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THE CLIMATE OF ALGERIA.

WE regret that Dr. Thevenet's interesting work* on the climate of France's most important colony has not earlier received that notice which its importance merits.

In the early volumes of the *Met. Mag.* (V. and VI.) we dealt very fully with the rainfall of Algeria, basing our remarks almost entirely upon Prof. Raulin's works, in which he dealt with the records of the fall of rain from 1838 to 1867. We must revert to this matter after giving a general notice of the work now before us, which deals almost exclusively with observations made in and subsequently to 1875, the date at which the meteorological service of the country was re-organized.

Although the work is beautifully printed and liberally illustrated, Dr. Thevenet has not given a map showing the position of his stations. It is strange how frequently the directors of large systems omit this ; probably the facts are so indelibly imprinted upon their own minds that they do not realize, that even with a list of latitudes and longitudes, it gives strangers much trouble to prepare such a map for themselves, and that if once done in their own office (where it would be quite easy to do) it would save all their readers much trouble, or it would induce them to study the work instead of putting it aside until they "had time to find where all the places are."

Temperature.—The subject first dealt with is temperature ; and preceding any figures are several very interesting and clearly expressed paragraphs dealing with the physical geography of the country, and with the conditions of temperature produced by solar heat falling on deep sea, on sandy districts like the Sahara, and on various other surfaces. Then come the tables, and here we find a surprise ; Dr. Thevenet gives elaborate tables of monthly mean maxima, seasonal maxima, and extreme maxima, and corresponding details respecting the minima ; but all through the volume we cannot find the mean annual temperature at a single station. We do not

* *Essaie de Climatologie Algérienne*, par Dr. A. Thevenet, Directeur du Service Météorologique Algérien. Giralt, Alger, Mustapha. 1896, 4to, 120pp. and 44 plates.

see why on pages 15-16 and 19-21 the values for the year were not given, because then it would have been comparatively easy to have got out the means. We hold that in a book like this the author should work out the results completely, and not leave his readers to do so. There is another point upon which no information is given. From pages 3 to 7 it is evident that the period of observation is not identical at all stations, and with so large a number as 61 stations, covering in some cases 20 years (even at 10 years this would give more than 7,000 months), some records must be imperfect, but there is nothing to show how the missing values have been supplied.

The absolute maximum appears to have been 122° F. in the shade at Orléansville, Lon. $1^{\circ} 19' E.$, Lat. $36^{\circ} 40' N.$, altitude 387 ft.

The absolute minimum is stated as $6^{\circ} 8' F.$ at El-Aricha, Lon. $1^{\circ} 23' W.$, Lat. $34^{\circ} 16' N.$, altitude 4,364 ft. Ten or fifteen degrees F. below freezing point is not unusual on the mountains, and sharp frost is not infrequent on the Sahara, but on the Mediterranean coast frost is rare, and at Cap Caxine, a few miles from Algiers, no frost has ever been recorded.

Humidity.—For humidity, as for temperature, no yearly means are given, but the air seems less extremely dry than we imagined; monthly means below 40 per cent. are very rare, except on the high plateaux and on the Sahara. There are, however, some startling figures for the Military Hospital at Ain Sefra (Lon. $0^{\circ} 36' W.$, Lat. $32^{\circ} 50' N.$, altitude 3,560 ft.) where the means for July and August are given as 13·8 and 12·2 per cent.

Evaporation.—As there are here also no yearly totals and the results, except at the Central Office, are from Piche's tubes, we do not quote them; but we may add that, as far as we can make out, the results at Algiers are:—

Piche.		Water Vessel in Shade.		Water Vessel in Sun.
40 inches	... ..	53 inches	.....	77 inches.

Rainfall.—This section is very interesting and amply illustrated by coloured maps, and we have no reason whatever to doubt the accuracy of a single statement, and yet we are not content. The author's mode of dealing with the subject affords pleasant reading, and the plates in this work bring all the facts clearly before the reader's mind. Yet the diametrically opposite mode of treatment adopted by Prof. Raulin has great merits. Prof. Raulin tells all he can respecting the rain gauges used, the positions in which they were placed, and he gives every individual monthly and annual total; so that one can see directly upon what data every mean value is based, and has ample data for studying secular variation. Nothing of the kind can be got out of the present work, except for the single city of Algiers, for which a monthly record is given from 1838 to 1895, composed of four different sets of observations; but as the overlapping portions of the records are not given, and there is no information respecting the position of any of the gauges, we cannot

tell from this book, whether the undernoted differences are due to secular change or to variety in position. The means are :—

		Inches.	Mm.
M. Don, ingénieur des dessèchements.....	1833-47	36·98	939·3
Môle de la Marine et Ponts-et-Chaussées ...	1848-70	28·39	721·1
Hôpital militaire du Dey	1871-83	28·74	729·9
Hôtel-de-Ville d'Alger	1884-95	29·39	746·5
Mean of the whole series		30·16	766·0*

Here we have the last 48 years in three localities agreeing very closely and giving 28·74 inches, and the 10 previous years giving 8 inches, or 29 per cent. more.

The wide divergence of the different records is easily seen by referring to Prof. Raulin's *Observations Pluriométriques faites dans l'Algérie*, Bordeaux, 1876, page 26 *et seq.*; where it will be found that during the six years 1865-70, the Mole, Arsenal, Hospital and Observatory records were all being kept simultaneously, and that the differences between them often amounted to *ten inches*! Our impression is that the true rainfall at, or near, the ground-level is 36 inches, because (1) That was about the mean at the Observatory for 1865-70; (2) It is near that given by the series 1838-47; (3) It is supported by the series for 1855-66 (35 inches) given in *Met. Mag.*, Vol. V., page 50; (4) Several of the gauges giving small totals were very high above the ground, that at the Mole was 12 ft. and those at the Arsenal and Hospital were 20 ft. above the ground; of course they recorded less.

We have been comparing the values given in the present work with those in M. Angot's Memoir in the *Annales Bureau Central Météorologique de France*, 1881, and although M. Angot does explain how he completed imperfect records, we find in it the same absence of original data as in the work now before us. In fact Dr. Thevenet's Memoir of 1896 much resembles M. Angot's of 1883. Dr. Thevenet, however, gives some very effective diagrams of monthly rainfall, which show clearly the wetness of the Algerian winter on the coast and the very small amount at the stations in the interior. At one station, El-Goléa, 1,257 ft. above sea, the average total yearly fall is only two inches and three-quarters (2·82 in.).

In subsequent sections and chapters Dr. Thevenet deals with Hail (very interesting, but we are not sure that regelation plays so prominent a part in its formation as the author seems to attribute to it), Snow, Wind, Barometric Pressure and Weather Forecasting; but our notice is already long, and we must conclude. In doing so, we are glad to say that this book is much more readable than the majority of such works; the author frequently runs off into little disquisitions—semi-physical, semi-meteorological—which, even if one cannot in every case adopt his views, are nevertheless well worth reading, and suggestive. There is, as we have said, no map of the stations, but in all other respects the book is well illustrated.

* Printed as 766·7, which is the sum of the mean monthly values.

RESULTS OF METEOROLOGICAL OBSERVATIONS AT CAMDEN SQUARE FOR 40 YEARS, 1858-97.

APRIL.

ELEMENTS.	MONTHLY MEANS OR TOTALS.						ABSOLUTE READINGS.								
	Mean, 40 years	Highest Month and Date.	Lowest Month and Date.	MEANS 9 A.M. AND 9 P.M.				EXTREMES AT 9 A.M. AND 9 P.M.							
				Mean.	Highest Month.		Lowest Month.		Highest.	Lowest.	Mean of all Highest Lowest.	Mean of all Highest Lowest.			
					Value.	Date.	Value.	Date.					Value.	Date.	
Barometer (cor. & red.) {	1 29.931	2 30.180 1893	3 29.658 1859	4 9 a.m. 9 p.m.	5 29.932 29.931	6 30.184 30.182	7 1893 1861	8 29.664 29.652	9 1859 1859	10 30.722 30.677	11 17th, 1887 16th, 1887	12 28.911 28.885	13 19th, 1876 14th, 1859	14 30.375 30.359	15 29.381 29.371
Dry Bulb..... {	47.3	51.6 1865	43.2 1860	9 a.m. 9 p.m.	48.5 46.1	53.5 50.0	1865 1869	44.2 41.0	87.88 1860	68.0 63.2	20th, 1870 11th, 1869	33.5 31.5	1st, 1887 11th, 1879	58.9 56.3	38.8 36.8
Max.	58.1	..	..	..	..	67.7	1865	52.4	1888	81.4	27th, 1865	40.0	27th, 1861	70.7	46.2
Min.	39.7	..	..	..	..	43.2	1867	35.3	1860	54.8	18th, 1865	24.5	1st, 1859	49.1	29.8
Wet Bulb..... {	44.2	48.1 1865	40.4 1860	9 a.m. 9 p.m.	44.9 43.4	49.3 47.0	1865 1869	40.8 38.8	1887 1860	60.0 57.5	20th, 1870 12th, 1872	31.4 29.8	1st, 1859 12th, 1862	53.5 52.4	36.2 34.5
Solar Rad., black ...	95.5	..	..	..	..	106.0	1870	87.6	1884	122.0	12th, 1871	49.8	8th, 1885	114.8	60.9
Solar Rad., bright..	67.2	..	..	..	..	76.1	1893	61.6	1879	88.4	25th, 1893	45.0	3rd, 1878	80.5	50.9
Grass Minimum ...	35.4	..	..	..	..	39.4	1867	30.2	1892	51.0	28th, 1872	19.4	16th, 1862	46.4	24.5
Soil, 1 foot	45.9	..	..	..	..	49.5	1874	42.2	1888	56.2	28th, 1874	37.4	13th, 1879	50.0	42.0
Cloud {	5.8	7.1 1877	3.1 1893	9 a.m. 9 p.m.	6.2 5.3	8.0 7.1	1877 1869	3.4 2.7	1893	10 10	Every year Every year	0 0	Various Various	10.0 10.0	0.4 0.0
Rainfall {	1.66	4.97 1878	.24 1893	9 a.m. 9 p.m.	.81 .85	3.01 1.96	1878 1878	.10 .02	1863 1893	2.48 .79	11th, 1878 25th, 1882	.00 .00	Every year Every year	.33 .32	.00 .00

Max. Rainfall in 24 hours, 2.56 in., 10th, 1878. Mean max. daily fall, .51 in.

THE DRY WINTER.

WE have received so many notes upon the above subject, that we find it difficult to classify them. We have selected three for publication *in extenso* at the end of this note; partly because of their completeness, and partly because by their distance (Woburn is about 80 miles N. of Worthing) they show the wide area over which the want of water exists. Other notes we must take in abstract.

Romney Marsh.—We were told that the ditches in this district which usually, even in summer, are so full of water as to form fences for the sheep, were dry, and the sheep were crossing them. The rector of Old Romney (the Rev. W. Anderson) was kind enough to write as follows:—"There is no doubt that our dykes and ditches are unusually dry, for this period of the year, and in a few cases the graziers have surrounded their pastures with netting. But the sheep are not running from field to field so universally as your quotation seems to imply. . . . I hear serious apprehensions as to what great trouble there will be in the summer time if the exceptional drought continues." In another letter, he said that one of the principal farmers told him that he did not remember such dryness in March, but his father had often spoken of a great drought in March, 1835.

Tenterden.—The rainfall at this station for the five months September to February, both inclusive, was 6·42 in. instead of 14·07 in., or considerably under half the average. The observer (Mr. Mace) says that his well had (on March 24th) been empty for six weeks, although he had never before known it so for more than one day. Mrs. Mace, who has lived in the house for 55 years, recollects no previous instance; but had heard of one in the summer of 1835. The effect on wells is not uniform, some having water, while others near them have been dry for a long time.

Hitchin.—The dry period may be said to have begun with July, 1897, the following being the average, and the actual, fall month by month:—

Month	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apl.	Total.
Average	2·67	2·33	2·17	2·71	2·29	1·84	2·02	1·47	1·46	1·63	20·59
1897-98	·80	2·07	1·90	·62	1·15	2·32	·54	1·11	1·27	1·30	13·08
Deficiency	1·87	·26	·27	2·09	1·14	+ ·48	1·48	·36	·19	·33	7·51

We can see no other period of ten months equally dry back as far as the record extends, viz., to 1850; but there is a drier *seven* months, viz.:—

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apl.
1879-80	·61	·75	·51	·26	2·08	·86	1·50

but that succeeded a very wet time, and was followed by a dry May (·88 in.).

To the Editor of the Meteorological Magazine.

SIR,—I see by the *Met. Mag.* that you intend to make some mention next month of the dry time we have lately passed through. The enclosed will, I think, be worth publishing.

The dry time began on the 18th March, 1897, and continued to 22nd March, 1898. During this period the rainfall amounted to 16·87 in. This was 7·66 inches, or upwards of 31 per cent. less than the average rainfall of a year. There were 144 rain days. The average amount on each day was ·117 in., and only on 3 days did the fall exceed ·50 in. These small daily quantities, and the very deficient rainfall in October, November, and January, will tell a tale on our underground springs. Indeed, I already hear of short supply.

In the following table I have, for convenience of comparison, taken the complete calendar year April, 1897, to April, 1898. One inch of rain at the end of March, 1898, brings up the total of the year to 17·40 in. This is 7·13 inches, or rather more than 29 per cent., less than usual.

Rainfall at Aspley Guise, Bedfordshire, from 1st April, 1897, to 31st March, 1898, inclusive, compared with the average rainfall for 25 years—1871 to 1895 :—

Month.	Average.		1897-98.			
	Month.	From Apr. 1.	Month.	Difference.	From Apr. 1.	Difference.
IV.	1·65	1·65	1·46	— ·19	1·46	— ·19
V.	1·93	3·58	1·34	— ·59	2·80	— ·78
VI.	1·92	5·50	1·72	— ·20	4·52	— ·98
VII.	2·76	8·26	·35	—2·41	4·87	—3·39
VIII.	2·19	10·45	3·24	+1·05	8·11	—2·34
IX.	2·33	12·78	1·90	— ·43	10·01	—2·77
X.	2·62	15·40	·88	—1·74	10·89	—4·51
XI.	2·59	17·99	1·15	—1·44	12·04	—5·95
XII.	1·86	19·85	2·59	+ ·73	14·63	—5·22
I.	1·84	21·69	·66	—1·18	15·29	—6·40
II.	1·50	23·19	·86	— ·64	16·15	—7·04
III.	1·34	24·53	1·25	— ·09	17·40	—7·13

Yours truly,

EDWARD E. DYMOND.

Oaklands, Aspley Guise, Bletchley, 1st, May, 1898.

To the Editor of the Meteorological Magazine.

SIR.—It may interest you to know how we have fared for rain during the last seven months, since the amount recorded in my gauge is less than for the corresponding period in any previous year since observations commenced here in 1852 :—

	Fall in inches.	Mean Fall, 1852-96.	+ or —	Decess at end of each month. inches.
1897. October ..	0·48	3·89	—3·41	3·41
„ November ..	1·75	3·04	—1·29	4·70
„ December ..	3·35	2·55	+0·80	3·90
1898. January ..	0·81	2·55	—1·74	5·64
„ February ..	1·56	1·80	—0·24	5·88
„ March ..	0·81	1·70	—0·89	6·77
„ April ..	1·02	1·56	—0·54	7·31
Total for 7 months...	9·78	17·09	—7·31	7·31

In the first four months of 1897 there was an excess of rainfall ; but for the last twelve months, *i.e.*, from May 1st, 1897, to April 30th, 1898, there has been a decess ; which has been most marked from October 1st, 1897, until now. In this period only 18·60 in. fell, against a mean amount of 27·95 in. for the forty-five years, 1852-96.

	Fall in inches.	Mean Fall 1852-96.	Decess at end of each month in inches.
1897. May ..	1·03	1·77	0·74
„ June ..	2·40	1·95	0·29
„ July ..	0·33	2·08	2·04
„ August ..	2·76	2·34	1·62
„ September ..	2·30	2·72	2·04
„ October ..	0·48	3·89	5·45
„ November ..	1·75	3·04	6·74
„ December ..	3·35	2·55	5·94
1898. January ..	0·81	2·55	7·68
„ February ..	1·56	1·80	7·92
„ March ..	0·81	1·70	8·81
„ April ..	1·02	1·56	9·35
Total for 12 months ...	18·60	27·95	9·35

In the years 1854, 1855, 1857, 1861, 1892, and 1896, the fall of rain during the first four months of each year was low, and in three of these years it was lower than this year, but in the previous three months there had been a larger amount than in the last quarter of 1897, so that the present year is the driest I can find recorded here ; the amount registered is only two-thirds of the average for the past twelve months.

Last 3 months of	Fall. in.	First 4 months of	Fall. in.	Total Fall for 7 consecutive months. in.
1853.....	9·3	1854.....	3·9	13·2
1854.....	7·5	1855.....	3·0	10·5
1856.....	6·2	1857.....	5·0	11·2
1860.....	8·6	1861.....	5·4	14·0
1891.....	11·89	1892.....	4·08	15·97
1895.....	11·86	1896.....	4·21	16·07
1897.. ..	5·58	1898.....	4·20	9·78

There has been much scarcity of water in the county; shallow wells and springs have given a diminished yield, the ditches and small streams have never been full for some months. The subsoil, however, has remained damp, and the surface has not been dried up by hot weather; hence the meadows and pastures look green, and vegetation has done well through the period.

Yours faithfully,

C. KELLY.

Worthing, May 1st, 1898.

To the Editor of the Meteorological Magazine.

SIR,—I enclose a table showing the mean rainfall of the six winter months, October to March, at five stations in Hertfordshire, for periods of 38 to 48 years, and the rainfall of the three driest winters during the longer period, and indeed for the last 60 years at least. It will be seen that last winter was the driest but one,—that of 1879-80, when the mean rainfall was about an inch and a half less than in the winter of 1897-98. The next driest winter was that of 1890-91, but it had nearly half-an-inch more rain than 1897-98. In the driest winter the fall was less than half the mean. This mean is not quite accurate, being that of varying periods, but it must be very near the true mean.

Yours truly,

JOHN HOPKINSON.

The Grange, St. Albans, May 7th, 1898.

Rainfall of the six winter months, October to March, in Hertfordshire.

Station.	Period.	Winter Mean.	The three driest winters.		
			1879-80.	1890-91.	1897-98.
		in.	ins.	ins.	ins.
Royston	47 years, 1851-98.....	11·28	5·14	7·19	6·66
Hitchin	48 „ 1850-98	12·01	5·07	7·21	7·01
Berkhamsted.....	42 „ 1856-98.....	15·00	6·91	8·36	8·90
Rothamsted	45 „ 1853-98.....	13·92	7·03	8·99	8·46
Bayfordbury	38 „ 1860-98.....	12·87	5·40	8·34	6·84
(Hertford).					
Mean		13·02	5·91	8·02	7·57

(To be continued in our next.)

THE GLOOMY SUMMERS OF 1860 AND 1879, AND THE 19 YEARS' CYCLE.

To the Editor of the Meteorological Magazine.

SIR,—Will you kindly print some memories of an old correspondent, which go to show that a cold, gloomy, rainy summer may be expected for 1898, at least in the midland counties?

The sunless, miserable and dripping summers of 1860 and 1879 must live in the memories of meteorologists as well as in their registers, and that, I think, over the whole of England, though my recollections here given are only of Rutland and the adjoining counties.

I would not argue from only two data that because 19 years from gloomy 1860 brought gloomy 1879, *therefore* another 19 years *must* bring us to a gloomy 1898. But there has been so obvious a parallel between most of the last few years, and those years that preceded them by 19 and 38 years respectively, that ground has been given for watching whether 1898 will not prove like 1879 and 1860.

Thus, before 1860 there came the three brilliant summers of 1856, 1857 and 1858. In my early school-boy days at Uppingham a wet day for a cricket match was a thing unknown, and when in 1860 a long bout of rain in the middle of May was followed by an edict that the cricket ground was *not to be used for some days*, it seemed an outrage on the order of nature. Alas! for some months thereafter we had to be thankfully astonished if we could get a dry wicket at all!

Now, the summers of 1895, 1896 and 1897 have been much like those three glories of 1857, 1858 and 1859; and so also, though not quite so much so, were the summers of 1876, 1877 and 1878; with this further resemblance, that in 1878 and 1897 a very brilliant summer came early to an end, and a wet August spoiled what might have been a good harvest.

Again, 1891 with its frequent floods and constant autumn rains was much like 1872, as 1894 was like 1875. The wet year 1852, with its November floods, which make the earliest of my meteorological memories, comes one year too soon to fit in with the cycle.

Further, the dry and splendid 1893 matched 1874 exactly; the quite unique heat and dryness of 1868 found a fair imitation in 1887; 1884 and 1865 go together as good summers with magnificent autumns, and my father tells me that 1846 may be put with these.

I am writing from memory *only* and away from home, so that probably other parallels could be added to the above, even if much may be said *per contra*. Unhappily, records prior to 1860 are none too many, but you, Mr. Editor, have access to most of them. Can you give us in some future number facts as to the years prior to 1857, whether to confirm or to demolish the theory of a 19 year cycle?

I am, yours truly,

H. A. BOYS,
of North Cadbury, Somerset.

Wing Rectory, Rutland, April 26th, 1898.

REVIEWS.

Ueber das Wetterschiessen am südöstlichen Abhange des Bachergebirges nächst Windisch-Feistritz (Steiermark), von ALBERT STIGER. Fritz Rasch Cilli, 1898, 8vo, 12 pages, 2 plates.

ON page 141 of the last volume of the *Meteor. Mag.* will be found, under the title of "Experiments to drive away Hail," an account of the experiments made by Herr A. Stiger on the prevention of hail-storms by the discharge of vertical cannon. That note it will be seen had been furnished by the United States Consul.

Herr Stiger has received so many letters and enquiries upon the subject that he has written this little pamphlet by way of reply. He points out that it was the serious yearly losses to his vineyards which forced him to make the experiment, and he gives a map which shows that 33 stations have now been provided with mortars specially constructed for the purpose, there are also engravings of the patterns adopted, and details of cost; but he seems to ignore the meteorological side of the subject, and does not give the date of a single storm or any data whereby the success of the system can be tested.

Blue Hill Meteorological Observatory. A. LAWRENCE ROTCH, Director. *Exploration of the Air by means of Kites.* [Excerpt Annals Harvard Obs., XLII., Part I.] Cambridge, U.S.A., 1897, 4to, 88 pages, 8 plates.

THIS may be regarded as the official record of the kite work of the Blue Hill Observatory up to the spring of 1897. As we have on several occasions called attention to this important work, we need now merely state that in this memoir (which is beautifully illustrated) Mr. Fergusson deals with the mechanical part of the subject, explaining fully the patterns of kite used, and the arrangements for determining the height they reach, and also the various forms of recording barographs, thermographs and hygrographs carried up by them. Mr. Helm Clayton in the third part of the memoir reports upon the results obtained. We are glad to see that care is taken to determine the height of the kite trigonometrically whenever possible.

The graphic representations of the results obtained are very well drawn, but if Americans are going to adopt the metric scale, we think that at least they might give the scale in feet, yards or miles on one side of a plate like No. 5.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, April the 20th, at the Institution of Civil Engineers; Mr. F. C. Bayard, LL.M., President, in the chair. The following new Fellows were elected :—James Tertius Collins, J.P., Francis A. Darton, Marten Llewelyn Evans, and Thomas Jordan Heighington.

Major H. E. Rawson, R.E., read a paper on “Anticyclonic Systems and their movements.” Cyclones and anticyclones have long been recognised as powerful weather controls, and their movements studied, but up to the present very little has been written in this country upon the progressive movements of the cores of the high-pressure areas, or anticyclones. The author referred to previous investigations by Abercromby, Scott, Loomis, H. C. Russell and Buchan, and then proceeded to give the results of an examination which he had made of all the available synoptic weather charts for the 11 years, 1881 to 1891. After a preliminary study of the subject, the author found that anticyclones were so frequent in certain localities that he grouped them under the names of “Atlantic,” “Greenland,” “Scandinavian,” and so on. During the period just mentioned (1881–91), there were 212 cases in which the centre or core of an anticyclonic system was over the British Isles, and of these 130 were due to the Atlantic system, 41 to the Scandinavian, and 17 to the Greenland; 22 to the Atlantic and Scandinavian systems extending and merging together, and 2 to the same thing occurring in the case of the Atlantic and Greenland systems. It is thus evident that we owe the greatest number of our anticyclones to the Atlantic system. They occur in all months, but more especially in January, June and October, and are least frequent in April and November. When such anticyclones move away from our area the direction is very much influenced by the season of the year. By far the largest number drift off in some direction between north-east, through east to south, and take the more southerly course in December, January and February. Some few between April and July move west or south-west, and still fewer north or north-west.

The Hon. F. A. Rollo Russell described the results of observations which he had made, chiefly at Haslemere, on haze and transparency during 1897. He found that the greatest clearness occurred with winds from the westward, and the least clearness with winds from the eastward. The highest mean visibility was 24 miles with west winds, and the lowest mean visibility was 10·6 miles with north-east winds.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, NOVEMBER, 1897.

STATIONS. (Those in <i>italics</i> are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.	
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.		
	Temp.	Date.	Temp.	Date.										
England, London	59·1	18	28·0	26	51·0	40·3	43·3	0·100	88	84·1	23·9	1·04	14	7·9
Malta.....	72·1	15	50·2	28	67·0	55·9	52·1	78	138·6	44·5	1·69	11	5·6	
Cape of Good Hope ...	86·1	22	47·1	28	70·7	53·3	52·7	71	...	...	·69	7	5·0
Mauritius.....	86·6	30	64·1	1	83·3	70·1	65·6	72	134·0	56·3	1·05	9	5·9	
Calcutta.....	84·0	4	60·2	30	80·8	65·4	63·4	72	142·2	52·0	·00	0	2·6	
Bombay	90·6	13	69·0	20	87·0	72·0	66·4	66	136·4	57·2	·00	0	0·1	
Ceylon, Colombo	92·2	...	72·0	...	89·3	74·3	72·7	78	153·0	67·0	11·66	13	4·1	
Melbourne.....	99·0	19	43·2	9	74·8	52·1	49·8	63	144·0	33·8	·83	8	5·0	
Adelaide	106·3	10	44·7	3	82·1	57·1	47·2	46	164·6	36·5	·30	6	3·7	
Sydney .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Wellington	66·3	14	39·0	11	62·9	51·1	47·4	70	130·0	32·0	2·35	12	4·0	
Auckland	79·0	28	44·0	11	65·6	52·5	46·0	70	135·0	42·0	1·51	13	5·1	
Jamaica, Kingston	90·7	8	68·7	25a	88·3	71·3	69·4	80	...	...	·48	5	3·4
Trinidad	90·0	9,16	68·0	19	86·8	70·8	72·3	83	168·6	68·0	9·39	18	...	
Grenada.....	85·4	7	71·0	24	82·7	73·4	71·7	74	151·0	...	9·01	25	3·7	
Toronto	59·3	5	19·6	23	44·0	31·9	33·9	81	74·0	12·0	4·18	16	7·8	
New Brunswick, Fredericton	54·8	27	2·7	24	39·8	23·2	24·0	74	...	...	5·97	14	6·8
Manitoba, Winnipeg	58·2	2	—23·6	27	21·3	5·7	...	...	...	...	·72	6	5·3
British Columbia, Esquimalt	55·9	12	27·4	28	46·1	36·4	39·2	94	...	...	7·30	25	8·5

a and 26.

REMARKS.

MALTA.—Adopted mean temp. 59°·4, or 2°·8 below average. Mean hourly velocity of wind 9·2 miles, or 0·1 below average. TSS on 20th, 22nd and 26th; L on 21st and 30th; H on 26th and 30th. J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·6 above, of dew point 1°·4 above, and rainfall ·80 in. below, their respective averages. Mean hourly velocity of wind 10·3 miles, or 0·5 below average; extremes, 23·6 on 18th and 1·6 on 10th. Prevailing direction E.S.E. to E. by N. T. F. CLAXTON.

CEYLON, COLOMBO.—Mean temp. 81°·4 or 1°·7 above, mean dew point 0°·4 above, and rainfall 1·01 in. below, their respective averages. Mean hourly velocity of wind 7·1 miles; prevailing directions N.W., N. and N.N.E. TSS on 10 days, and L on 1st and 29th. Slight earthquake on 17th. H. O. BARNARD.

Adelaide.—A hot, dry month. The mean temp. being 2°·6 above, and rainfall ·69 in. below, the average of 40 years. C. TODD, F.R.S.

Wellington.—Strong N.W. winds almost throughout; showery in the earlier, and dry in the latter, part of the month. T on 10th; S on hills on 10th; H on 10th and 30th. Mean temp. 0°·5 above, and R 1·82 below, average. Earthquakes on 11th and 15th. Solar halo on 19th. R. B. GORE.

Auckland.—Unusually dry, with a predominance of cold S.W. winds. R less than half the average of 30 years; mean temp. slightly under the average. T. F. CHEESEMAN.

JAMAICA, KINGSTON.—In Kingston mean hourly velocity of wind 1·4 miles. Rainfall one-fifth of the average. Island rainfall a little below the average. R. JOHNSTONE.

TRINIDAD.—Rainfall 2·53 in. above the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL,
APRIL, 1898.

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.			in.
I.	Uxbridge, Harefield Pk..	1·18	XI.	Builth, Abergwesyn Vic.	4·20
II.	Dorking, Abinger Hall	1·06	„	Rhayader, Nantgwillt...	4·23
„	Birchington, Thor	·69	„	Lake Vyrnwy	4·33
„	Hailsham	1·22	„	Corwen, Rhug	2·27
„	Ryde, Thornbrough	1·32	„	Criccieth, Talarvor	2·75
„	Emsworth, Redlands ...	1·09	„	I. of Man, Douglas	1·95
„	Alton, Ashdell	1·85	XII.	Stoneykirk, Ardwell Ho.	1·36
III.	Oxford, Magdalen Col..	1·19	„	New Galloway, Glenlee	4·58
„	Banbury, Bloxham	1·85	„	Moniaive, Maxwellton Ho.	4·10
„	Northampton, Sedgebrook	1·76	„	Lilliesleaf, Riddell	3·29
„	Duddington [Stamford].	1·97	XIII.	N. Esk Res. [Penicuik]	2·55
„	Alconbury	1·56	XIV.	Glasgow, Queen's Park..	1·65
„	Wisbech, Bank House...	1·21	XV.	Inverary, Newtown	5·55
IV.	Southend	1·22	„	Oban, The Corran .....	...
„	Harlow, Sheering	1·45	„	Islay, Gruinart School...	1·91
„	Colchester, Lexden	1·12	XVI.	Dollar	2·59
„	Rendlesham Hall	·86	„	Balquhider, Stronvar...	6·97
„	Rushall Vicarage	1·32	„	Ballinluig .....	...
„	Swaffham	1·14	„	Dalnaspidal H.R.S.	5·82
V.	Salisbury, Alderbury ...	1·47	XVII.	Keith H.R.S.	3·11
„	Bishop's Cannings	1·81	„	Forres H.R.S.	1·12
„	Blandford, Whatcombe ..	1·76	XVIII.	Fearn, Lower Pitkerrie..	1·74
„	Ashburton, Holne Vic...	4·05	„	N. Uist, Loch Maddy ...	...
„	Okehampton, Oaklands ..	2·25	„	Invergarry	1·88
„	Hartland Abbey	1·90	„	Aviemore H.R.S.	1·63
„	Lynton, Glenthorne ...	2·08	„	Loch Ness, Drumnadrochit	1·66
„	Probus, Lamellyn	2·17	XIX.	Invershin	5·26
„	Wellington, The Avenue	1·88	„	Dunross	3·20
„	North Cadbury Rectory	1·85	„	Watten H.R.S.	2·41
VI.	Clifton, Pembroke Road	2·23	XX.	Dunmanway, Coolkelur...	7·78
„	Ross, The Graig	1·76	„	Cork, Wellesley Terrace	4·00
„	Wem, Clive Vicarage ...	1·67	„	Killarney, Woodlawn ...	7·16
„	Wolverhampton, Tettenhall	1·24	„	Caher, Duneske	3·16
„	Cheadle, The Heath Ho.	2·30	„	Ballingarry, Hazelfort...	3·96
„	Coventry, Priory Row ...	2·31	„	Limerick, Kilcormac ...	2·42
VII.	Grantham, Stainby	1·86	„	Broadford, Hurdlestown	3·15
„	Horncastle, Bucknall ...	2·41	„	Miltown Malbay	2·95
„	Worksop, Hodsck Priory	2·50	XXI.	Gorey, Courtown House	4·07
VIII.	Neston, Hinderton	1·69	„	Athlone, Twyford	3·70
„	Southport, Hesketh Park	1·98	„	Mullingar, Belvedere ...	3·40
„	Chatburn, Middlewood.	2·03	„	Longford, Currygrane...	4·24
IX.	Melmerby, Baldersby ...	2·89	XXII.	Woodlawn	3·07
„	Scarborough, Observat'y	2·88	„	Crossmolina, Enniscoe ...	4·70
„	Middleton, Mickleton ...	2·83	„	Collonoe, Markree Obs.	3·13
X.	Haltwhistle, Unthank...	3·63	„	Ballinamore, Lawderdale	...
„	Bomburgh	3·01	XXIII.	Warrenpoint	5·80
„	Duddon Valley, Ulpha School	6·40	„	Seaforde	3·20
„	Keswick, The Bank	4·55	„	Belfast, Springfield	3·70
XI.	Llanfrechfa Grange	2·53	„	Bushmills, Dundarave..	3·19
„	Llandovery	4·26	„	Stewartstown	4·73
„	Castle Malgwyn	2·54	„	Killybegs	4·21
„	Brecknock, The Barracks	1·56	„	Horn Head	2·85

APRIL, 1898.

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.	Differ- ence from average 1880-9.	Greatest Fall in 24 hours		Max.		Min.						
				Dpth	Date				Deg.	Date	Deg.			Date.
		inches.	inches.	in.								In shade.	On grass.	
I.	London (Camden Square) ...	1·01	— ·73	·21	27	12	66·5	8	28·9	6	3	10		
II.	Tenterden	1·22	— ·50	·39	26	11	65·0	8	31·0	5	2	13		
III.	Hartley Wintney	1·57	— ...	·32	11	13	68·0	16	...	...	...	18	
III.	Hitchin	1·30	— ·49	·26	27	12	65·0	8	26·0	4	9	...		
IV.	Winslow (Addington)	1·82	— ·10	·35	28	11	67·0	8	23·0	5	9	13		
IV.	Bury St. Edmunds (Westley) ..	1·48	— ·18	·31	27	12	63·0	8	29·0	1	...	...
V.	Norwich (Brundall)	1·22	— ...	·31	26	12	66·0	8	27·4	1	4	11		
V.	Winterbourne Steepleton ...	1·72	— ...	·65	14	15	58·2	26	24·9	6	11	17		
V.	Torquay (Cary Green)	1·27	— ...	·55	28	11	57·6	12	34·0	5	0	6		
VI.	Polapit Tamar [Launceston]..	1·91	— ·31	·66	29	11	62·0	8	24·0	5	5	8		
VI.	Stroud (Upfield)	2·24	+ ·09	·46	11	14	62·0	7, 8	33·0	4	0	...		
VI.	ChurchStretton (Woolstaston)	1·86	— ·48	·44	11	13	64·0	8	31·5	5	1	8		
VII.	Worcester (Diglis Lock)	1·55	— ·16	·26	29	16	...	...	...	...	...	...
VII.	Leicester (Rotherby Hall) ...	2·26	— ...	·88	11	14	...	...	...	...	...	...
VII.	Boston	2·24	+ ·53	·60	11	11	68·0	8	25·0	6	4	...		
VIII.	Hesley Hall [Tickhill]	2·33	+ ·62	·93	11	14	63·0	8	24·0	4	6	...		
VIII.	Manchester (Plymouth Grove) ..	2·09	+ ·38	·70	11	18	67·0	8	32·0	1	1	1		
IX.	Wetherby (Ribston Hall) ..	4·14	+ 2·29	1·82	11	13	...	...	...	...	...	...
IX.	Skipton (Arnccliffe)	6·44	+ 3·01	1·09	6	21	...	...	...	...	...	...
X.	Hull (Pearson Park)	2·88	+ ·96	·97	11	13	68·0	8	27·0	5	6	11		
X.	Newcastle (Town Moor)	2·04	+ ·21	·55	28	11	...	...	...	...	...	...
X.	Borrowdale (Seathwaite)	11·16	+ 4·02	2·61	9	18	...	...	...	...	...	...
XI.	Cardiff (Ely)	1·51	— ·90	·28	8	11	...	...	...	...	...	...
XI.	Haverfordwest	3·11	+ ·48	·87	13	11	61·8	8	25·8	5	3	21		
XI.	Aberystwith (Gogerddan) ...	2·61	+ ·05	·74	11	11	65·0	8	...	...	...	...
XII.	Llandudno	2·19	+ ·38	·65	11	13	65·0	8	32·5	5	0	...		
XII.	Cargen [Dumfries]	4·68	+ 2·45	·76	6	16	59·0	18	23·6	5	2	...		
XIII.	Edinburgh (Blacket Place) ...	1·91	— ...	·57	28	15	61·3	22	28·3	5	1	4		
XIV.	Colmonell	3·50	— ...	·89	13	12	67·0	22	31·0	15	...	...
XV.	Tighnabruaich	3·95	— ...	·65	10	17	58·0	25a	29·0	5	2	...		
XV.	Mull (Quinish)	4·27	+ 1·29	·74	8	21	...	...	...	...	...	...
XVI.	Loch Leven Sluices	3·70	+ 1·48	1·30	29	12	...	...	...	...	...	...
XVI.	Dundee (Eastern Necropolis) ..	4·40	+ 2·35	·95	28	15	59·0	9	26·8	5	3	...		
XVII.	Braemar	4·41	+ 1·99	1·36	13	19	60·6	22	23·2	5	3	16		
XVII.	Aberdeen (Cranford)	5·51	— ...	1·20	29	21	60·0	10b	27·0	4	3	...		
XVIII.	Cawdor (Budgate)	1·64	+ ·12	·35	15	18	...	...	...	...	...	...
XVIII.	Strathconan [Beaully]	5·05	+ 2·24	·82	30	10	...	...	...	...	...	...
XIX.	Glencarron Lodge	5·57	— ...	·90	10	20	65·8	22	28·6	5	1	...		
XIX.	Dunrobin	3·04	+ 1·31	·50	29	15	56·5	24	35·0	12	0	...		
XX.	S. Ronaldshay (Roeberry) ...	4·33	+ 2·72	1·04	15	21	57·0	8	32·0	2, 3	2	...		
XX.	Darrynane Abbey	6·03	— ...	1·40	22	21	...	...	...	...	...	...
XX.	Waterford (Brook Lodge) ...	4·94	+ 2·47	·89	29	16	61·0	27	29·0	1	5	...		
XXI.	O'Briensbridge (Ross)	3·66	— ...	·49	17	19	...	...	...	...	...	...
XXI.	Carlow (Browne's Hill)	4·15	+ 1·87	·77	11c	15	...	...	...	...	...	...
XXII.	Dublin (FitzWilliam Square) ..	2·67	+ ·55	·96	30	16	64·7	7	33·4	5	0	2		
XXII.	Ballinasloe	3·16	+ ·82	·71	12	19	...	...	...	...	...	...
XXIII.	Clifden (Kylemore)	6·50	— ...	1·22	9	15	...	...	...	...	...	...
XXIII.	Waringstown	3·28	+ ·86	·45	30	15	67·0	22	25·0	4	2	10		
XXIII.	Londonderry (Creggan Res.) ..	3·93	+ 1·69	·74	17	24	...	...	...	...	...	...
XXIII.	Omagh (Edenfel)	3·70	+ 1·47	·69	17	18	65·0	21	26·0	4	4	6		

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

a—and 26.

b—and 11.

c—and 30.

METEOROLOGICAL NOTES ON APRIL, 1898.

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.

TENTERDEN.—After the heavy snow-falls of March, dry, cold weather set in again for 4 weeks, broken only by slightly warmer nights and a few showers from 8th to 16th. Only 3 days with temp. above 60°, fewer than in any April since 1891. Warm, showery weather, after a TS on 26th, was very acceptable. Duration of sunshine, 177 hours.

HARTLEY WINTNEY.—The first 10 days were very spring-like, with light, soft and warm S.W. winds. Most of the R fell in the second and last weeks of the month. Keen, harsh N.E. winds prevailed from 19th to 27th. R ·18 in. above the average; mean max. temp. 61°·3, mean min. 30°·2; ozone on 20 days; distant T on 9th.

ADDINGTON.—Frost occurred on grass on a good many mornings, but little damage was done. The weather was favourable for all outdoor operations, and vegetation of all kinds was in a rather advanced state at the end. More than half of the R fell in the last five days. Swallows seen on 9th, cuckoo and nightingale heard on 19th.

BURY ST. EDMUNDS, WESTLEY.—Cold, with several sharp frosts, and only one day with temp. above 60°. Very dry from 13th to 25th, then nice rains and growing weather. Distant T on 10th.

NORWICH, BRUNDALL.—Fine at first, showery about Easter, then 10 days of exceedingly cold E. winds, keeping back vegetation. The month ended with showery weather. Mean temp. 47°·3. R ·45 in. below the average. T and L in evening on 10th; T at 4 p.m. on 16th. Lunar halo on 27th.

WINTERBOURNE STEEPLTON.—The month was dry, with very cold nights. Mean temp. 45°. In the latter half the wind was mostly E. or N.E., and the weather was the reverse of "growing," until R came on the 27th. Fog on 3 days.

TORQUAY, CARY GREEN.—R 1·15 in. below the average. Mean temp. 48°·5, or 0°·4 above the average. Duration of sunshine 192 hours 5 mins., being 13 hours 30 mins. above the average; one sunless day.

POLAPIT TAMAR.—Rather dry on the whole. S.W. gale on 30th. R for the first four months of the year 3·37 in. below the average.

WOOLSTASTON.—A cold and backward month. Mean temp. 47°·8. T with vivid L on 15th; T on 29th; gale on 29th and 30th.

WALES.

HAVERFORDWEST.—April commenced with keen ground frosts and fine bright days. Very low temp. on grass, 12 readings being below 25°. Much of the R fell during the night, so that the month might be characterised as bright and sunny, with very cold nights. Moderate gales from 8th to 10th; the 11th

disastrously wet. Fine weather from 14th until 29th. R and storms at the end. Vegetation very forward and hay very promising.

ABERYSTWTH, GOGERDDAN.—The weather on the whole was very good, with a few nice growing showers.

SCOTLAND.

CARGEN [DUMFRIES].—The cold weather at the end of March continued for the first five days of April, when a welcome change occurred, and the mean temp. from 6th to 14th was 49° . Light S winds prevailed during this time, and gentle R fell each day, except 12th. The temp. during the rest of the month was rather lower, and E. winds blew from 24th to 30th, marring the prospect of an early spring. R the greatest recorded in April in 38 years, 1871 being the only other year with more than four inches. T for several hours on the 29th. S. winds on 20 days. Sunshine slightly exceeded the average. Although by no means an early spring, the weather was very favourable for vegetation, and farm work is in a forward state.

EDINBURGH, BLACKET PLACE.—Mean temp. $2^{\circ}7$ above the average, being the seventh consecutive month with a mean above the average of 134 years. R normal, but bright sunshine (94 hours) much below the mean. Distant T at 2.45 p.m. on 10th; solar halo on 19th.

COLMONELL.—R $1\cdot15$ in., and mean temp. $4^{\circ}0$, above the average of 22 years. H on 4th; T, L and H on 11th.

TIGHNABRUAICH.—A good month for the spring season. T on 30th.

MULL, QUINISH.—Mild, wet, and very unsettled. The rainfall has only twice been exceeded since the gauge was established in 1874; namely, in 1880 and 1882. Vegetation very forward.

ABERDEEN, CRANFORD.—Very cold and wet.

S. RONALDSHAY, ROEBERRY.—The wettest April for 31 years. Mean temp. $44^{\circ}1$, or $0^{\circ}3$ above the average of 8 years.

IRELAND.

DARRYNANE ABBEY.—A wet month; the first half mild and stormy, with a strong gale on 10th.

WATERFORD, BROOK LODGE.—R about double the average. Fog on 4 days; T on 10th and 15th.

O'BRIENSBRIDGE, ROSS.—Rainfall more than the average. Temp. generally low, with squalls and fog. Very little frost. T, L and H, on 14th. Vegetation backward.

DUBLIN, FITZWILLIAM SQUARE.—A mild, genial spring month, very favourable to vegetation. Heavy rains on 11th, 23rd and 30th made up 75 per cent. of the total for the month. A remarkable and sudden increase of temp. occurred between 5th and 6th. Mean temp. $49^{\circ}7$, or $2^{\circ}0$ above the average. Fog on 5 days. High winds on 8 days and gales on 2. H on 10th. Temp. in shade above 60° on 6 days. Solar halos on 4 days; lunar halo on 1st.

OMAGH, EDENFEL.—The wettest April for 34 years except 1871, but following on a dry seed-time, and with a mean temp. somewhat above the average, all crops present a favourable appearance. The principal summer migrants arrived about a week earlier than the average.