

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

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THE DROUGHT.

ALTHOUGH at the majority of stations the "Partial Drought," which began with March and continued throughout April, was brought to an end by rain between the 15th and 21st of May; the period since then has again been very dry, and so continues (up to June 12th). This being the case, it seems unwise to attempt to write its history. But in case anyone should imagine that it is unprecedented, we give the figures for Greenwich for 1844 and for 1893 in identical arrangement:—

1844.		Total.	in.	days.
March (from 11th)	12th, '15; 14th, '36; 22nd, '07 ..	From 11th ...	'58	... 21
April	12th, '17; 13th, '02; 26th, '04 .....	... ..	'23	... 30
May	7th, '01; 9th, '02; 29th, '12 .....	... ..	'15	... 31
June	5th, '02; 10th, '01; 17th, '02; 18th, '03 ...	To 23rd	'08	... 23
			1·04	105
1893.		Total.	in.	days.
March (from 2nd)	3rd, '04; 4th, '10; 13th, '01; } 14th, '01; 16th, '07; 17th, '02	From 2nd ...	'25	... 30
April	17th, '04; 20th, '06; 29th, '02 .....	... ..	'12	... 30
May	1st, '01; 16th, '01; 17th, '30; 18th, '01; } 19th, '03; 20th, '02; 23rd, '02; 29th, '08; } 30th, '06 .....	... ..	'54	... 31
June	4th, '01; 7th, '18	To 10th	'19	... 10
			1·10	101

To the Editor of the Meteorological Magazine.

SIR,—The following figures will show that even in the centre of Ireland we have had a partial drought of severity and extraordinary duration, only 1·44 in. of rain having fallen from March 1st to May 16th inclusive, on 17 of the 77 days.

The copious fall (1·96 in.) from 17th—23rd May has been invaluable, and crops are now growing rapidly. Vegetation generally is a month earlier than usual.

1893.		
March	in.	in.
March 1 ...	.02	April 15 ...
„ 2 ...	.13	„ 16 ...
„ 3 ...	.06	„ 17 ...
„ 5 ...	.02	„ 22 ...
„ 7 ...	.02	„ 28 ...
„ 10 ...	.03	„ 30 ...
„ 13 ...	.07	
„ 18 ...	.27	.65
„ 31 ...	.06	May 1 ...
	—	„ 15 ...
	.68	
		.11
		1.44

Yours truly,

M. FRASER.

Hazelfort, Shinrone, May 24th, 1893.

SIR,—The partial drought still continues, and it may be of interest to have the details. At present there is not the slightest sign of any change; in fact, everything points to a long continuance of the drought, which daily becomes more and more serious. The hay crop will be an almost entire failure, so will be the oat and root crops, and the difficulty will be to find a substitute for them at any reasonable rate.

1893.

March	in.	May	in.	June	in.	
March 13 ...	.09	May 17 ...	.09	June 4 ...	.13	Thunder shower p.m.
„ 16 ...	.04	„ 18 ...	.07	„ 6 ...	.03	
„ 17 ...	.08	„ 19 ...	.01		—	
April 16 ...	.05	„ 20 ...	.07			„, to the 10th .89 in 99 days!
May 16 ...	.04	„ 29 ...	.19			

Thus beating the Uckfield record for both 1844 and 1854, viz. :—

1844	.....	March 14th to June 16th	.....	.89 in. in 93 days.
1854	.....	Feb. 6th, „, April 30th	.....	.59 „ „, 84 „

Yours very truly, C. LEESON PRINCE.

The Observatory, Crowborough, Sussex, June 10th, 1893.

NEW ISSUE OF OLD METEOROLOGICAL BOOKS.*

It is given to some persons to dream dreams, to others to realize them. Having formed a considerable collection of works upon Meteorology from the very infancy of printing, it has long been a day-dream of ours to reprint some of the most rare, with a moderately literal translation, and a few notes. Our energetic correspondent Dr. Hellmann has not merely had a somewhat similar dream, but

* Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus herausgegeben, von Prof. Dr. G. Hellmann.

No. 1.—L. Reynman. Wetterbüchlein Von wahrer Erkenntniss des Wetters. 1510.

No. 2.—Blaise Pascal. Récit de la Grand Expérience de l'Equilibre des Liqueurs. Paris: 1648.

4to. Berlin: A. Asher and Co., 1893.

has realised it. Thanks to the help of the German Meteorological Society and of its Berlin branch, and doubtless to much gratuitous work on the part of Dr. Hellmann, and to the co-operation and resources of the great publishing house of A. Asher and Co., of Berlin, a series of publications has been commenced, most moderate in price (considering the beauty of their reproduction) and of the highest interest. Dr. Hellmann's plan differs from ours in that he does not give any translation, but on the other hand, he reprints in perfect facsimile, and he gives an introductory account of each work, which we do not think it an exaggeration to say is superior to anything which any other living person could write. In the prospectus Prof. Hellmann announces his intention to reprint in facsimile a few (perhaps a dozen at the most) of the rarest and most important early tracts and maps relating to Meteorology and to Terrestrial Magnetism, each being preceded by a bibliographical note, and, where possible, by a biographical account of the author and an explanation of the leading features of importance in the tract or map. The size of each part will be small quarto (about 10 inches by 8 inches), each being complete in itself. Not more than two will be issued in any one year, and, if we may judge from the two numbers now before us, the cost will be about 5s. each part.

We must now say a few words respecting the first two numbers of this series—numbers which we shall not be at all surprised to find in a year or two, like Merle's MS., worth three or four times their original cost.

No. 1.—This is the reproduction of one of the many "Wetterbüchlein" issued in the 16th century. They were really popular guides to the weather, partly astrological, and partly incorporations of popular weather proverbs. The one selected is believed to be the oldest book upon the weather printed in German, and is dated 1510; it is moreover, reproduced from the copy in Dr. Hellmann's library, which is believed to be unique.

The first twenty-five pages are devoted to a list (with copious notes) of other editions of, or resembling, the present work; this is followed by details as to the compilation and translation of the work, which occupy 16 pages more, and this is followed by the reprint itself, occupying a final 14 pages.

Dr. Hellmann is so thoroughly a master—in fact we may say *the* master—of his subject that it is very dangerous for any one to express any difference of opinion, but while we think that Dr. Hellmann has proved that Reynman quoted largely (as he himself says) from Bonatus, we should have pointed out that much of Bonatus is to be found in Aratus and other early writers.

Like Dr. Hellmann, we have tried, and failed, to trace the section entitled—

**Das wetter zuwissen durch die vier
quart des jars, als Diechtenperger setzt.**

The subject is treated so much in the style of Alkindus that we took down our copy, but have not found the passage. Considering, however, how careless persons were three or four centuries ago as to the spelling of names, we are not at all sure that this is not the right direction in which to search, because undoubtedly the section is much in the style of Alkindus's writing, and the printer of our copy of Alkindus was a Liechten Here is the title—

Astrorū { Alkind } de pluuijs imbribus et
indices { Gaphar } betis : ac aeris mutatioe

Venetiis Anno Dñi. 1507.

Ex officina Petri Liechtenstein.*

Is it possible that Reynman wrote from memory, and substituted the printer's name (imperfectly) for that of the author? But if so, how is it that we cannot find the section? We must leave the solution to others.

No. 2.—This second reprint is that of a pamphlet entitled, "Récit de la grande Expérience de l'Equilibre des Liqueurs," by Blaise Pascal. Paris: 1648.

As most persons are aware, Pascal was the first to prove that the mercury in a barometer tube was supported by the pressure of the air, which he did by inducing a friend to fill two tubes with mercury, ascertain what they read, and that they agreed at Clermont Ferrand, and then to empty one and carry it to the top of the Puy de Dôme (3,550 feet above Clermont), fill it there, and see if on the top it read less, then return to the bottom and repeat the original measurement. This important experiment was made on September 19th, 1648, and up to the present moment we presume that few persons are aware that any account had been issued previous to the first edition of Pascal's "Traitez de l'Equilibre, &c.," Paris, 1663; but reference to the Preface and to the "Avertisement" on p. 164 of the "Traitez" will show that Pascal issued his pamphlet almost immediately after receiving the account of the successful experiments at Clermont, and further, that in the fifteen years between its issue

* We have spelled the second author's name Gaphar because the first letter closely resembles the form of G used at the end of the 15th century, but that there is some doubt about it is evident from the following amusing confusion:—

The tract was printed at Paris in 1540 by Kerver, with the name as Iaphar.

The Royal Society has a copy of the 1507 edition, and in both editions of the R. S. catalogue (1839 and 1883) the name is printed Gaphar.

In the Pulkowa catalogue (1860) it is printed Saphar.

In the "Bibliography of Meteorology," Part II., 1889, it is type written Japhar.

In the Crawford catalogue (1890) it is printed Saphar.

In the British Museum catalogue it is spelled Gaphar, with the Arabic name added, as [*i.e.* J'afar ibn Muhammad?]

We have, therefore, three authorities for G, two for S, and one each for I and for J.

and that of the "Traitez," all the copies had been distributed. And now, two hundred years later, Dr. Hellmann can trace only three copies of the original issue as being in existence, viz. :—(1) Bibliothèque Nationale, Paris; (2) Bibliothèque St. Geneviève, Paris; (3) Königlichen Bibliothek, Breslau.

As this tract is reprinted in all three editions of the "Traitez" (1663, 1664, and 1698), and also in Pascal's collected works, the information cannot compete in rarity with No. 1, though it may surpass it in importance as a record of one of the great discoveries of the world, and in the present issue we have the advantage of Dr. Hellman's lucid introduction.

It is such a phenomenon to pick up a misprint in Dr. Hellmann's books that we must tell him of one. On p. 7, in reprinting the title of the "Traitez," he has "S. Jacques" where it should be "S. Iacques." It would be a happy thing for some of us if we never made a worse mistake.

THE REMARKABLE SEASON.

To the Editor of the Meteorological Magazine.

SIR,—The annexed table may perhaps be worthy of a place in your Magazine, as it shows the extraordinary character of the present Spring. The observations are all taken from plants or trees in my own garden, and in those cases marked with an asterisk, from the same individual plants or trees. The Spring is thus (omitting the snowdrop) 23 days earlier than the average of the last eight years.

	Average date, 1885-1892.	1893.	Difference.
	Day of year.	Day of year.	Days.
Flowering of Snowdrop	45	48	+ 3
" " Daffodil	103	87	-16
*Bursting of Chesnut buds.....	114	95	-19
* " " Sycamore buds.....	123	103	-20
*Flowering of Red Currants	123	96	-27
* " " Cherry	131	105	-26
* " " Pear	135	103	-32
* " " Apple	145	116	-29
* " " Strawberry	151	126	-25
* " " Common Rhododendron	157	131	-26

The rainfall for this station since March 5th inclusive (67 days) has only been 1.51 in., certainly not more than one-quarter of the average.—Yours very truly,

CHARLES L. BROOK.

Harewood Lodge, Meltham, Yorkshire, May 11th, 1893.

MAXIMUM SHADE TEMPERATURE IN APRIL, 1893.

THANKS to Mr. G. von U. Searle, we are able to correct an error on p. 64. The mean temperature at 9 a.m. in April, 1866, was $50^{\circ}\cdot 41$, not $54^{\circ}\cdot 1$ as there printed. The true value being below $50^{\circ}\cdot 8$, the entry for 1866 should be entirely struck out; but in the upper table the max. of $79^{\circ}\cdot 4$ is correct, and should stand.

The following letter raises another point:—

To the Editor of the Meteorological Magazine.

SIR,—I noticed with some surprise that the max. temp. at Camden Square on April 20th was only $78^{\circ}\cdot 2$. Here, in Stevenson screen, it reached $82^{\circ}\cdot 2$, being a higher reading than any recorded in April at Greenwich in 52 years.

The absolute drought lasted 30 days, March 17th to April 15th, exactly the same number of days as in 1887; the partial drought 78 days, February 28th to May 16th, with 0·63 in. of rain.

Yours very truly,

G. VON U. SEARLE.

30, *Edith Road, West Kensington, May 20th, 1893.*

[The first portion of this letter has led to our examining the maxima for April 20th, and the result is worthy of record. We will, in the first place, quote the maxima obtained in Stevenson screens only, arranging them from the coldest to the warmest:—

Royal Botanic Gardens	W. Sowerby	$77^{\circ}\cdot 5$
Camden Square	G. J. Symons.....	$78^{\circ}\cdot 1$
Royal Observatory, Greenwich	W. Ellis	$78^{\circ}\cdot 9$
Old Street, E.C.....	Rev. A. P. Hockin	$79^{\circ}\cdot 1$
Norwood	W. Marriott	$81^{\circ}\cdot 6$
West Kensington	G. von U. Searle	$82^{\circ}\cdot 2$

Apparently the smoke of London was drifting northwards, and so prevented the sun having its full power in North London. This is corroborated by the fact that at Greenwich the max. on the Glaisher stand was $1^{\circ}\cdot 1$ above that on the Stevenson, while at Camden Square the excess was only $0^{\circ}\cdot 1$ —strong evidence of the presence of haze.

This is rendered nearly certain by comparing the max. in sun at Greenwich and at Camden:—

	Max. temp. in Sun.		
	Greenwich.	Camden.	Greenwich excess.
20th	$128^{\circ}\cdot 5$	$113^{\circ}\cdot 7$	$14^{\circ}\cdot 8$

The usual excess of Greenwich above Camden Square is about 6° ; on the 20th it was more than double that; therefore, either it was exceptionally sunny at Greenwich, or exceptionally hazy at Camden Square.—ED.]

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, the 17th instant, at the Institution of Civil Engineers, 25, Great George Street, Westminster, Dr. C. Theodore Williams, President, in the chair.

Dr. H. R. Mill was elected a Fellow of the Society.

The following papers were read :—

(1) "The Mean Maximum and Mean Minimum Temperature of the Air on each day of the year, at the Royal Observatory, Greenwich, on the average of the fifty years 1841 to 1890," by William Ellis, F.R.S. Last year the author presented to the Society a paper giving tables of the mean temperature on each day of the year at Greenwich for the 50 years 1841-90, and the present paper gives the mean daily max. and min. for the same period. Mr. Ellis explained that the tables were calculated from the max. and min. of the photographic records, corrected to the values of the revolving stand. The following table gives the mean monthly temp. deduced from the means of the max. and min., as compared with the mean of 24 observations daily :—

Month.	Mean Temperature, 1841-1890.		Deviation of latter, 1841-1890.
	Mean from 24 Observations daily.	Simple Mean of Maximum and Minimum.	
January	38·53	38·37	—0·16
February	39·50	39·80	+0·30
March ..	41·68	42·37	+0·69
April	47·17	48·09	+0·92
May.....	53·10	53·93	+0·83
June	59·44	60·36	+0·92
July.....	62·45	63·57	+1·12
August	61·61	62·91	+1·30
September	57·19	58·24	+1·05
October	50·01	50·49	+0·48
November	43·21	43·20	—0·01
December ..	39·66	39·39	—0·27
THE YEAR	49·46	50·06	+0·60

The lowest mean max., mean min., and mean temperatures all occur on January 12th, except that there is an anomalous mean min. slightly lower on February 12th. The highest mean max. and the highest mean occur on July 15th, and the highest mean min. on August 13th, about which date there is also a rise in the mean max. and mean.

The mean max. occurs about April 17th and October 15th.
 „ „ temp. „ „ May 2nd „ „ 18th.
 „ „ min. „ „ „ 9th „ „ 20th.
 „ „ range „ „ March 25th „ „ 10th.

Dr. Buchan remarked that the decrease of temp. on February 12th and the increase about August 13th were not abnormal, but were secondary min. and max. coinciding in date with the min. and max. temp. of the sea surrounding our islands.

Mr. Symons said that the differences shown in the last column were very similar to the values given in Glaisher's tables for obtaining mean temp. from the readings of the max. and min., and that they would probably disappear if a Stevenson screen were used.

Mr. Southall stated that the date of mean temp. given in the paper was about half-way between that given by Howard in the "Climate of London," and by Mr. Glaisher from the earlier Greenwich records.

(2) "Notes on Winter," by Alexander B. MacDowall, M.A., F.R.Met.Soc. The first part of this paper consists principally of a collection of statements by different authorities as to the weather experienced in winter and the probability of the existence of cycles, &c. In the latter part of the paper the author discusses the question of periodicity of winter weather, the relation of summers to winters, &c. By classifying the winters of the past 78 years as very cold, cold, mild, and very mild, and comparing them with the preceding November and following March, &c., he arrives at the following conclusions:—A "very cold" November apparently tends to be followed by a winter colder than the average; and a "very mild" November by a winter milder than the average. A "very cold" winter tends to be followed by a summer cooler than the average; and a "very mild" winter by a summer hotter than the average. It appears also that summers before "very cold" winters have more often been cool than not.

Mr. Gaster and Dr. Buchan called attention to the fact that our temp. is very largely due to the frequency and duration of cyclones and anticyclones and the paths which they take, and that no system of forecasting which ignored them, could be satisfactory.

Mr. Harries pointed out that if a cold winter tends to be followed by a cool summer, and a cool summer to be followed by a cool winter, as long as the rule holds we cannot have warm seasons.

The President and Mr. Tripp also spoke.

(3) "Suggestions, from a practical point of view, for a new Classification of Cloud Forms," by Frederic Gaster, F.R.Met.Soc. This is an important paper which it is difficult to condense without injury, but the following extracts will give an outline of its contents:—

"I will first state briefly the principles on which the present proposal is based. Simultaneously with Capt. Wilson-Barker, one of our Fellows, I came to the conclusion (as stated in the discussion which followed his paper* on February 19th, 1890) that there are, in fact, only two main classes of cloud-forms, viz. : (1.) Those which arrange themselves in the form of sheets—whose vertical measurements are small when compared with the horizontal. To these he and I both apply the general terms *stratus* or *stratiform*. (2.) Those which rise up in heaps (like masses of cotton wool) from a horizontal base; and to these we apply the terms *cumulus* or *cumuliform*. If I

* *Quarterly Journal*, vol. xvi. p. 131.

understand him rightly, I may say we look upon cirrus and cirriform clouds as modifications of the stratiform, and believe that by adopting these terms, and supplementing them by a few well-known prefixes or affixes, we may describe all the forms at present recognised, and leave room for embracing others not yet clearly defined.

The prefixes and affixes employed in this paper are mainly the following :—

Detached, applied to sheet-clouds when the sheet is broken up into a number of more or less rounded cloudlets—such as is found in the conventional *cirro-cumulus* cloud.

Fracto, applied to clouds, or portions of clouds, with ragged edges.

Turreted, when portions of the cloud rise up abruptly from the base, in a turret-like form, at certain distances from one another.

Mammato when, instead of the rounded portion of certain clouds rising upward from a base, they hang downwards somewhat in the form of mammæ. Instances of this occur both in stratiform and cumuliform clouds.

Furrowed, applied to certain forms of stratus cloud, the under surface of which is in ridges, as though it had been ploughed, as a field.

Cirriform, to those clouds which, while appearing as sheets, or parts of sheets, have a distinct filamentary structure either in right or curvilinear lines, or take the form of feathers, delicate seaweed, &c.

With these principles in view I have drawn up the accompanying Table. [Too long to reproduce.] In it all the cloud forms with which I am acquainted as being satisfactorily identified are classed under four headings, viz. :

1. SURFACE CLOUDS, or those which appear commonly between the earth's surface and a level of about 2,000 feet, at which latter altitude the bases of some of the *cumulo-nimbi* (in Class 2) are occasionally found.
2. LOWER MEDIUM CLOUDS, commonly found at an altitude varying from 2,000 to about 10,000 feet from the earth.
3. HIGHER MEDIUM CLOUDS, including all varieties which usually float at an elevation ranging from 10,000 to about 22,000 feet.
4. HIGHEST (OR CIRRIFORM) LEVEL CLOUDS, or those found commonly at elevations exceeding 22,000 feet.

Columns are given in the Table furnishing :—(1) The names of each variety of cloud included in the classification ; (2) A short account of the principal characteristics of each as far as appearance goes ; (3) A reference to certain photograms or other pictures in

possession of well-known authorities, and in which the variety is portrayed ; (4) The names hitherto applied to the variety by some well-known authority ; and (5) A convenient abbreviation by which its appearance might be recorded in an ordinary Meteorological Register.

The limits of altitude separating class from class are by no means hard and fast lines, nor are the altitude values quoted to be taken as severely accurate, but rather as being a good approximation to the limiting heights of the zones in which the varieties in each class ordinarily appear over the northern half of Europe. Cirriform cloud is occasionally found at much lower levels than 20,000 feet ; in fact, some lower medium clouds have been observed to assume a cirrus like shape at times. Such occurrences are noteworthy, and point to an unusual condition—and a good observation of such an occurrence will naturally suggest to an investigator the necessity for considering what the conditions were which contributed to such an erratic development.”

The President remarked that cloud nomenclature seemed by general consent entirely based on Latin, and that that language showed a considerable paucity of suitable words.

A letter was read from the Rev. Clement Ley, urging the importance of simplicity in the classification of clouds, and suggesting that the proposals of the paper would not be acceptable internationally, as English words were used in some of the names, and that inasmuch as the names were not based on physical properties or structure, they were non-scientific.

Mr. Bayard suggested that, as a starting-point, a representative set of illustrations should be prepared and definitely named.

Admiral Maclear would hesitate to put the proposed classification before the observers of the Roy. Met. Soc., of the Met. Office, coast-guards, sailors, &c.

Mr. Symons asked how observers were to estimate the altitude of clouds, and Mr. Ellis spoke of the difficulty of training observers.

Dr. Buchan thought observers correctly named all the usual forms, but that the utmost confusion prevailed in their ideas of the altitude of clouds.

Mr. Gaster, in reply, agreed with all that had been said as to the difficulties of the subject, but as our knowledge of the direction and velocity of the wind at considerable heights was entirely dependent upon it, and comparable observations were at present non-existent, he felt that something must be done. He had purposely avoided any reference to physical characteristics for the sake of simplicity. He did not propose that observers should estimate the altitude of clouds, and had put it in the paper from the best available sources merely as an indication of the height at which the different forms were usually found.

REVIEW.

Borough of Southport. Meteorological Department. Report and Results of Observations for the year 1892, by J. BAXENDELL, F.R.Met.Soc., Meteorologist to the Corporation. 4to. Crompton, Southport: 1893. 16 pages.

WE do not remember having seen any earlier number of this Report, and we think that it is the first, though it does not say so. If it be the first, it is a very creditable one. On the other hand, we know that the Corporation of Southport was among the earliest to realize the fact that it was to the advantage of a town to know something about its climate, and we remember, quite ten years' since, finding in Hesketh Park a very fair set of meteorological instruments, and it is rather strange if no annual reports have been published.

As far as we can judge, the arrangements at Southport are now, with one exception, very satisfactory, and the Report indicates efficiency; but of course there are improvements which suggest themselves to an outside critic, and possibly some of them may be useful as suggestions for subsequent issues. We do not wish to hurt the feelings of any Southportian, but if we are to be favoured with a copy in future, and if any of our readers are to be enabled to get copies, it would be as well to explain where Southport is. We are quite aware that Mr. Baxendell gives the Lat. and Lon. with scientific accuracy, but for the general public a key map of the N.W. of England would be a useful addition. Again, if this report is intended for general distribution, why not give a map of the town, colouring the parks, and showing where the observations are made, and by some of the many mechanical processes reproducing some photographs of the instruments in position? This would cost a little, but they could be reprinted in subsequent issues, and would make the reports much more useful to non-residents.

Returning to strictly meteorological points. We hope that in the next issue it will be made clear to outsiders exactly where the various instruments are. Doubtless all Southportians interested in the subject know, but we cannot find out whether the Fernley Observatory is in Hesketh Park or not, or whether the "Fernley louvred structure" and the "Stevenson screen" are or are not in the same part of the town. Again, there are novel and useful values given on p. 12 [Why has the printer not paged the pamphlet?] of the level of subsoil water at "Southport" and "Birkdale"—a stranger would like to know in what part of Southport these levels are taken, and also where Birkdale is.

All the foregoing are merely suggestions for improvement and for rendering this useful publication generally as well as locally interesting.

But we have one serious complaint to make. Why should Southport, by making its rainfall day end at 9 p.m., break the rules as to the measurement of rainfall adopted at nearly every other station not merely in the British Isles, but throughout Europe?

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, DECEMBER, 1892

STATIONS. <i>(Those in italics are South of the Equator.)</i>	Absolute.				Average.				Absolute.		Total Rain.		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
England, London	54·5	15	16·7	27	41·4	31·4	32·6	85	66·2	12·1	1·37	11	6·0
Malta.....	69·9	9	48·7	8	64·9	54·6	50·7	79	117·0	43·0	2·07	13	6·0
<i>Cape of Good Hope</i> ...	82·9	12	50·9	14a	72·4	57·7	...	...	...	...	3·02	6	5·5
<i>Mauritius</i>	84·6	13	67·6	19	83·2	71·0	67·9	76	136·5	62·0	6·24	15	5·5
Calcutta.....	79·5	31	49·0	10b	75·8	52·4	52·8	71	132·5	38·5	·00	0	5·4
Bombay.....	88·7	18	66·8	3	84·2	69·9	66·0	70	133·9	54·7	·00	0	1·7
Ceylon, Colombo ...	90·6	11	67·3	27	86·9	72·4	70·2	78	158·0	62·0	·86	10	4·6
<i>Melbourne</i>	92·5	25	45·9	4	70·1	51·8	49·2	65	151·1	37·8	1·46	9	5·9
<i>Adelaide</i>	97·5	24	49·7	1	79·1	57·3	48·5	49	160·7	41·6	1·17	8	4·0
<i>Tasmania, Hobart</i>.....	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Wellington</i>	74·1	26	45·0	22	67·8	53·8	49·8	67	145·0	37·0	4·36	11	3·8
<i>Auckland</i>	78·0	16	52·0	27	69·8	56·4	56·4	79	138·0	39·0	2·02	15	5·8
Jamaica, Kingston.....	87·8	6	63·8	26	85·4	67·1	66·0	78	...	...	·72	4	3·3
Trinidad.....	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto.....	42·4	8	8·4	26	31·0	20·4	22·4	80	...	...	1·24	21	7·4
New Brunswick, Fredericton.....	41·9	2	11·7	24	25·5	10·0	17·5	83	...	...	1·79	10	4·2
Manitoba, Winnipeg...}	33·0	2	36·8	25b	8·4	11·3	...	...	...	...	·10	8	4·8
British Columbia, Esquimalt.....	51·4	31	18·7	21	42·9	35·3	37·7	92	...	...	4·88	27	8·0

a And 15. b And 26.

REMARKS.

MALTA.—Mean temp. 58°·6. Mean hourly velocity of wind 10·5 miles. Thunderstorms, with hail, on 14th and 28th. The sea temp. fell from 66°·4 to 64°·0.

J. SCOLES.

Mauritius.—Mean temp. of air 0°·4 below, dew point equal to, and rainfall ·97 in. above, their respective averages. Mean hourly velocity of wind 8·6 miles, or 2·3 miles below average; extremes, 20·0 on 31st and 1·8 on the 5th, 10th, and 22nd; prevailing direction, E. by N. Lightning on 6 days. Thunder and lightning on 2 days.

C. MELDRUM, F.R.S.

CEYLON, COLOMBO.—Thunderstorms on the 15th, and lightning only on the 3rd, 4th, 12th, 16th, and 24th.

J. C. H. CLARKE, Lt.-Col. R.E.

Melbourne.—Thunder and lightning on the 7th; lightning on the 8th. Lunar halo on the 1st.

R. L. J. ELLERY, F.R.S.

Adelaide.—Mean temp. 2°·9 below the average of 35 years. Rainfall 34 in. above the average, making the total for the year 21·53 in., or 1·15 in. above the average. The month was unusually cool, and on only two days did the temp. reach 90° in the shade.

C. TODD, F.R.S.

Wellington.—The early part of the month was showery, with strong wind from N.W., 3·25 in. of rain falling on 4th; finer during the latter part of the month, but occasional showers and strong wind. Thunder and hail on 10th. Earthquake on 2nd, slight at 10.10 p.m. Mean temp. the same as the average; rainfall 43 in. above the average.

R. B. GORE.

Auckland.—A seasonable month, but with mean temperature considerably below the average.

T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL,
MAY, 1893.

[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.			n
II.	Dorking, Abinger Hall.	.55	XI.	Builth, Abergwessin Vic.	3.51
„	Birchington, Thor .....	.66	„	Rhayader, Nantgwillt..	3.64
„	Brighton Prestonville Rd	.56	„	Corwen, Rhug	1.13
„	Hailsham .....	.63	„	Carnarvon, Cocksida ...	1.12
„	Ryde, Thornbrough	1.02	„	I. of Man, Douglas	1.52
„	Alton, Ashdell	1.05	XII.	Stoneykirk, Ardwell Ho.	1.16
III.	Oxford, Magdalen Col...	.77	„	New Galloway, Glenlee	2.82
„	Banbury, Bloxham	1.39	„	Melrose, Abbey Gate ...	2.32
„	Northampton, Sedgebrook	1.61	XIII.	N. Esk Res. [Penicuik]	1.20
„	Alconbury	1.17	„	Edinburgh, Blacket Pl..	1.37
„	Wisbech, Bank House..	1.01	XIV.	Glasgow, Queen's Park.	3.28
IV.	Southend .....	.89	XV.	Islay, Gruinart School..	1.93
„	Harlow, Sheering	1.12	XVI.	Dollar	1.63
„	Colchester, Lexden.....	.83	„	Balquhider, Stronvar..	3.71
„	Rendlesham Hall	1.65	„	Coupar Angus Station..	1.03
„	Diss	1.29	„	Dunkeld, Inver Braan..	1.19
„	Swaffham	1.13	„	Dalnaspidal H.R.S. ...	1.51
V.	Salisbury, Alderbury ...	.90	XVII.	Keith H.R.S.	1.63
„	Bishop's Cannings	1.38	„	Forres H.R.S.	1.19
„	Blandford, Whatcombe ..	.91	XVIII.	Fearn, Lower Pitkerrie..	.97
„	Ashburton, Holne Vic....	...	„	Loch Shiel, Glenaladale	3.96
„	Okehampton, Oaklands.	1.96	„	N. Uist. Loch Maddy ...	1.86
„	Hartland Abbey	2.27	„	Invergarry	1.46
„	Lynmouth, Glenthorne.	2.78	„	Aviemore H.R.S. ....	.96
„	Probus, Lamellyn	1.06	„	Loch Ness, Drumnadrochit	1.03
„	Wincanton, Stowell Rec.	1.15	XIX.	Invershin	1.03
„	Weston-super-Mare	1.33	„	Scourie	2.67
VI.	Clifton, Pembroke Road	1.20	„	Watten H.R.S.	1.21
„	Ross. The Graig	1.66	XX.	Dunmanway, Coolkelure	2.77
„	Wem, Clive Vicarage ...	1.47	„	Fermoy, Gas Works ...	2.23
„	Cheadle, The Heath Ho.	2.28	„	Killarney, Woodlawn ...	.98
„	Worcester, Diglis Lock	2.48	„	Tipperary, Henry Street	2.46
„	Coventry, Coundon	2.04	„	Limerick, Kilcornan ...	1.76
VII.	Ketton Hall [Stamford]	.76	„	Ennis	1.30
„	Grantham, Stainby	1.06	„	Miltown Malbay.....	1.38
„	Horncastle, Bucknall ...	.92	XXI.	Gorey, Courtown House	1.02
„	Worksop, Hodsck Priory	1.56	„	Mullingar, Belvedere ...	2.15
VIII.	Neston, Hinderton	1.53	„	Athlone, Twyford	2.99
„	Knutsford, Heathside...	1.96	„	Longford, Currygrane...	...
„	Lancaster, Rose Bank...	2.37	XXII.	Galway, Queen's Coll...	1.25
„	Broughton-in-Furness..	2.86	„	Crossmolina, Enniscoe..	1.35
IX.	Ripon, Mickley	2.55	„	Collooney, Markree Obs.	1.53
„	Scarborough, South Ciiff	1.44	„	Ballinamore, Lawderdale	...
„	EastLayton [Darlington]	2.16	XXIII.	Lough Sheelin, Arley ..	2.52
„	Middleton, Mickleton..	1.84	„	Warrenpoint	1.42
X.	Haltwhistle, Unthank..	2.62	„	Seaforde	1.46
„	Bamburgh	1.68	„	Belfast, Springfield ...	1.60
„	Newton Reigny	1.57	„	Bushmills, Dundarave...	1.38
XI.	Llanfrechfa Grange	3.32	„	Stewartstown	1.69
„	Llandoverly	2.32	„	Buncrana	1.57
„	Castle Malgwyn	1.12	„	LoughSwilly, Carrablagh	1.54

MAY, 1893.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					Days on which .01 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours		Max.		Min.					
				inches.	inches.			Dpth	Date	Deg.	Date	Deg.	Date.	In shade.	On Grass.
I.	London (Camden Square) ...	.80	- 1.10	.35	17	8	78.6	12	38.2	31	0	0
II.	Maidstone (Hunton Court)...	.93	- .45	.65	29	6	...	...	...	...	...	...
III.	Strathfield Turgiss	1.01	- .86	.34	18	10	79.7	3	33.2	...	0	5	
IV.	Hitchin .....	.93	- 1.02	.50	17	9	78.0	15	32.0	6,7	2	...
V.	Winslow (Addington)	2.70	+ .60	1.44	17	9	78.0	12	35.0	11	0	2	
VI.	Bury St. Edmunds (Westley)	1.03	- .72	.34	29	7	...	...	...	...	...	...
VII.	Norwich (Cossey) .....	.89	- .78	.10	16	10	...	...	...	...	...	...
VIII.	Weymouth(LangtonHerring)	1.13	- .48	.58	18	6	73.0	29	40.0	8	0	...	
IX.	Torquay (Cary Green) ...	1.14	...	.31	16	9	72.7	12	43.3	21	0	0
X.	Bodmin (Fore Street)	1.32	- 1.21	.54	19	9	...	...	...	...	...	...
XI.	Stroud (Upfield)	1.79	- .25	.77	15	10	78.0	5	44.0	31	0	...	
XII.	ChurchStretton(Woolstaston)	2.81	- .06	.99	19	13	74.5	5	36.5	8	0	2	
XIII.	Tenbury (Orleton)	2.11	- .44	.62	18	10	78.7	5	33.8	11	0	1	
XIV.	Leicester (Barkby)	1.81	- .16	1.33	17	8	79.0	4	28.0	10	3	7	
XV.	Boston	1.22	- .50	.33	17	10	82.0	22	34.0	31	0	...	
XVI.	Hesley Hall (Tickhill).....	1.92	- .12	.81	17	10	76.0	14	28.0	7	3	...	
XVII.	Manchester(PlymouthGrove)	1.94	- .41	.80	17	12	80.0	13	39.0	10	0	0	
XVIII.	Wetherby (Ribston Hall) ..	2.34	+ .39	.87	29	7	...	...	...	...	...	...
XIX.	Skipton (Arncliffe)	3.13	- .59	1.04	17	12	...	...	...	...	...	...
XX.	Hull (PearsonPark)	1.07	- .81	.25	17	9	73.0	4	33.0	11	0	1	
XXI.	Newcastle (Town Moor)	1.93	+ .18	.60	20	11	...	...	...	...	...	...
XXII.	Borrowdale (Seathwaite).....	5.75	- 2.86	1.06	21	12	...	...	...	...	...	...
XXIII.	Cardiff (Ely).....	2.84	- .01	.93	19	11	...	...	...	...	...	...
XXIV.	Haverfordwest	1.23	- 1.13	.35	21	10	74.5	6	37.5	8	0	1	
XXV.	Aberystwith, Gogerddan	2.02	...	.62	15	10	81.0	5	30.0	31	1	...
XXVI.	Llandudno.....	1.75	- .18	.48	1	11	...	...	...	...	...	...
XXVII.	Cargen [Dumfries]	2.46	- .06	.89	17	12	75.8	14	35.4	30	0	...	
XXVIII.	Jedburgh (Sunnyside).....	2.47	- .57	.75	20	12	79.0	14	33.0	10	0	...	
XXIX.	Old Cumnock	2.53	+ .09	.66	18	12	...	...	...	...	...	...
XXX.	Lochgilthead (Kilmory)	2.75	- .60	.57	17	16	...	...	38.0	1	0	...
XXXI.	Oban (Craigvarren) .....	...	...	...	...	...	...	...	...	...	...	...
XXXII.	Mull (Quinish)	3.02	+ .07	.41	22	18	...	...	...	...	...	...
XXXIII.	Loch Leven Sluices	1.50	- 1.06	.30	19 ^a	8	...	...	...	...	...	...
XXXIV.	Dundee (Eastern Necropolis)	1.35	- .31	.45	28	14	72.4	14	34.8	1	0	...	
XXXV.	Braemar	1.07	- 1.34	.21	12	12	68.2	14	27.8	2	3	5	
XXXVI.	Aberdeen (Cranford)	1.20	...	.19	11	17	70.0	14	33.0	1	0	...
XXXVII.	Strome Ferry.....	2.69	- .66	.48	11	18	...	...	...	...	...	...
XXXVIII.	Cawdor [Nairn]	1.25	- .50	.22	12	15	...	...	...	...	...	...
XXXIX.	Dunrobin	1.28	- .82	.25	3	14	65.0	27	32.0	2	1	...	
XL.	S. Ronaldsay (Roeberry).....	1.47	- .25	.25	18	16	63.0	10	40.0	1c	0	...	
XLI.	Darrynane Abbey.....	1.44	...	.46	1	9	...	...	...	...	...	...
XLII.	Waterford (Brook Lodge) ...	1.59	- .64	.26	16	11	70.0	10	38.0	3	0	...	
XLIII.	O'Briensbridge (Ross)	2.46	...	.47	18	11	71.0	13	44.0	1	0	...
XLIV.	Carlow (Browne's Hill) .....	...	...	...	...	...	...	...	...	...	...	...
XLV.	Dublin (FitzWilliam Square)	1.67	- .26	.72	20	10	70.2	11	42.8	31	0	0	
XLVI.	Ballinasloe	2.40	- .29	.56	21	10	68.0	5b	38.0	31	0	...	
XLVII.	Clifden (Kylemore)	3.12	...	.77	22	12	...	...	...	...	...	...
XLVIII.	Waringstown	1.18	- 1.26	.35	16	10	74.0	27	39.0	1	0	0	
XLIX.	Londonderry (Creggan Res.) ..	1.46	- 1.06	.26	17	15	...	...	...	...	...	...
L.	Omagh (Edenfel)	1.26	- 1.21	.24	1	11	73.0	14	40.0	30	0	0	

a And 21, 29. b And 13, 14, 28. c And 29.

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

METEOROLOGICAL NOTES ON MAY, 1893.

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.—The month of May was as exceptional in its weather as the two preceding months. Great heat occurred, 79°·7 being registered in shade on 3rd, and 94°·0 in the sun on the 12th, while the month ended with 29°·6 on the grass on 31st. Wild flowers unusually early in bloom. TSS on 15th and 18th. T on 28th. First rose in flower on 6th; wild convolvulus on 22nd.

ADDINGTON.—The long drought which set in on the 4th of March was fairly broken up on the 15th of May, thus lasting for 72 days, the total R during that time being only ·16 in. The weather was very fine until the 15th, followed by a succession of sharp TSS, that of the 17th accompanied by a great downpour of R. The end of the month was cold, with a frost on the last night, when dahlias and vegetable marrows were blackened.

BURY ST. EDMUNDS.—The drought still continues, what R has fallen having apparently done little good, and the agricultural outlook is worse than ever. Distant T on 20th, and T on 29th.

LANGTON HERRING.—The R for March, April, and May (1·60 in.) is the smallest for three consecutive months during 18½ years, the next smallest being 1·74 in. for November and December, 1879, and January, 1880. R fell on only 15 days in the three months, the smallest number previously being 20 in June, July, and August, 1887. There was absolute drought from April 30th to May 13th; on the 18th ·58 in. fell, which refreshed everything, but only ·03 in. fell after the 19th. The hottest May for 22 years, the mean temp. at 9 a.m. (57°·7) being 3°·9 above the average. High N.E. winds on 8th, 9th, and 10th. Fogs on 15th and 23rd. T and L on 16th.

TORQUAY, CARY GREEN.—A very fine and sunny month. Duration of bright sunshine 229 hours, equal to 48 per cent. of the possible amount. Sunshine was recorded on every day in the month, the greatest daily amount being 14 hours on 11th, equal to 93 per cent. of the possible duration.

BODMIN, FORE STREET.—High wind from the 6th to the 10th. Rather large H on the 20th. A mild, warm and dry month. Strawberries plentiful, and some cherries and raspberries ripe—very early. The last night of the month rather cold.

STROUD, UPFIELD.—During a TS on 15th ·65 in. of R fell between 3 p.m. and 4 p.m. A house was struck by L at Chalford, a cow killed at Stonehouse, and a colt killed near Stroud.

WOOLSTASTON.—The drought broke up on the 14th, and R fell every day for a week, but too late to save the hay crop, which will be very scanty. Mean temp. 56°·1.

ORLETON.—The warmest May recorded here in 37 years, the mean for the month being 5° above the average, and 1° above that of May, 1868. Country very much burnt up until the 15th, when a TS, with heavy R, occurred, and R fell each day for a week. The temp. reached 70° on 12 days. T on 15th, 16th, and 17th; L on 15th.

BARKBY.—T on 17th and 29th.

MANCHESTER.—Fine summer weather prevailed for the first 15 days; the 17th was rainy; T and L occurred on the 18th and 19th, and from 18th to 23rd was showery. The last week was fair, with the exception of the 29th, which was rainy. Mean temp. 56°·1.

HULL, PEARSON PARK.—Rainless from 3rd to 15th, then showery, with T, till 20th, followed by another rainless week.

WALES.

HAVERFORDWEST.—The weather continued fair as in the preceding months, but on the whole not so warm. Great dryness of the air was shown by the wet and dry bulb thermometers, a difference of 10° being frequently observed. The amount of bright sunshine was also in excess, but the temp. did not at any time become excessive, though 70° was reached on four days. This truly remarkable season makes one think summer is over; gooseberries are ripe, currants ripe and full coloured, strawberries the same; pears fully 2 inches long, and in fact everything from three to five weeks before its time. The hawthorn, seldom in bloom with us before the 1st of June, long since vanished and haws formed; lilac, laburnum, rhododendrons, all nearly gone. What flowers shall we have for the summer when it comes? The usual cold spell about the 15th, absent. Such a magnificent May month has not been experienced here since 1847. The hay crop will be a sad failure.

GOGERDDAN.—Very dry, with bright sunshine throughout the month. A few T showers.

SCOTLAND.

CARGEN.—In every respect an exceptionally fine month, the mean temp. being $3^{\circ}5$ above the average. There was only one day in which there was absolutely no sunshine. The winds, generally speaking, were light. About two inches of R fell between the 17th and 23rd, which greatly benefited vegetation, and all crops are luxuriant. Strawberries and cherries are ripe in several gardens, and new potatoes and peas have made their appearance at table. T on 18th and 19th, and T and L on 20th.

JEDBURGH.—The weather during the month was highly favourable for all vegetation and seed planting, and the R in the middle of the month greatly improved pastures. Potatoes and bush and tree fruit look well. It is generally stated that vegetation in the memory of living man has never before been in such an advanced stage at the end of this month.

ROEBERRY.—Upon the whole a very fine month. Mean temp. $49^{\circ}6$.

IRELAND.

DARRYNANE ABBEY.—Another dry, hot month. All crops looking well, and very forward, especially potatoes.

WATERFORD, BROOK LODGE.—The first half of the month was very dry, with some east winds. T on the 21st. Mean temp. $55^{\circ}2$. In the two months from March 17th to May 16th, there were only seven rainy days, with 1.24 in. of R.

O'BRIENSBRIDGE, ROSS.—A fine month; no frost; refreshing showers from 15th to 23rd inclusive, and vegetation forward.

DUBLIN.—Like March and April, this month was singularly fine, warm, and for the most part dry. Unlike March and April, however, the amount of cloud was considerable, 6.2, compared with only 4.9 in March and 4.0 in April. Nor was the drought at all as severe as in the two previous months, R falling abundantly at the beginning and in the middle of the month. As regards temperature, this was a "record month," the mean temp. ($56^{\circ}7$) being $4^{\circ}7$ above the average, and $0^{\circ}9$ above that of May, 1868. Solar halos were seen on the 6th and 10th. High winds were noted on only 4 days, never attaining the force of a gale. T heard on the 15th, 20th, and 29th. No H, sleet, or S fell.

WARINGSTOWN.—Fine, warm, and dry; crops looking well, and grass good, but water in drinking places for cattle getting very low.

EDENFEL.—The ideal May of which the poets have informed us, but which we have not experienced here for 30 years, at all events; warm, balmy, with nothing approaching to frost, and just sufficient R to promote a vegetation, earlier by a full fortnight than the average and luxuriant in flowers and foliage of all kinds, of a softness and richness quite unprecedented.