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RAINFALL AND FLOOD AT BRISTOL.

IT is rather singular that in *British Rainfall*, 1893, there are given details of a great rain at Eastbourne in 1893, and that before the volume has been received from the binders, we have the details of a remarkably similar one at Bristol. The Docks Engineer, Mr. J. M. McCurrich, M.I.C.E., has kindly favoured us with a copy of his report and a diagram showing the half-hourly reading of the storm rain gauge at the Cumberland Basin. We give the report verbatim, and reproduce the diagram, but have altered the scale to that adopted in *British Rainfall*—viz., one inch to represent one hour of time and one inch of rain. Diagrams are most useful, but unless great care is used to secure uniformity in the relations between the scales for time and for the phenomena represented, diagrams will suggest false ideas. On the diagram given herewith we have not merely adhered to the scale adopted in *British Rainfall*, but we have reproduced two of the rains there represented so as to facilitate comparison.

We now give Mr. McCurrich's report, which we have broken up into numbered paragraphs for the convenience of reference from the few notes which we have added at the end.

1. The rainfall on Tuesday, July 24th, was so exceptional that I think it well to make a short report upon it.

2. The rain began to fall about 1.30 p.m., and continued without intermission until nearly 10 p.m. The total rainfall between 1.30 p.m. and 10 p.m. was 2·47 in., and the total up to 12 p.m. was 2·53 in. Between 3 p.m. and 7 p.m. 1·80 in. fell. The rainfall between 6 p.m. and 7 p.m. was the heaviest, being ·52 in the first half-hour, and ·35 in the second half-hour, making a total of ·87 in. during the hour.

3. Mr. Francis Fox, in his report of August 27th, 1889, to the Bristol Town Council, on the prevention of Froom floods, said that from data furnished to him by Mr. Robert F. Sturge, Fellow of the Royal Meteorological Society :—"It is seen that in August, 1865, 2·90 in. fell in 15 hours, of which quantity about 2¼ in. fell in four hours. Later in the same month 1½ in. of rain fell in seven hours. In June, 1884, 2·40 in. fell in 10½ hours. In March, 1889, nearly three inches fell in 48 hours, of which about 1½ in. fell in eight hours.

In October, 1882, when the previous severe flood took place, the rainfall was 3⅓ in. in 48 hours, of which quantity 2½ in. fell in 36 hours."

4. A fall of one inch in 12 hours is very exceptional at Bristol, and occurs on an average less than once a year. From the records kept here I have prepared a list of the times since 1876 when the rainfall exceeded ·90 in. in 12 hours. It must be remembered that the rainfall is entered into a book at fixed times twice a day. Formerly the readings were taken at 9 a.m. and 9 p.m., but now they are taken at 12 noon and 12 midnight. In the event of a heavy rainfall beginning at, say 9 a.m., and lasting until 3 p.m., the rainfall in the three hours before noon would be booked to the first half of the day, and the rainfall after noon to the second half of the day. The readings will not, therefore, in every case give the maximum fall during any consecutive 12 hours. They are as follow :—

		in.
1877	August 31st	0·91
1879	August 17th	1·11
1880	October 5th	1·40
1881	June 5th	1·28
1882	July 7th	0·92
,,	October 23rd	0·93
,,	October 24th	1·03
1884	June 22nd	2·00
,,	July 17th	1·04
,,	December 6th	0·91
1885	October 10th	1·04
,,	November 5th	1·08
1886	December 26th	1·02
1887	September 1st	0·93
1887	October 30th	0·98
1888	February 14th	1·00
1889	March 8th	1·70
,,	April 8th	0·94
,,	September 24th	0·92
1890	July 17th	1·33
1891	January 23rd	1·19
,,	June 25th	1·18
,,	October 6th	1·05
,,	October 19th	1·03
1892	July 16th	0·98
,,	September 29th	0·93
1894	July 24th	2·53

5. According to the readings taken here, two inches of rain fell on the 22nd June, 1884, between 9 a.m. and 9 p.m. No rain fell for several days before that, and only ·04 in. fell in the succeeding 12 hours.

6. On July 24th, 1894, the barometer stood here at 29·90 in. at noon, and it fell gradually to 29·82 in. at midnight. There was a slight breeze from the north.

7. The rainfall on July 24th appears not to have been so heavy to the north of Bristol [as in the City], as the Froom at Frampton Cotterell only rose to a very slight extent. At Bristol the Froom rose less than 2 ft. The Malago was, however, high, and the fields above St. John's Cemetery were flooded. The Avon rose about four feet, the maximum height at Cumberland Basin at 5.20 on Wednesday, July 25th, being 7 ft. 4 in. on the gauge.

4. We are sorry to hear that the good old custom of reading at 9 a.m. and 9 p.m. has been abandoned. It was most unwise, because (irrespective of breaking Rule IX.) it prevents the Dock record being comparable with any other.

7. This point cannot be adequately considered until all the returns

are collected at the end of the year; but probably Mr. McCurrich's inference is correct, as we hear from Miss Fry that 2·65 in. fell at Failand House, while at the Fishponds Mr. Harding recorded only 2·01 in. The absence of serious flooding (such as Bristol has often suffered from) is due to the fact that it was a local rain, and not a general one over the watersheds of the Avon and the Froom.

HEAVY RAIN AND HAIL STORMS, JULY, 1894.

To the Editor of the Meteorological Magazine.

SIR,—A remarkable hailstorm visited us on July 2nd. The morning was bright and extremely hot, the thermometer marking 85° at 10 a.m.; the maximum of the day was only 1° higher (86°). At 1.40 p.m. a violent and sudden squall brought with it from the S.E. such a thunder and hailstorm as I do not remember to have seen before in my rather long experience. The curious uniformity in size, form, weight, and general appearance of the hailstones was most interesting, and a description of them may enable some of your correspondents to build theories as to their formation. Each stone was of a double convex form, slightly flattened at the poles, and surrounded by a zone of transparent ice, arranged in spiculæ or minute plates, and projecting about the eight of an inch from the equatorial level. This zone was, as I have said, transparent, while the body of the stone resembled frosted or finely-ground glass. The long diameter varied from an inch to an inch and a-half, including the zone, and the short diameter was about three-quarters of an inch. Nine of them weighed exactly 320 grains, or nearly 35½ grains each.

About a mile to three miles west of us the storm was still heavier, judging from the mischief done. Much glass was broken, fruit trees were knocked to pieces, and looked next day as if they had been scorched; wheat and beans were decapitated, and a large tree was shivered to atoms by lightning, about a mile to our N.E. After the storm the sky remained overcast, but the days preceding and succeeding it were fine and bright.—Very faithfully yours,

THOMAS E. AMYOT.

Diss, Norfolk, August 5th, 1894.

To the Editor of the Meteorological Magazine.

SIR,—On Saturday, the 21st inst., we experienced the heaviest rain-storm I have ever witnessed in this locality. Thunder was heard at 3.50 p.m. (after a fine and warm day), and almost exactly at 4 o'clock the rain commenced, descending in sheets and torrents, mingled with hailstones of large size, for about 20 minutes, when its violence somewhat abated, rain entirely ceasing at 4.30 p.m.

On emptying the gauge, I measured *over one inch* (exact amount, 1·02 in.) as the product of this extraordinary shower, and I cannot

help thinking that this amount, large as it is, may be really less than the true rainfall, for there was very probably some loss due to out-splashing in so violent a fall. I may add that the roads near this house were completely flooded, and washed completely bare, the "oldest inhabitants" of the adjacent village declaring they had never seen such a shower before. The storm, or cloud-burst, was very local. It appeared to travel from almost due south to north, and at a place under two miles from here (in a N.W. direction) *no rain fell during the afternoon*, and hay was being carried all evening.—Yours truly,

B. T. GRIFFITH-BOSCAWEN.

Trevalyn Hall, Rossett, Denbighshire, July 28th, 1894.

To the Editor of the Meteorological Magazine.

SIR,—Finding in this morning's *Times* no account of the storm of yesterday, I conclude that it was of small area, and perhaps at its heaviest here. If so, you may like to hear of it. The morning of July 29th was bright at intervals, though rather hazy, with barometer falling slightly from 30·10 in. to 30·05 in., but there was nothing to indicate the approach of any great disturbance. About 10.30 a.m. the sky began to darken, especially in the N.E., but without any perceptible wind. A few very large drops fell about 11.45 a.m., and the rain began in earnest about 12.15 p.m. In a few minutes the downpour was as heavy as any I have ever watched, and almost, if not quite, vertical, while the size of the drops was remarkable, as well as their close contiguity. But I saw no hail, though some hail is said to have fallen at Strawberry Hill; neither was the lightning very vivid. In fact, I saw no lightning in the early part of the downfall, and probably there were not from first to last more than thirty flashes visible here.

The storm, which had approached us from N.E. and passed very slowly, began to return from W. at about 12.45 p.m., as was manifest from the inclination of the drops, which had hitherto been vertical. But from whatever quarter it descended, it scarcely ever slackened for one instant, until at about 1.20 p.m. the sky towards the south began to brighten, and the clouds went slowly northwards.

The bulk of it was down by this time, and I measured 1·94 in. at 1.30 p.m., that amount having fallen in an hour and a quarter. There was still some short lightning and sharp thunder in the north, where the blackness of the storm now lay; and presently up it came again, but most of its burden had been discharged.

The entire fall up to 9 a.m. July 30th was 2·26 in., which is, I think, the heaviest in my record, beginning in September, 1866. —Faithfully yours,

R. D. BLACKMORE.

Teddington, July 30th, 1894.

RAIN OF JULY, 1894, IN THE S.E. OF ENGLAND.

THE rainfall of July having been exceptionally heavy in the South-Eastern Counties of England, we have, in addition to the usual tables, extracted from the returns received all falls exceeding five inches, and tabulated them with the difference from the average of the ten years, 1880–89, where the records extend over that period.

It will be seen that in every case the total fall for the month is considerably more than twice the average :—

STATION.	COUNTY.	Total Fall. in.		Difference from the average. in.
Teddington	Middlesex	5·95	...	+ 3·46
Abinger Hall	Surrey	5·66	...	+ 3·12
Benenden (East End)	Kent	5·33	...	+ 3·06
Tenterden	,,	5·26	...	+ 2·91
Cranbrook (Hartley)	,,	5·63	...	+ 2·93
Hythe	,,	5·64	...	+ 3·02
Paddock Wood (Capel)	,,	5·50	...	—
Steyning	Sussex	6·56	...	+ 3·83
Hailsham	,,	6·12	...	+ 3·58
Ditchling	,,	6·25	...	—
Niton (St. Catherine's Ho.).	Hants	5·32	...	—
Ryde (Thornbrough)	,,	5·26	...	—
Emsworth (Redlands)	,,	5·14	...	—
Liss (Lingwood)	,,	5·63	...	—
Alton (Ashdell)	,,	5·36	...	+ 2·86

Abinger Hall.—Two heavy falls of rain occurred, without thunder, viz. : 1·55 in. on 10th and 1·46 in. on 29th. G. PAYNE.

Benenden, East End.—1·22 in. fell on 6th, 1·18 in. on 10th and ·93 in. on 29th. At *Rolvenden*, 1·44 in. fell on 6th, 1·26 in. on 10th, and 1·03 in. on 29th. J. ELLIS MACE.

Tenterden.—The largest fall for July during 32 years, the next largest being 5·08 in. in 1888. Thunderstorms on 24th and 29th. J. ELLIS MACE.

Cranbrook, Hartley.—Total fall 2·97 in. more than the average of 25 years, and only once exceeded in 29 years, namely in 1888, when 5·73 in. fell. On 6th 1·48 in. fell, on 10th 1·36 in., and on 29th ·73 in. In the 28 days ending August 7th the fall was 6·20 in. GEORGE PILE.

Ditchling.—Fine and warm till the 6th, when a severe thunder storm occurred, and the rest of the month was very wet and dull. The falls of rain on 10th (2·13 in.) and 29th (1·82 in.) were exceptionally heavy. F. H. PHILLIPS.

Liss, Lingwood.—The heaviest fall yet recorded here (2·00 in.) fell on the 30th, and 1·05 in. fell on 11th. ROBERT BARNES.

THE MAY FROST OF 1894.

To the Editor of the Meteorological Magazine.

SIR,—I note your criticism on my criticism, and thank you for the same. I had not overlooked what the Rev. Mr. Boys reported. I do not myself think that what he says at all upsets my theory. I think that, if inquired into, it may be found only to confirm my idea. Mr. Boys simply says "there was no wind at 3.20 a.m.;" my theory is that the damage was done by the wind after sunrise. Mr. Boys should say what happened after sunrise, say at 5 or 6 a.m. He speaks, earlier in his letter, of very piercing N.N.E. winds. If that very piercing N.N.E. wind sprang up after sunrise, my theory is confirmed. The stillness at 3.20 a.m. would aid deposition of hoar frost, which would be melted by the sun, and then the wind would cause rapid evaporation. If, however, no wind sprang up, my theory is gone as far as he is concerned. Would it not be interesting to ask him?

Regarding the height at which the damage here took place, the most damage was done in the valley between here and Croydon, say about 150 to 200 ft. above sea level, exposed to N.N.E. and N.N.W. There the ashes were blackened, oaks and maples shrivelled; at Ingleside, 375 feet above sea, the ashes were no worse, but yew trees nipped, and the damage was comparatively slight. Higher on the hill, say to the top (500 feet), the result was about the same as at Ingleside. Ingleside hillside faces N.E.—Yours sincerely,

HAROLD SMITH.

Ingleside, Kenley, Surrey, July 25th, 1894.

To the Editor of the Meteorological Magazine.

SIR,—I have no desire to impugn anything that Mr. Harold Smith says in his letter published in the July Magazine touching the May frost and the N.E. wind.

I fully admit that the N.N.E. wind, which set in on the 15th, and suddenly became so bitter about noon May 19th, *brought* the cold; but I maintain that, in Northamptonshire at least, it was the dropping of the wind that made that cold so powerful for mischief. It was precisely that dropping of the wind which made me on the Sunday evening foresee, and make preparations for, the frost; and of the intense stillness of the air at 3.20 a.m. on May 21st there can be no doubt.

You attributed the mischief mainly to radiation; and for this county your remarks are strongly corroborated by the reports which have reached me from many members of the Northamptonshire Natural History Society (Meteorological Branch).

The mischief done by the frost has only gradually been revealed. I had hoped that my apples and pears, of which I had an extraordinarily abundant crop, and which seemed well *set*, would have survived, but they have been dropping off by slow degrees ever since, until most trees have none left, and the rest but very few. Many

gooseberries dropped at once, but more were left than I at first supposed. Currants at first seemed less hurt, and have nearly all disappeared since.

Wasps were very numerous on the first days of June, but I have hardly seen any for the last four weeks; and now I am wondering whether they will presently be appearing in swarms proportionate to their numbers in the early spring.

H. A. BOYS.

Easton Mauduit Vicarage, Northampton, July 23rd, 1894.

P.S.—A saying has been reported to me from N.W. Essex: "As many misties in March, so many frosties in May;"—too well borne out this year!

To the Editor of the Meteorological Magazine.

SIR,—I see that in the July *Met. Mag.* you notice Mr. H. Clements' forecast for July. He was singularly wrong for this district, the rainfall here being 5·02 in., against an average of 2·72 in. for 19 years.

Anent Mr. Harold Smith and your remarks on the May frost, here a young plantation, facing north, had nearly every tree damaged, whereas another, facing south, had scarcely one injured. This seems to support Mr. H. Smith's view. The frost was—20th, 29° in Stevenson screen and 25° on ground; and 21st, 29° and 25° respectively.—Yours truly,

EDWARD SIMPSON.

Walton Hall, Wakefield, August 1st, 1894.

THE BRITISH ASSOCIATION AT OXFORD.

A generation has passed since the British Association has visited that grand old city, which may in some respects claim to be the ancestral home of British science—the home of Boyle, Wallis, Hooke—and for a time, in its early days, of the Royal Society.

Old and grand as are the traditions of Oxford, what has struck us most is the growth since 1860—then the new museum was just being filled by Professor Phillips, and it stood almost in the fields, now it is in the city—Keeble College was not thought of—nor was there, we believe, one of the excellent ladies' colleges—now we find telephones, tramways, electric lightning—in fact Oxford, while retaining all its old charm, is at the same time seizing all the good things, and showing a vigour which centuries do not seem to check.

The Association meeting has been a large and very pleasant one, considerably larger than that of 1860.

We give notes of some of the meteorological papers, and hope to complete the series in our next.

EARTH TREMORS COMMITTEE.

Abstract of Report drawn up by the Secretary, MR. C. DAVISON.

Since the last Report was written, several changes have been made by Mr. H. Darwin in his bifilar pendulum. (1) The mirror is mounted in a light frame so that its plane is perpendicular to that of the suspending wire, thus diminishing the disturbing effects of changes of temperature. (2) The lever used for tilting the frame of the pendulum through a known angle is constructed so that its centre of gravity coincides with the axis of the tilting-screw. (3) Without approaching the instrument the spot of light can be adjusted to the centre of the scale or photographic paper, and the sensitiveness altered, by means of tangent-screws connected with the foot-screws and worked by long handles.

The Greek earthquake pulsations of April 27th were observed in Birmingham with the bifilar pendulum from 7.59 to 8.28 p.m. (G.M.T.) Their average period was from 12 to 14 seconds, and their range in the E.-W. plane not less than $\frac{1}{4}''$ when greatest. The pulsations of April 20 and 27 were recorded by tromometers at several geodynamic observatories in Italy, by horizontal pendulums at Nicolaiew and Charkow in the south of Russia, and by magnetographs at Potsdam, Wilhelmshaven, Parc St. Maur, Utrecht and Kew. The Brassart seismoscopes at the observatory of Athens enable the time at the epicentrum to be determined fairly accurately. Making use of the epochs at which the first large pulsations are registered, the following are the estimates of the mean velocity :

April 20.—2·08 km. per sec. [78 miles per min.] (from 6 observations).

April 27.—3·21 km. per sec. [120 ,, ,,] (from 13 observations).*

One of the improved bifilar pendulums with photographic recording apparatus will shortly be erected at Birmingham. The Committee consider it desirable that its records should be compared for about a year with those of a similar instrument placed a short distance from it. They accordingly ask to be re-appointed so as to continue their work, and to be provided with a grant of £100 for the purchase and installation of a duplicate apparatus.

[*The Japan earthquake of March 22nd, 1894, was recorded at Rome, and in *Nature* of August 9th the velocity of propagation is taken as 2·50 km. per second, or 93 miles per minute.—ED.]

UNDERGROUND TEMPERATURE COMMITTEE.

TWENTIETH REPORT.

Report drawn up by PROF. EVERETT, *Secretary.*

The Committee were re-appointed for the purpose of investigating the rate of increase of underground temperature downwards in various localities of dry land and under water.

The nineteenth report contained the results of observations taken in 1891 by Mr. Hallock, of the Smithsonian Institution, at depths extending to 4,462 ft. in a nearly dry well at Wheeling, Virginia.

Mr. Hallock, who now dates from Columbia College, New York, has recently furnished the Secretary with printed copies of a paper, contributed by him to the American Association for the Advancement of Science last year, containing further observations in the well, made at the expense of the U.S. Geological Survey.

When the observations of 1891 were finished, an oak plug was driven into the top of the casing to protect the hole. In July, 1893, the plug was with-

drawn, and the well, instead of being dry as before, was found to be full of fresh water to within 40 ft. of the top. This water is believed to have leaked in at the lower end of the innermost casing—that is, at 1,570 feet below the surface.

By means of inverted Negretti maximum thermometers, protected against pressure by sealing them in stout glass tubes, careful observations were taken at various depths from 1,586 ft. to 3,196 ft., two thermometers being employed to check one another at each depth. The results were practically identical with those obtained two years previously, when the well was full of air, the greatest certain difference being only one-fifth of a degree. An obstruction at 3,200 ft. prevented observation at greater depths; but this obstruction will probably be removed, the well pumped dry, and the drilling continued.

In making the observations, four thermometers were lowered at a time, two of them being in an iron bucket 3 feet long and 3 inches in diameter at the end of the wire, and the other two in an open wire frame 260 ft. from the end of the wire, the diameter of the bore being just under 5 inches.

The temperatures at 103 ft., 206 ft., and 300 ft. were also observed with suitable thermometers, the temperature at 103 ft. being 52°·53, which is 1°·2 higher than the true temperature of the soil at that depth, as determined by other observations in the immediate neighbourhood.

The smallness of the disturbance of temperature by convective circulation in this well, both when dry and when filled with water, is very remarkable, and renders the well specially suitable for determinations of the increase of temperature downwards.

The Committee have to record with deep regret the loss of their valuable member, Mr. Pengelly.

REVIEW.

Aero-therapeutics, or the treatment of Lung Diseases by Climate . . . with an address on the High Altitudes of Colorado, by CHARLES THEODORE WILLIAMS, M.D.Oxon., Senior Phys. to the Consumption Hospital, late President Royal Meteor. Soc. 8vo. Macmillan: London, 1894. 188 pages.

THIS volume contains the Lumleian Lectures for 1893, delivered by the author before the Royal College of Physicians, with its esteemed President, the late Sir Andrew Clark, Bart., M.D., in the chair.

Dr. Theodore Williams in his brief preface says:—

> "I have attempted in the following pages to sketch a scientific system of Aero-therapeutics, based on the combination of modern meteorology with clinical experience, each element of climate being duly considered in its bearing on Health and Disease.
>
> "Unfortunately our knowledge in these departments contains many gaps, which increasing experience may, it is to be hoped, gradually fill in."

In our opinion, Dr. Williams has produced a work which goes far beyond the above limits, and we have not noticed one point in which he appears to us to have laid himself open to attack. In fact, it would have been strange if he had, because he possesses several

special qualifications for writing upon the subject. (1) We do not see anything wrong in his meteorology.* (2) Dr. Theodore Williams is thoroughly devoted to his profession, and has travelled largely so as to be personally familiar with the districts to which he sends his patients. (3) He is evidently most careful in keeping, and in working up, statistics as to his patients; in fact, while rigorously securing the anonymity of his patients, the way in which he combines the doctor and the statistician is excellent. As a specimen, we reproduce one of his tables dealing with 814 cases:—

TABLE IV.—*Results of Different Climates compared.*

	No. of Patients.	Average length of Residence.	First Stage.	Second and Third Stages.	Bilateral Affection.	RESULTS.						
						GENERAL.			LOCAL.			
						Improved.	Stationary.	Worse.	Arrest.	Improved (including Arrest).	Stationary.	Worse.
		Months.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
High altitudes.	247	12·2	65·0	35·0	37·0	83·4	2·0	14·6	42·5	75·5	5·3	19·1
Sea voyages ...	65	1·6 average of voyage	63·0	37·0	37·0	77·0	—	21·6	7·7	53·3	10·7	33·8
Riviera	210	9·0	59·0	41·0	36·0	65·2	10·0	24·8	5·9	36·6	17·8	45·6
Home climates.	292	9·7	58·0	42·0	42·0	63·7	8·2	28·0	2·0	38·9	20·0	41·1

We see no advantage in the second decimal in columns 8 and 9 in the original, and have, therefore, omitted them; and in the "Results" for the second line—sea voyages—there is 1·4 per cent. lost somewhere in the "General" columns, and 2·2 per cent. in the "Local" columns.

Our meteorological readers must not, however, assume that the work is wholly medical; on the contrary, it may be regarded as consisting of three ingredients in nearly equal proportions, meteorology, medicine, statistics.

It is not usual to set up part of the index of a book in a review but we know of no plan which will give in smaller space an equally

* Except quite unimportant little things, such as printing 47·5° for 47°·5, and quoting, on page 38, the humidity at Cairo to two places of decimals, 58·46. Doubtless it was so given in the work whence Dr. Williams quoted it; but the second decimal place of humidity is about the equivalent of the third decimal place of temperature, and few would trust a wet-bulb thermometer to the thousandth of a degree. We therefore gibbet the error. Dr. Williams is responsible merely for copying a bad example without thinking of its absurdity,

good indication of the variety of information which the book contains :—

ÆRIAL, AERIAL OR AËRIAL.

To the Editor of the Meteorological Magazine.

SIR,—I am disposed to question the propriety of two cases of typography in the *Meteorological Magazine* for July, page 89. In lines 25 and 26 you print "Ærial," and in line 34 "ærial;" it seems to me that these should be "Aerial" and "aerial," just as in line 17 you print Aerodynamics. "Ærial" reminds me somewhat of what people call "areated" instead of "aerated" bread. Excuse my hypercriticism, and believe me, yours very faithfully,

J. M. DU PORT.

Denver Rectory, Downham, July 31*st*, 1894.

[We felt very penitent on reading the above, and also on turning up "Aerial" in Nuttall's Dictionary; but, before pleading guilty, wrote to ask Mr. Washington Moon. He replied "Æ is not justifiable in Aërial, which is the only word we have beginning with *aer* in which the accent is on the second vowel, therefore do not omit the diæresis; Aerial is as wrong as is Ærial. Probably the pronunciation of *aer* in *aërial* was differentiated from that of other words which begin with *aer* in order to distinguish aerial from the sound of the proper name *Ariel*." Thus far, therefore, the Canon and the Editor and the Dictionary are alike condemned.

Finally, we turned to Nuttall itself for the definition of the word Diæresis, and found "the mark (··) placed over two vowels, denoting that they are to be pronounced as distinct letters, as *aër*."

In the first place, this statement says "over *two* vowels," and as an illustration puts the mark over *one* ! and in the second place, while on p. 272 it quotes *aër* as a type of what should be done, on p. 21 it gives—

Orthography.	Pronunciation.
AERATE	*á-ĕr-ate.*
AERATION	*a-ĕr-á-shun.*
AERIAL	*a-é-re-al.*
AERIFEROUS	*ayr-if-er-us.*
AERIFIED	*ayr-e-fide.*
AERONAUT.....	*ayr-o-nawt.*

The diæresis is not omitted because the printer had no capital E with the diæresis, for in the definitions they are similarly omitted; evidently Dr. Nuttall forgot them.—ED.]

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, FEBRUARY, 1894.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
England, London	56·4	7	23·3	19	47·8	35·5	36·6	83	91·1	18·0	1·75	16	5·8
Malta	64·8	28	42·8	16	58·7	49·9	47·1	82	117·5	37·4	4·40	8	6·5
Cape of Good Hope	...	...	...	...	...	...	...	...	...	...	...	...	...
Mauritius	85·5	20	69·6	1	83·1	74·0	70·1	78	138·1	62·2	4·48	18	6·0
Calcutta	91·5	17	54·1	6	84·0	62·0	61·2	70	143·9	44·6	·25	1	1·4
Bombay	88·6	15	64·6	3	84·0	70·9	66·7	70	137·5	55·4	·00	0	0·4
Ceylon, Colombo	91·8	14	68·0	1	88·7	72·0	69·8	75	147·0	61·0	·52	6	1·8
Melbourne	96·1	5	46·2	13	77·6	56·3	51·7	62	146·1	36·1	·39	4	4·5
Adelaide	101·3	4	49·8	19	82·6	58·3	50·0	48	158·3	42·5	·01	1	2·5
Sydney	83·3	21	58·8	14*a*	75·5	64·4	58·3	75	155·9	50·1	5·06	18	5·5
Wellington	80·0	23	48·0	26	71·0	57·6	53·8	69	140·0	35·0	5·22	12	4·5
Auckland	81·5	9	49·0	27	74·8	61·3	60·6	77	147·0	47·0	3·65	11	5·3
Jamaica, Kingston	89·0	7	62·8	5	84·0	66·2	65·4	79	...	...	·67	8	2·9
Trinidad	95·0	2	63·0	8, 9*b*	86·6	65·6	67·1	76	167·0	61·0	2·36	12	...
Toronto	43·1	28	— 9·9	24	28·0	12·4	18·4	81	...	—10 0	2·25	14	6·0
New Brunswick, Fredericton	44·9	18	—30·5	14	24·0	— 2·7	8·0	77	...	...	2·95	9	4·0
Manitoba, Winnipeg	37·6	28	—30·7	19	15·2	— 9·9	...	...	...	...	1·00	6	5·0
British Columbia, Esquimalt	51·9	26	20·2	19	41·6	32·3	34·6	90	...	...	4·27	22	8·0

a And 23. *b* And 10.

REMARKS.

MALTA.—Mean hourly velocity of wind 14·6 miles, the highest recorded in 11 years; for the 5 days 19th to 23rd the velocity averaged 30 miles per hour. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·4 below, dew point equal to, and rainfall 1·73 in. below, their respective averages. Mean hourly velocity of wind 13·3 miles, or 2·0 miles above average; extremes, 62·2 on 22nd, and 0·0 on 27th and 28th; prevailing direction, E.S.E. T and L on 7th, 8th, and 9th, T on 18th, and L on 21st. A cyclone passed N.E., E. and S.E. of the island between the 19th and 24th.

C. MELDRUM, F.R.S.

Melbourne.—Aurora Australis visible from 7.30 to 10.30 on the 25th. T and L on 27th and 28th. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean temp. 3°·3 below the average of 37 years, the month being, with one exception, the coolest February experienced since records began. Rainfall very light, ·62 in. below the average. C. TODD, F.R.S.

Sydney.—Weather dry in the first part of the month, wet in the latter part; generally hot and oppressive. H. C. RUSSELL, F.R.S.

Wellington.—Showery in the early part of the month, and strong N.W. wind on 2nd, 3rd, and 12th; fine during the middle, with light variable winds; the end of the month very wet, with strong winds from S.E., 2·90 in. of rain falling on the 25th and 26th. Prevailing winds N.W. Sleet fell on 25th and 26th. Mean temp. 1°·8, and rainfall 1·68 in. above, the average. R. B. GORE.

Auckland.—A heavy fall of rain occurred on the 16th, 1·95 in. being recorded, but no other noteworthy peculiarities. Barometrical pressure, mean temp., and rainfall all close to the average of 27 years. T. F. CHEESEMAN.

JAMAICA.—Mean hourly velocity of wind 4·0 miles. Weather fine, with average rainfall. On the 5th the barometer reached the highest point since the establishment of the service in 1880, viz., 30·180 in. (cor. and red.) at 7 a.m. R. JOHNSTONE.

SUPPLEMENTARY TABLE OF RAINFALL, JULY, 1894.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			
II.	Dorking, Abinger Hall.	5·66	XI.	Rhayader, Nantgwillt..	6·73
,,	Birchington, Thor	3·95	,,	Lake Vyrnwy	3·14
,,	Hailsham	6·12	,,	Corwen, Rhug	1·90
,,	Ryde, Thornbrough	5·26	,,	Carnarvon, Cocksidia ...	3·48
,,	Emsworth, Redlands ...	5·14	,,	I. of Man, Douglas	2·46
,,	Alton, Ashdell.....	5·36	XII.	Stoneykirk, Ardwell Ho.	2·12
III.	Oxford, Magdalen Col...	3·36	,,	New Galloway, Glenlee	2·97
,,	Banbury, Bloxham	3·23	,,	Melrose, Abbey Gate...	2·25
,,	Northampton, Sedgebrook	2·89	XIII.	N. Esk Res. [Penicuick]	2·15
,,	Alconbury.....	2·49	,,	Edinburgh, Blacket Pl..	2·83
,,	Wisbech, Bank House..	3·55	XIV.	Glasgow, Queen's Park.	2·71
IV.	Southend	4·00	XV.	Inverary, Newtown	5·79
,,	Harlow, Sheering	3·10	,,	Islay, Gruinart School..	1·39
,,	Colchester, Lexden.....	3·96	XVI.	Dollar.....	2·96
,,	Rendlesham Hall	2·05	,,	Balquhidder, Stronvar..	5·78
,,	Diss	4·08	,,	Ballinluig	2·64
,,	Swaffham	2·67	,,	Dalnaspidal H.R.S. ...	4·81
V.	Salisbury, Alderbury...	3·49	XVII.	Keith H.R.S.	7·62
,,	Bishop's Cannings	4·38	,,	Forres H.R.S.	5·41
,,	Blandford, Whatcombe.	4·93	XVIII.	Fearn, Lower Pitkerrie.	4·78
,,	Ashburton, Holne Vic....	6·09	,,	Loch Shiel, Glenaladale	6·55
,,	Okehampton, Oaklands.	3·70	,,	N. Uist. Loch Maddy ...	4·77
,,	Hartland Abbey	4·39	,,	Invergarry	3·11
,,	Lynmouth, Glenthorne.	4·59	,,	Aviemore H.R.S.	2·96
,,	Probus, Lamellyn	4·55	,,	Loch Ness, Drumnadrochit	3·29
,,	Wellington, Sunnyside..	4·05	XIX.	Invershin	4·82
,,	Wincanton, Stowell Rec.	5·64	,,	Scourie	5·29
VI.	Clifton, Pembroke Road	5·35	,,	Watten H.R.S.	4·07
,,	Ross, The Graig	2·60	XX.	Dunmanway, Coolkelure	4·20
,,	Wem, Clive Vicarage ...	2·63	,,	Fermoy, Gas Works ...	5·26
,,	Cheadle, The Heath Ho.	2·48	,,	Killarney, Woodlawn ...	5 22
,,	Worcester, Diglis Lock	2·58	,,	Tipperary, Henry Street	4·19
,,	Coventry, Coundon	2·93	,,	Limerick, Kilcornan ...	4·54
VII.	Ketton Hall [Stamford]	3·03	,,	Ennis	4·05
,,	Grantham, Stainby	3·16	,,	Miltown Malbay.....	5·66
,,	Horncastle, Bucknall ...	2·94	XXI.	Gorey, Courtown House	3·93
,,	Worksop, Hodsck Priory	2·70	,,	Athlone, Twyford	3·61
VIII.	Neston, Hinderton	2·79	,,	Mullingar, Belvedere...	3·44
,,	Lancaster, Rose Bank...	...	,,	Longford, Currygrane...	4·56
,,	Broughton-in-Furness..	5·23	XXII.	Galway, Queen's Coll...	5·79
IX.	Ripon, Mickley	3·32	,,	Crossmolina, Enniscoe..	...
,,	Scarborough, South Cliff	2·57	,,	Collooney, Markree Obs.	5·87
,,	East Layton [Darlington]	2·52	,,	Ballinamore, Lawderdale	...
,,	Middleton, Mickleton..	2·98	XXIII.	Lough Sheelin, Arley ..	4·65
X.	Haltwhistle, Unthank..	2·74	,,	Warrenpoint	3·85
,,	Bamburgh.....	1·33	,,	Seaforde	4·16
,,	Keswick, The Beeches...	3·75	,,	Belfast, Springfield	5·20
XI.	Llanfrechfa Grange	4·82	,,	Bushmills, Dundarave...	3·75
,,	Llandovery	4·24	,,	Stewartstown	3·38
,,	Castle Malgwyn	4·69	,,	Buncrana	4·06
,,	Builth, Abergwessin Vic.	6·50	,,	Lough Swilly, Carrablagh	4·48

JULY, 1894.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Date	Min. Deg.	Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	3·25	+ ·57	1·12	10	17	88·2	6	48·9	14	0	0
II.		Maidstone (Hunton Court)...	4·27	+ 2·09	1·25	10	19	...	...	...	...	...	...
,,		Strathfield Turgiss	3·93	+ 1·54	1·34	29	24	85·7	1	44·0	4	0	0
III.		Hitchin	1·94	— ·78	·52	10	17	83·0	1,6	48·0	3	0	...
,,		Winslow (Addington)	2·86	— ·43	·68	22	19	85·0	6	45·0	4	0	0
IV.		Bury St. Edmunds (Westley)	3·25	+ ·68	·61	10	19	78·0	2	53·0	14	0	...
,,		Norwich (Brundall)	4·14	...	·79	22	20	84·6	2	48·0	15	0	0
V.		Weymouth(LangtonHerring)	4·31	+ 2·16	1·00	28	21	72·0	2,6	49·0	5	0	...
,,		Torquay (Cary Green)	4·18	...	1·00	22	19	72·3	6	49·6	14	0	0
,,		Polapit Tamar [Launceston]..	3·29	— ·12	·55	23	23	77·0	1	51·0	14	0	...
VI.		Stroud (Upfield)	2·40	— 1·17	·40	22	18	86·0	1	51·0	13	0	...
,,		ChurchStretton(Woolstaston)	2·99	+ ·02	·81	24	23	80·0	6	48·0	11*c*	0	0
,,		Tenbury (Orleton)	5·34	+ 2·48	2·06	29	17	83·8	1	41·2	14	0	0
VII.		Leicester (Barkby)	2·34	— ·65	·48	22	22	86·0	6	43·0	3, 13	0	0
,,		Boston	3·48	+ ·69	·86	24	16	85·0	27	46·0	21	0	...
,,		Hesley Hall [Tickhill].....	3·02	+ ·35	·90	25	18	85·0	1	43·0	14	0	...
VIII.		Manchester(PlymouthGrove)	3·06	— ·73	·53	16	18	86·0	1	45·0	11	0	0
IX.		Wetherby (Ribston Hall) ...	3·19	+ ·01	·72	26	12	...	...	...	...	...	...
,,		Skipton (Arncliffe)	4·47	— 1·17	1·04	25	17	...	...	...	...	...	...
,,		Hull (PearsonPark)	3·23	+ ·64	·51	10	15	80·0	5	47·0	8, 12	0	0
X.		Newcastle (Town Moor)	1·69	— 1·83	·39	10	13	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	8·08	— 2·91	2·77	17	19	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely).....	4·42	+ ·36	·93	24	25	...	...	...	...	...	...
,,		Haverfordwest	2·86	— 1·35	·69	29	21	81·0	2	47·2	13	0	0
,,		Aberystwith (Gogerddan) ...	4·62	...	1·60	24	16	85·0	1	40·0	13	0	...
,,		Llandudno.....	1·93	— 1·07	·66	24	20	82·6	1	48·6	12	0	...
XII.	SCOTLAND.	Cargen [Dumfries]	2·61	— 1·32	·72	6	12	81·0	1	43·6	23	0	...
,,		Jedburgh (Sunnyside).....	3·54	+ ·10	1·08	9	13	81·0	1	43·0	8	0	...
XIV.		Colmonell	2·79	...	1·31	6	15	86·0	1	40·0	10	0	...
XV.		Lochgilphead (Kilmory).....	3·77	— ·53	·75	6	17	...	...	40·0	22	0	...
,,		Mull (Quinish).....	4·75	+ ·70	1·36	4	19	...	...	...	...	...	...
XVI.		Loch Leven Sluices	2·90	— ·72	·50	7*a*	10	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	3·45	— ·01	·70	25	21	73·9	6	43·8	19	0	...
XVII.		Braemar	3·07	— ·14	1·00	2	18	78·0	2	39·0	8	0	0
,,		Aberdeen (Cranford)	3·50	...	·70	17	21	72·0	4	43·0	20	0	...
XVIII		Strathconan [Beauly]	2·98	— ·52	·72	13	9	...	...	...	...	...	...
,,		Glencarron Lodge.....	5·54	...	1·00	12	22	83·6	2	42·0	23	0	...
,,		Cawdor [Nairn]	4·57	+ 1·27	1·17	12	19	...	...	...	...	...	...
XIX.		Dunrobin	5·02	+ 2·17	1·05	12	18	75·5	1	48·0	25	0	...
,,		S. Ronaldsay (Roeberry).....	4·75	+ 2·39	1·07	12	13	68·0	5	47·0	19	0	...
XX.	IRELAND.	Darrynane Abbey.....	5·94	...	1·19	30	25	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	5·09	+ 1·56	·81	28	21	74·5	30	43·0	22	0	...
,,		O'Briensbridge (Ross)	4·96	...	·54	29	25	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill)	4·23	+ ·71	1·45	24	23	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	3·77	+ 1·09	1·56	24	21	75·7	1	48·3	23	0	0
XXII.		Ballinasloe	4·20	+ ·65	·65	24	25	78·0	1	47·0	23	0	...
,,		Clifden (Kylemore)	9·48	...	1·35	5	27	...	...	...	...	...	...
XXIII		Waringstown	2·98	— ·54	·35	24	20	84·0	31	46·0	22	0	0
,,		Londonderry (Creggan Res.).	4·74	+ ·62	·48	4*b*	24	...	...	...	...	...	...
,,		Omagh (Edenfel)	3·08	— ·64	·35	10	24	80·0	1	40 0	21	0	0

a And 16, 26. *b* And 7, 11. *c* And 14.

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

METEOROLOGICAL NOTES ON JULY, 1894.

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

ENGLAND.

STRATHFIELD TURGISS.—A wet month, with only seven days without R. From the 6th to the 26th R fell every day, and on the 29th 1·34 in. fell within 24 hours. The continued R sadly interfered with the hay harvest, rendering the ensilage principle very useful to the farmers. T on 26th and 29th.

ADDINGTON.—From the 6th until the 24th the weather was unsettled, and very hindering for hay making. T was heard on several days, but there was no severe storm. The last week was fine. The max. temp. in shade was above 80° twice, namely on the 1st and 6th, but was generally low for July.

BURY ST. EDMUNDS.—A usual July month; many days with R, but no very heavy quantities here, the storms being very partial. Corn much laid. TSS on 6th, 10th, and 24th; T on 2nd, 9th, and 11th.

NORWICH, BRUNDALL.—Mean temp. was quite up to the average, and almost precisely the same as in July, 1893. The absolute max. was 3° lower and the absolute min. 3° higher than last year, R nearly double. T and L on nine days and T on two other days. Between 7 a.m. and 8 a.m. on the 23rd ·79 in. of R fell in a TS.

LANGTON HERRING.—From the 6th to the end of the month the weather was most unsettled. Between 3 a.m. and 4 a.m. on the 29th a heavy TS occurred, and T was heard on the 7th, 11th, 12th and 24th. A solar halo was observed on the 6th, and there was a dense fog on the morning of the 30th. Mean temp. at 9 a.m. (61° 6) 1°·3 below the average. Night temp. very uniform. Since the beginning of the year rain has fallen on 121 days, which is 28 above the average number of rainy days for the first seven months, and for the same period the excess of R is 2·53 in.

TORQUAY, CARY GREEN.—R 1·44 in., and wet days 3, above the average. Mean temp. 60°·2, or exactly the average. Amount of sunshine 160 hours, 45 minutes, being 22 hours, 45 minutes below the average. Three sunless days.

WOOLSTASTON.—The first week was very hot and oppressive; the remainder of the month was rather wet, R falling almost every day and doing a good deal of damage to the later hay harvest, T and L on 6th. Mean temp. 59°·6.

TENBURY, ORLETON.—The first 8 days of the month were very fine and warm, but the remainder was rather below the average temp. with a great amount of R, nearly all of which fell in heavy partial storms. T on 1st, 21st and 29th. Of the 5·33 in. which fell during the month 3·18 in. fell in 7 hours, 10 minutes, viz.: on the 10th ·73 in. in 40 mins.; on the 21st ·39 in. in 30 mins.; and on the 29th 2·06 in. in 6 hours. The amounts on the 10th and 21st were very remarkable from the fact that on each occasion not more than ·01 in. fell at Eastham, one mile distant. The R on the 29th (2·06 in.) is believed to be the heaviest ever recorded here in the time. It commenced at 2.30 p.m., and at 5 p.m. the quantity in the guage was ·64 in. There was then about 30 mins. with practically no R, but at 5.30 p.m. it began again and poured in torrents till 8.30 p.m., when the amount was 1·42 in., giving a total quantity of 2·06 in.

LEICESTER, BARKBY.—Hay harvest much delayed by R from 6th to 26th; occasional T and L. Mean temp. for month 62°·5; the nights warm.

MANCHESTER, PLYMOUTH GROVE.—Fine summer weather on the 1st, from the 4th to the 10th and from the 24th to the 31st; T and L on the 13th; TS on the 25th. Mean temp. 62°·8.

SEATHWAITE.—TSS on 6th and 25th; R on the 6th 1·03 in., on the 16th 2·20 in., and on the 17th 2·77 in.

WALES.

HAVERFORDWEST.—Many wet days, greatly interfering with hay-making, especially in the last week. In many places hay had been cut a fortnight, much to its detriment. Corn crops looking well, but sadly wanting sunlight

and heat to ripen them. With the exception of the high temp. on the 2nd, the ther. rose to 70° or upwards on 11 days only. Wind mostly from W. and S.W., and S.E. Many days were damp, warm and relaxing.

GOGERDDAN.—Stormy throughout the month, with very little bright sunshine.

SCOTLAND.

CARGEN.—The temp. during the first 25 days of the month, with the exception of the first two days, was somewhat cold and ungenial, but from the 25th to the end was very warm, the mean temp. of the month being about the average. Westerly winds prevailed for 20 days. A severe TS, lasting an unusually long time, was experienced on the 6th, and T was heard on the 19th. A remarkable solar halo was seen on the 11th. All crops abundant and looking well. The hay crop much above the average.

JEDBURGH.—The R in the first half of the month was frequent, but generally the weather was agreeable, and as there was much sunshine, all crops look well. Corn cutting will be a month later than last year. The atmosphere was very still after the 15th. T, L and heavy R on the 9th and 15th.

MULL QUINISH.—Generally a warm, wet month; great heat from 1st to 4th, and from 24th to 31st; all crops and vegetation most luxuriant.

BRAEMAR.—A month of fine, settled weather; sunshine 162 hours; sharp TS, with vivid L, from 9 p.m. to 11 p.m. on the 6th; T and L from 3 to 6 p.m. on the 21st.

ROEBERRY.—The wettest July recorded in 27 years, the R being 2·19in. above the average of that period. Mean temp. 57°·3.

IRELAND.

DARRYNANE ABBEY.—A wet, bad month. Very heavy R all the morning on 31st, 1·19 in. falling in rather under 8 hours. Potato blight much spread and increasing fast.

WATERFORD, BROOK LODGE.—A wet month, with a good deal of T. The max. temp. very regular at about 65°. Blight commenced to show in the potatoes, and very little hay was got in from the fields. Green crops look well. T on 1st, T, L and H on 7th, L on 10th, heavy T with H on 23rd.

O'BRIENSBRIDGE, ROSS.—The worst possible month for hay-making, causing heavy loss in all the early cuttings. T and L frequent, and a cow killed by L on 23rd.

DUBLIN.—A very changeable, showery and thundery, but tolerably warm month, of average mean temp., but considerable R, with a decided prevalence of winds from westerly points, but easterly towards the close. Mean temp. (60°·3) slightly below the average. Rainy days 4 above the average. High winds on 7 days, attaining the force of a gale on the 18th. Electrical disturbances were frequent, and a severe TS occurred on the night of the 25th. A parhelion appeared on the evening of the 25th. [The mean temp. for June should have been 43°·1, not 49°·0.]

EDENFEL.—There can be no better example of how mere figures without explanation may mislead as to the character of weather than in contrasting the returns for July, 1893 and July, 1894. The former, with a R of 3·64 in., was a fine, fresh, mostly dry and sunshiny month, and one of the most favourable hay harvests for many years, while the month just passed, with a R of but 3·08 in., has been (with but a short interval) in all respects the reverse. A cloudy, saturated atmosphere, with Scotch-misty "dropping" weather, rendered hay-saving the most difficult and prolonged in 30 years, and fruit of all kinds almost flavourless.