1868	41·5	46·0	1868—69	+ 2·8

* The warmest January on record occurred this winter.

† A mild winter.

|| A remarkably mild winter.

‡ A mild and stormy January.

R. C. C. L."

SOLAR RADIATION TEMPERATURES.

To the Editor of the Meteorological Magazine.

SIR,—The time is approaching when many observers will be again trying the heat of the sun's rays, and if some uniform plan can be adopted, even if not the best, it would be much better than the discordant results of last summer.

I would propose a very simple matter, merely a board say 8 in. by 12 in., supported by legs say 3 in. long, the board of course to be blackened a dead black, for which there is nothing better than glue and lamp black, and the board left rough from the saw.

There are many obvious disadvantages in placing a thermometer on the grass; one is that it is very liable to be trodden on, another that a few blades of grass will often escape observation, and interfere with the results.

It is too late to discuss what plan will be best, but if you suggest one, I have no doubt it will be at once adopted, and so we shall avoid the really ridiculous returns of last summer.—Yours, &c.,

JOHN DAVIS.

Derby, March 31st, 1869.

[We think that the plan recommended by the Rev. F. W. Stow is the best, viz., to place a dull black bulb maximum vacuum thermometer so that its bulb points to S.E., is 4 ft. above the ground, and not in the least sheltered or shaded by the post by which it is supported.—ED.]

MEAN DAILY HUMIDITY.

To the Editor of the Meteorological Magazine.

SIR,—Will you be kind enough to inform me of the correct mode of computing the above? I have hitherto worked with *Glaisher's Diurnal Range Tables, 4th Edition, 1867*, but the observations during

November and December last have frequently resulted in the absurdity that the mean temperature of the wet bulb has been much greater than that of the dry, although, as in the following instance, at 9 a.m. the wet has been $0^{\circ}\cdot6$ below the dry, and at 3 p.m. $0^{\circ}\cdot1$ below. If you can explain how to avoid this palpable error, you will greatly oblige, yours very truly,

C. H. GRIFFITH.

CALCULATIONS IN DETAIL, OCTOBER 24TH.

9 a.m.				3 p.m.					
Dry Bulb.		Wet Bulb.		Dry Bulb.		Wet Bulb.		Max.	Min.
45°·6	...	45°·0	.....	55°·4	...	55°·3	..	60°·2	38°·4
				Max.....		60°·2	} Range, 21°·8		
				Min.....		38°·4			
Sum				2)98·6					
Mean... ..				49·3					
Corr. from Table V. ...				—0·9					

48·4 = Mean from max. and min.

DRY BULB.				WET BULB.			
9 a.m.	...	3 p.m.		9 a.m.	...	3 p.m.	
45°·6	...	55°·4		45°·0	...	55°·3	
Cor. from Table III.	—0°·2	—7°·4		—0·8	...	—3·9	
		45·4	48·0			44·2	51·4
		48·0				51·4	
		2)93·4				2)95·6	
		46·7	} =Mean from				} =Mean from Wet Bulb.

Therefore the wet bulb temp. is $1^{\circ}\cdot1$ above the dry bulb, which is absurd.

[The cause of the above anomaly is evidently the much larger subtractive correction to be applied to the dry bulb reading in the afternoon than that to be applied to the wet one ($-7^{\circ}\cdot4$ as against $-3^{\circ}\cdot9$), but we must confess we do not know how the mean daily humidity is otherwise to be determined. We are sure that Mr. Glaisher, as the author of the *Diurnal Range Tables* and of the *Hygrometrical Tables*, would confer a general favour by indicating the proper course to be pursued.—ED.]

WHEEL BAROMETERS.

To the Editor of the Meteorological Magazine.

SIR,—I can hardly take up any book on Meteorology without finding the wheel barometer held up to ridicule and condemnation. Can you tell me why? I find most books make abusive remarks take the place of reasons. I am the more puzzled, because the aneroid rarely suffers condemnation, and yet its larger companion invariably does.

I am, Sir, Yours very truly,

L. T. K.

[If our memory serves us aright, we are under promise to follow

the articles on thermometer stands with a series on thermometers, otherwise the above would almost tempt us to take up barometers first. However, we will reply briefly to L. T. K.'s inquiry, and leave the general question of barometers *in futuro*. We partly agree with L. T. K., who evidently thinks the old wheel barometer hardly used. Our opinion (by no means infallible, and only to be taken *quantum valeat*,) is that a *good* wheel barometer is by no means a useless instrument. Ever since barometers were invented, men have been trying to render the changes more readily visible to the eye than is the case with the simple upright column of mercury. We had in the olden time the diagonal barometer and the wheel barometer; in modern times we have had Howson's and several others, but to our own thinking none better than the wheel barometer. Why, then, has it become in such bad repute? We believe it, like many other things, has suffered from undue cheapening, undue desire for profit on the part of the makers, and ignorance on the part of many who use it. The first and second causes have led to the use of a tube narrow in bore, even at its widest, and (simply to save a pound or two of mercury) contracted through a large part of its length; the tube is not mounted as it should be, on a slab of flint glass at the bottom, but is simply stuck in a frame-work of stained deal, which may swell and shrink as much as it likes; the silken string is generally cotton; and the pulley, which ought to be carefully poised to work in agate bearings, is often hardly good enough for a roasting-jack; there is no provision made, by unequal graduation, to compensate for the string winding on itself, and therefore unduly increasing the leverage, and very often the hand itself, is not properly counterpoised; and it is rare to find them adjusted correctly, even when new; while to find that they are an inch wrong, and be told, "Oh, is it now? well I said I saw some of the quicksilver run out one day when we were moving it," is a very common event. These are a tolerable string of indictments, and of course do not apply to *all* wheel barometers, but to sadly too many. Perhaps, however, the greatest foe of the wheel barometer as at present made is dust. The frame-work, as we have said, is ordinarily stained deal, veneered with rose-wood; At the back there is a long door, which enables one to obtain access to the tube, but as the wood is often not too well seasoned, three months in a warm room dries the wood, and even if it fitted well originally, it soon allows access to the dust, of which a plentiful store is almost always to be found in the chamber, in the tube, on the strings, and worst of all on the axle, forming with the oil previously put there, a delightful resisting medium. Many persons may think these drawbacks sufficient to condemn any instrument; we do not; we believe they are all removable, and should be glad to hear that some one would undertake to supply wheel barometers in which they were all guarded against. Of course we do not for a moment contemplate observers making and publishing readings from wheel barometers; the effect of moisture on the cord would prevent that being expedient; but we believe there are many men who would like to have a wheel baro-

meter which would go without being knocked—as, for the reasons above stated, is now almost always necessary. Such a barometer would not only be a companion, but also a boon to regular observers, by telling them at once of any change, and thus, with the mere trouble of a glance, informing them whether or not extra readings of their standard barometer should be taken. The manufacture of aneroids is at present in the hands of opticians worthy of the name, hence its workmanship is incomparably superior.—Ed.]

REVIEW.

The Origin of the Seasons considered from a Geological Point of View.

By S MOSSMAN.—xvi.-472 pages, map and diagrams.—W. Blackwood and Sons.

A WORK on the Origin of the Seasons would generally be expected to be devoted to meteorology, but that is not the case with the one under notice, for the author is not treating of the seasons but of their origin. It is not very easy to condense Mr. Mossman's 500 pages into *one*, but the drift of his argument we take to be that during the earlier ages of the world the planes of the ecliptic and equator coincided, and there were no seasonal changes; that at a later epoch a gigantic earthquake threw up the existing continents, and caused such an excess of elevated dry land in the Northern Hemisphere, that the centre of gravity and axis of rotation were altered, and so the seasons dawned upon the earth. The author throws down the gauntlet to reviewers and readers alike, by devoting a page at the commencement of his work to the following extract:—

“Whenever a new and startling fact is brought to light in science, people first say ‘it is not true,’ then that ‘it is contrary to religion,’ and lastly, ‘that everybody knew it before.’—*Professor Agassiz.*”

We do not presume to offer ourselves as champions of the ordinarily received theory, nor will we say Mr. Mossman's “is not true,” but we must tell the author that our verdict is the excellent Scottish one—not proven. For instance, let us take two paragraphs, which are to a certain extent the foundation stones of Mr. Mossman's theory:—

“*Stupendous Elevations and Depressions of the Earth's Crust.*—But even this stupendous inequality on the earth's surface is not its greatest elevation or depression. There are other points at the sea-level where the mountains inland rise on the one hand to double the height of the Alps, and on the other hand the bed of the ocean reaches to twice the depth of that just indicated. Such a position exists at Point de Galle in Ceylon, or more appropriately, perhaps, Cape Comorin, at the extreme verge of Hindostan, where the observer stands between the Himalaya Mountains and the central bed of the Indian Ocean. Gaurisankar, the monarch of the Himalayas, and the highest mountain in the world, is 29,000 feet above the sea, while the greatest ascertained depth of the ocean is upwards of 35,000 feet. Here then we have a depression and elevation of the land 12 miles in perpendicular height. However, as the distance between the two extremes is not far short of 2000 miles, this indentation of the earth's crust would not appear greater in proportion than that between the Alps and the bed of the Atlantic

already given. A more striking example of precipitous elevation and depression exists between the highest peaks of the Andes and the bed of the Pacific Ocean adjacent, where they rise 'like a wall on an immense crevice,' as Humboldt remarks, which is not less than eight miles in perpendicular height in a distance of about 200 miles by horizontal measurement."

Surely both Humboldt and our author have allowed themselves to be misled by the artificial mode of representing sections of the ocean bed which has been so generally adopted, for how can a gradient of one in 167 be considered a "stupendous inequality," or a gradient of one in 25 be considered "like a wall on an immense crevice."

Then, on page 40, he writes—

"The form and movements of the Earth like a top spinning.—In computing the polar diameter of the earth at 7,898 English miles, as compared with the equatorial diameter of 7,925, astronomers show a difference of 27 miles. Without disputing that calculation, it is not illogical to conclude that the depression at the north pole is considerably greater than at the south, inasmuch as the water is immediately affected by the diurnal revolution of the globe where the land is not. At all events, the flattening at the north pole has not its equivalent in the south. Moreover, if we take the land as the ruling body, by virtue of its ponderosity, in the rotation of the earth, this diversity of contour is more apparent. Suppose the world emptied of its seas, the bed of the Arctic Ocean would present a still greater depression at the north pole, while those of the Atlantic, Indian and Pacific Oceans in the south would give the antarctic regions something of a tapering form. In that case the solid framework of the earth, as the rotating power which sustains its diurnal revolution, may be considered an oblate-oblong spheroid, or, to use a familiar comparison, top-shaped; and that well-known toy, which has beguiled our boyhood's hours by its rotation, may show to the popular mind a familiar example of the obliquity of the ecliptic when the top leans to one side while spinning, yet describing a circle in its course while kept in motion, the former illustrating diurnal revolution and the latter annual rotation."

Doubtless we shall be indited for presumption, but we not only object to Mr. Mossman's suggestion that the world is top-shaped, but also to the traditionary orange. If the obvious fact that the equatorial diameter exceeds the polar only by $\frac{1}{1000}$ th part is not sufficient proof of the absurd exaggeration indicated by the orange, perhaps the following extract will be :—

"The departure of the terrestrial spheroid from the form of an exact globe is so inconsiderable, that if an exact model of it turned in ivory were placed before us, we could not, either by sight or touch, distinguish it from a perfect billiard ball. A figure of a meridian actually drawn on paper could only be distinguished from a circle by the most precise measurement."*

This being the case with reference to a difference of 25 miles, we need not point out how difficult it is to believe that depths and heights of 5 or 6 miles can have caused any change in the motion of a mass containing some 260,000,000,000 of cubic miles.

Our author is great at quotations, and deserves credit for the strict honesty with which he assigns them to their original sources; he is greater still on Chinese, Australian, and New Zealand questions, and supplies much useful information respecting their climate and natural productions.

MARCH, 1869.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which ≥1 or more fell.	TEMPERATURE.					No. of nights below 32° on grass
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Max.		Min.					
				Dpth	Date.			Deg.	Date.	Deg.	Date.		
		inches	inches.	in.				Deg.	Date.	Deg.	Date.		
I.	Camden Town	1.97	— .11	.55	20	16	54.0	5	26.8	13	11		
II.	Staplehurst (Linton Park) ...	2.91	+ .42	.66	20	23	50.0	5*	24.0	4, 8	19		
III.	Selborne (The Wakes).....	1.93	— .56	.60	16	12	48.4	19	22.5	7	21		
III.	Hitchen	1.46	— .71	.62	18	19	50.0	18	26.0	6	10		
IV.	Banbury	1.54	— .66	.62	19	21	50.7	5	26.0	7	18		
IV.	Bury St. Edmunds (Culford). ..	1.87	— .33	.46	27	12	51.0	5, 26	19.0	3	24		
V.	Bridport	2.25	— .62	.60	19	15	57.0	5	27.0	16	13		
"	Barnstaple	1.06	— 2.09	.25	2	9	...	...	...	...	...
"	Bodmin	2.85	— .90	.58	16	12	52.0	5	29.0	15	3		
VI.	Cirencester	1.60	— 1.00	.66	19	9	46.0	19	35.0	11†	...		
"	Shifnall (Haughton Hall) ...	1.59	— .35	.62	19	12	52.0	5	25.0	17	15		
"	Tenbury (Orleton)	1.79	— .63	.53	19	16	53.5	5	26.3	7	11		
VII.	Leicester (Wigston)	1.96	— .15	.80	19	12	52.0	26	26.0	6, 26	12		
"	Boston	2.72	+ .93	1.18	19	22	52.0	25	27.5	13	12		
"	Killingholme (Lincoln)	2.69	..	.67	27	21	50.0	26	27.0	3, 17	6		
"	Derby.....	1.64	— .61	.56	19	15	51.0	5, 26	27.0	30	10		
VIII.	Manchester	1.27	— 1.42	.44	19	10	..	...	...	...	...
IX.	York	1.82	— .17	.37	19	20	50.0	26	25.0	3	13		
"	Skipton (Arnccliffe)	2.17	— 2.64	.55	1	17	49.0	25†	28.0	3	4		
X.	North Shields	1.30	— 1.05	.27	10	16	54.0	28	26.8	3	8		
"	Borrowdale (Seathwaite).....	3.21	— 10.29	.97	1	16	...	...	...	...	...
XI.	Cardiff (Town Hall).....	1.70	...	.46	19	11	...	...	...	...	...
"	Haverfordwest	3.14	— .31	1.18	16	13	51.8	18	22.5	14	14		
"	Rhayader (Cefnfaes).....	1.78	— 2.06	.40	18	8	51.0	...	22.0	...	...
"	Llandudno.....	1.37	— .89	.42	1	13	53.5	18	30.3	10	3		
XII.	Dumfries .....	.53	— 2.45	.20	1	7	59.0	31	27.0	27	12	
"	Hawick (Silverbut Hall) ...	1.15	...	.17	1, 10	18	...	...	...	...	...
XIV.	Ayr (Auchendrane House) ...	.67	— 3.06	.37	1	9	53.0	3	23.0	11	17	
XV.	Castle Toward	1.28	— 3.31	.32	1	12	55.0	22	21.0	2, 10	21		
XVI.	Leven (Nookton) .....	.94	— 1.13	.31	2	11	55.0	6	23.0	3	14	
"	Stirling (Deanston)	1.00	— 2.53	.48	1	12	55.2	23	16.9	3	25		
"	Logierait .....	.76	...	.21	28	9	...	...	...	...	...
XVII.	Ballater	1.78	...	.38	5	19	49.0	30	17.0	3	18	
"	Aberdeen	1.90	...	.59	1	19	51.6	19	25.2	3	14	
XVIII.	Inverness (Culloden) .....	.94	...	.45	4	...	49.0	25	27.0	3	13	
"	Fort William .....	...	...	...	...	...	...	...	...	...	...
"	Portree	3.41	— 5.63	.47	17	23	...	...	...	...	...
"	Loch Broom	2.63	...	.53	4	20	...	...	...	...	...
XIX.	Helmsdale	2.77	...	.26	26	23	...	...	...	...	...
"	Sandwick	2.85	— .48	.40	3	25	47.0	25	26.5	1	13		
XX.	Cork	2.85	...	1.18	12	10	...	...	...	...	...
"	Waterford	2.55	— .34	.46	1	11	51.0	5	31.0	19	1		
"	Killaloe	3.86	— .47	1.53	1	17	52.5	7	25.0	15	6		
XXI.	Portarlington	2.09	— 1.22	.55	2	23	52.0	7	27.5	14	5		
"	Monkstown	2.90	+ .32	.46	19	18	53.0	18	27.4	12	9		
XXII.	Galway	3.44	...	.85	1	15	56.0	24	30.0	13	2	
"	Bunninadden (Doo Castle) ...	3.43	...	1.01	18	13	52.0	7	25.0	31	11		
XXIII.	Bawnboy (Owendoon)	3.38	...	.80	18	18	55.0	7, 23	27.0	14	9	
"	Waringstown	1.83	...	.33	19	18	54.0	7	25.0	11	13	
"	Strabane (Leckpatrick)	2.37	...	.35	1	21	59.0	22	25.0	11	18	

* And 18th & 24th. † And 27th. ‡ And 13th & 25th.

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

METEOROLOGICAL NOTES ON THE MONTH.

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

ENGLAND.

LINTON PARK.—Exceedingly dull, cold month, ground frequently covered with snow, and scarcely any sun; temp. only eight times above 45° ; winds mostly N. and N.E., but not high; great floods on the 21st. Vegetation made scarcely any progress during the month, the ground being very wet and cold; max. bar. $29\cdot94$ on 7th, and min. $29\cdot79$ on 2nd.

SELBORNE.—Tempestuous night on 2nd, wind N.W.; heavy snow at 2 p.m. on 27th. The vegetation, which had been very forward, has been checked throughout this month, but hitherto nothing injured.

BANBURY.—Heavy snow, with high wind, on 19th.

CULFORD.—Four inches of snow on 27th. In this locality March came in like a lion, and went out in the same way; it has certainly been the coldest March that I can remember; the mean or average temp. has only amounted to $36^{\circ}\cdot2$, while that of the two preceding months, January and February, was respectively $39^{\circ}\cdot9$ and $43^{\circ}\cdot1$.

BRIDPORT.—General direction of the wind N.E.; heavy N.W. gale on the 18th; lightning on the 28th.

BODMIN.—Average bar. $29\cdot85$; temp. $44^{\circ}\cdot0$.

CIRENCESTER.—A uniformly cold month, without hard frosts, a seasonable change from the mild January and February, saving the fruit buds from destruction. The storm of the 19th was most unusual, after $\cdot30$ in. of rain, with wind S.S.E. and S., it became calm for four or five hours, when the wind at 7 p.m. went to the N.E. with a gale, and snow, hail, and thunder, doing some damage; wind during the month principally N.E., without sunshine.

SHIFFNAL.—The month has been true to its character of coming in like a lion; it continued much colder than February, the temp. in shade only once exceeding 50° . Storms of snow or sleet on the 2nd, 8th, 10th, 12th, 13th, 14th, 27th, and 28th; high wind on 1st and 20th from N.W.; prevailing winds during month N.W. and N.E. Vegetation at a stand-still throughout the month, and the pastures at the close gone off considerably from what they were on the 1st; ribes sanguinea in blossom on 3rd, and gooseberries on the 29th. Plovers pairing on 16th, chaffinch singing on the 18th, and blackbird on 31st.

ORLETON.—Cold and cheerless month, with very slight changes of temp. and frequent slight falls of snow and hail, the winds generally strong from the N. and E., and the sky filled with cloud, except for a few hours in the nights; violent winds on the 2nd, 19th, 27th, and 28th; sudden change of wind at 5 p.m. on 19th. The temp. of the month more than $2^{\circ}\cdot50$ below the average, but was not so low as the same month in 1865 or 1867.

WIGSTON.—Snow fell on six days, but on the 28th it was continuous for 12 hours, yielding $\cdot60$ in. of water, equal to 7 in. of newly-fallen snow. A remarkable characteristic of this month, compared with January is, that the mean temp. was one-third of a degree below that of January, and $4^{\circ}\cdot75$ below that of February.

BOSTON.—Barometric pressure very unsteady all the month; temp. uniformly low, and much lower than the average of the season. Severe gales during the month, especially on the night of the 19th, when there occurred a heavy storm, attended by much injury to the shipping along the east coast. Vegetation checked by the cold, and considerable damage done to the blossoms of apricot and peach trees by the severe frosts.

KILLINGHOLME.—Very cheerless and sunless month, the polar current prevailing throughout; vegetation at a stand-still; such an Easter-day has seldom been known; it would have been a seasonable day for Christmas; sea roaring at night on 2nd and 20th; yellow auriculas began flowering on the 4th; rooks beginning to build on 5th.

DERBY.—The genial weather of the preceding two months has given place to snow-storms and piercing north-easterly winds, which doubtless will be beneficial

in checking the too forward vegetation. The temp. has been $3^{\circ}62$ above the mean of the last seven years for the month of March.

NORTH SHIELDS.—The first week rather fine, afterwards cloudy, with E and S. T and L on 10th, with S; lunar rainbow on 27th.

SEATHWAITE.—No day on which the rainfall reached 1 in., and only two on which it exceeded half-an-inch, the total being more than 10 inches below the average for March.

W A L E S.

HAVERFORDWEST.—The gale which commenced on February 27th, increased in violence on the 28th, abated a little on the morning of the 1st, but at 1 p.m. it recommenced, W.S.W. to N.W., increasing in force to the morning of the 2nd, when it was terrific in violence, tearing up trees and doing much damage; generally supposed to be the heaviest gale of the present season of gales; there was likewise a furious gale on the 19th, commencing suddenly at 2 p.m., raging with fearful violence till 6 p.m., and continuing from the N.W., to which point the wind had suddenly changed at the last-named hour from the S.W.; this gale did not entirely abate until the morning of the 21st, and was thought by some to have exceeded that at the beginning of the month. Frequent showers of snow and sleet; the Precelly range covered with S on the morning of the 9th, but notwithstanding the wintry character of the month, everything seems very forward; the white thorn was observed in bloom on the 25th.

CEFNFAES.—A cold, dry month, frost more or less severe from the 8th to the end of the month; winds generally N.E. or S.E. Lambs doing well.

S C O T L A N D.

DUMFRIES.—Month dry and cold, with withering northerly winds; vegetation much checked and pastures injured; the mean temp. $4^{\circ}06$ below the corresponding month of last year.

HAWICK.—This month has been remarkable for cold, cutting, easterly winds, with frequent showers of hail, sleet, and snow; and also for frosty nights, which have kept vegetation very much in check.

AUCHENDRANE.—A month of comparatively high bar., with small range, and low temperature. The very small rainfall and the large evaporation provided an excellent seed-time, but the frequent frosty nights checked growth. The winds were principally polar, and their mean force moderate. On 1st, 5th, 10th, 20th, and 28th, the weather was boisterous; some S fell, but it did not lie.

CASTLE TOWARD.—A dry, frosty month; vegetation, which had previously made much progress, has been checked by the winds from N.E. and N.W.; the ground has been dry and in fine condition for the seed since the middle of the month, and a great breadth has been sown; the frosty nights have been of great use in giving fine mould, but have been too severe for the garden and fruit trees without protection.

DEANSTON.—The month has been characterized by prevailing N. and N.E. winds, which have injured pastures in a forward state from previous mild weather, fruit trees in a forward state may suffer; health of society moderately good; very favourable seed-time toward the end of the month, which work has been well got forward.

LOGIERAIT.—Cold and stormy; vegetation backward; lapwings seen on the 3rd.

BALLATER.—Very cold and backward month, commencing with a sharp S storm, succeeded by others at intervals, one on the 26th being very fierce, but of short duration; agricultural work much interrupted, but oats sown on the 23rd; brilliant flickering aurora on the 2nd.

ABERDEEN.—The month has been cold and stormy, though drier than usual; vegetation completely checked, but starting again; frequent fall of S, but it did not lie, and was never more than two inches deep.

PORTREE.—Cold and stormy throughout; very strong gale on the 5th, from 5 a.m. to 2 p.m., from W. to N.W.; solar halos on 12th and 13th, from 7 a.m. to 9 a.m.

SANDWICK.—Temp., $2^{\circ}77$ below the mean of 42 years, in short we had our

spring weather in winter, and our winter in spring. On 9th, aurora coruscating to zenith, and from zenith to south.

I R E L A N D.

OWENDOON.—Fine weather for husbandry; H and T on 1st, and S on the mountains.

DOO CASTLE.—Middle and latter end of month dry.

WARINGSTOWN.—Cold and stormy, but latter part dry and favourable for labour. Temp. about half a degree below the average, a great contrast to last year, when the wind was from some westerly point on 29 days, this month only on six.

DE OMNIBUS REBUS.

A LARGE pile of short letters have recently accumulated on two subjects; the answers are similar, and will probably be generally useful, we therefore print the replies, which we really have not time to write.

Several questions are asked as to the proper way to enter the maximum and minimum temperatures. We have more than once stated the rule and explained the reasons (in addition to the paramount one of uniformity) which support the rules. They are these: the lowest temperature of the air takes place about an hour before sunrise, therefore the minimum temperature shown at 8 a.m., or any later hour, will 19 times out of 20 belong to that day, and even in the rare cases in which the observer knows that the minimum really occurred before midnight on the previous day, we think he should not depart from the rule, which is, *The minimum temperature is always to be entered against the day on which it is read.* The maximum temperature generally occurs about 2 p.m., therefore if the thermometer is read after that hour, it should be set against the day on which it is read, but if it is read in the morning, then it must be entered against the previous day.

Why put the thermometers 4 ft. above the ground, 5 ft. would be much better, nearer the level of the eye, and just at the point where the air meets the external organs of respiration? Is it too late to change?

We think so. Moreover, it must be remembered that the *bulbs* are to be 4 ft., which makes the scale reach nearly to 5 ft. If the bulbs were 5 ft., the top of the scale would be nearly 6 ft., and decidedly above the level of most people's eyes, whence the readings would always be in defect. We do not know why 4 ft. was fixed upon, but see *Met. Mag.*, vol. III., p. 74.

LATEST INTELLIGENCE.

CAMDEN TOWN.—The shade temperature on Sunday, April 11th, was 77°·6, an almost unexampled heat for that date.

SHEFFIELD.—A very sharp thunderstorm hovered over this town on Wednesday, 14th inst., between 6 and 8 p.m.; the lightning was mostly forked, and of a pale pink colour; the rain was not so heavy here as in South-West Lancashire.