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THE BRITISH ASSOCIATION IN SOUTH AFRICA.

[SECOND ARTICLE.]

Our previous report gave an outline of the voyage of the British Association to Capetown and of the scientific meetings held there so far as these were concerned with meteorological matters.

On August 18th and 19th the party set out for Natal, one group making the long railway journey of 930 miles to Johannesburg and 380 miles thence to Durban, but the great majority going by sea direct from port to port, a distance of 900 miles. The weather was remarkably fine, and the sea on the Agulhas Bank for once belied its reputation, for there was no motion to disturb the most susceptible. The *Saxon* and *Durham Castle* entered the harbour of Durban on the morning of August 22nd. In the afternoon one of the very few interludes of bad weather occurred in the shape of a severe thunderstorm, which spoiled a garden-party given to the visitors by the Mayor, although it did not damp the generous hospitality of the people of Durban. On the 23rd an opportunity was offered of seeing the coast scenery south of Durban in an excursion by rail to Lower Umkomaas, where the beach of white sand and black rocks was being lashed with the surf raised by the fresh South-East Trade. The next two days were spent in Pietermaritzburg, the capital of Natal, where the display of well-organized hospitality was, if possible, greater than ever, and two days more led the party through the scene of the battlefields about Colenso and Ladysmith.

Johannesburg was reached on the morning of August 28th, and that marvellous city provided at least two surprises—one, that the plague of dust was worse than had been anticipated; the other, that this town of fifteen years' growth was not a crowd of mean houses on the bare veld, but a place of stately buildings and handsome suburbs, shaded by the quick-growing gum trees. Here the Association resumed its official functions and the second half of the sectional meetings took place. The attendance was rarely large, but there were several papers of real importance, and meteorology and allied branches of knowledge were represented by the following:—

AUGUST 29th. Tuesday.

Sir Colin Scott Moncrieff—*Presidential Address [on Irrigation]*. (Section G.)

AUGUST 30th. Wednesday.

Prof. J. Milne—*Report of the Seismological Committee*, and *Recent Advance in Seismology*. (Section A.)

Report of Kites Committee. (Section A.)

Report of Ben Nevis Committee. (Section A.)

Report of Falmouth Observatory Committee. (Section A.)

R. F. Rendall—*Meteorological Notes from the Natal Observatory*. (Section A.)

C. D. E. Braine—*Notes on Irrigation in South Africa*. (Section E.)

J. Burtt-Davy—*Life-Zones of the Transvaal, their Climate and Crops*. (Section K.)

SEPTEMBER 1st. Friday.

H. Ingle—*Pretoria Rain and its Content of Combined Nitrogen*. (Section B.)

A. J. Herbertson and P. C. Waite—*A New Rainfall Map of Africa*. (Section E.)

C. D. E. Braine—*Irrigation in South Africa*. (Section G.)

No papers were read on Thursday, August 31st, that day being occupied by a visit to Pretoria and the Premier Diamond Mines, at which the largest diamond in the world had recently been discovered.

Mr. R. T. A. Innes, the Director of the Transvaal Meteorological Service, threw his new observatory open to members interested in meteorology and took much trouble in ensuring that everyone should see everything that could be of interest. The observatory is a substantial stone building of one storey on the top of a steep rocky hill in the northern suburbs, too steep and wind swept to be suited for all the purposes of a meteorological station, but the grounds run down to the level on the northern side and an enclosure there contains certain supplementary instruments, including a rain gauge and earth thermometers. The observatory itself is admirably equipped with self-registering instruments of the finest description, and a special feature is a large louvred shed in which thermometers, thermographs and hygrographs are exposed conveniently on tables "in the shade." An evaporation tank has been set up and its readings are likely to prove remarkable on account of the high wind and extremely dry air. As few heights above sea-level have been accurately determined, it is impossible to reduce barometer readings throughout the colony to sea-level. Still serviceable synoptic charts are drawn indicating, not absolute height, but differences from previous readings at the various stations.

The concluding meetings of the Association took place at Johannesburg on the afternoon of September 1st, and after resolutions of thanks for the unprecedented kindness of the welcome afforded it,

the Association resolved itself into its constituent units. South African hospitality, however, did not allow the members to disperse in the usual way, for all those from over sea, with a very few exceptions, were privileged to take part in a unique journey throughout the interior of South Africa in four special trains excellently equipped nnd perfectly managed, the same, in fact, as the party had already travelled in from Durban.

The first stopping place was Bloemfontein, the prettily-wooded capital of Orange River Colony, in the midst of a bare brown veld, showing the full effect of the end of the dry season, and traversed by an empty water-course which in the previous year had risen in flood and wrecked a considerable part of the town.

Mr. James Lyle, of Grey's College, has charge of the meteorological work of the colony, but although there are numerous stations at work, there is no central office or fully equipped observatory specially devoted to the purpose. A new site has been chosen for Grey's College on the veld beyond the town and there a convenient position will be available for giving an excellent exposure.

All day on September 4th was occupied by the journey southward to the Orange River through the dry veld covered with burnt-up grass and low shrubs, but only wanting irrigation to become extremely fertile. At night the trains passed into Cape Colony and turned northward again toward Kimberley, crossing the Modder river in the early morning and reaching the city of diamonds (and dust) in the forenoon. The night before, like several other nights on the high veld, had produced fine displays of sheet lightning in different parts of the horizon, but thunder was not heard and there was no rain. Indeed, the weather throughout the inland journey was intensely dry and one's hair crackled with electricity when being brushed, while once or twice the crepitations from a silk tie hastily drawn off a flannel shirt could be heard a few feet away.

It was one of the chief pleasures of the visit to Kimberley to see Mr. J. R. Sutton at his observatory in the pretty suburb of Kenilworth. Part of the cost of the shelters and instruments was borne by the De Beers Company, but Mr. Sutton, ably seconded by Mrs. Sutton, takes all the observations without any paid assistance in the intervals of a busy business life. The meteorological equipment is remarkably complete and, in addition to the routine, much experimental work has been carried on, the best we believe that has yet been turned out in any part of Africa. The Cape Meteorological Commission is unhappily very poor, but the duty lies upon it to see that this important station has some surer guarantee of permanence than the unsparing efforts of one man. In addition to meteorology, Mr. Sutton has a telescope for astronomical work and a seismograph for observing Earth movements.

Onward from Kimberley we travelled northward for 715 miles over the dry veld, on which the grass gave place more and more to low thorny shrubs and then to thin forest, with the green leaves

breaking out freshly in advance of the rains, until, on the morning of September 9th, we reached Bulawayo. Everything in this remarkable town was a surprise, and none greater than to find the meteorological station kept up by Father Goetz, S.J., one of the many Roman Catholic clergy engaged in educational work in South Africa. Of this we shall have something to say next month.

After visiting the impressive solitude of the Matopo Hills and seeing the majestic simplicity of the tomb of Cecil Rhodes, the party resumed its northward journey across a stretch of forest country, where the station houses are strongly palisaded against lions and other wild beasts. The trains drew up before daylight on the 12th, within hearing of the Victoria Falls. It was the end of the dry season and the water in the river was at its lowest; on this account the scenery of the rock gorges could be fully seen, not being lost, as when the river is higher, in clouds of spray. Low water as it was, the falls rose superior to description. It is enough to remind the reader that the Zambesi, flowing along level with the flat country in a stream a mile wide from bank to bank in a course so tranquil that canoes can ply to within a few yards of the edge, drops suddenly into a chasm in the black basalt rocks, nearly 400 feet deep and varying from 100 to 240 feet across. From this chasm the only escape is a narrow zig-zag gorge in some places not more than 100 feet wide, and through it the river rushes, while over it a single steel arch carries the Cape to Cairo railway into Central Africa.

On the afternoon of September 13th the trains left the falls, and travelling all night in comfortable sleeping cars, the party spent the greater part of each day in seeing a fresh town and receiving new hospitality—at Bulawayo on the 14th, at Salisbury on the 15th, at Umtali on the 16th, and then, entering Portuguese territory, at Beira on the 17th. At each of these places we visited an efficient meteorological station, and were able to see something of the peculiar conditions which sometimes require special modifications of exposure or protection. At Bulawayo on September 14th the dry bulb temperature in the shade was 85°, the wet bulb only 55°, a depression of 30 degrees, showing an amazingly low relative humidity. Such an observation gives point to the remark of Professor C. V. Boys, in his lecture at Capetown, to the effect that in the interior of South Africa water evaporates as rapidly as alcohol does at home.

At the risk of being tedious we must reiterate our gratitude to the countless friends who smoothed the way of the pilgrims of science at every step, and most of all to the ladies of the smallest and the most attractive town that entertained us, Umtali, where we left Rhodesia and British South Africa with a last outburst of that hearty welcome which was a revelation when we first met it at Capetown and always a delight.

For the return journey the Union Castle Company had put one of their steamers, the *Durham Castle*, on the East Coast route as a special favour, and one greatly appreciated. The units of the British Asso-

ciation went on board at Beira, after being entertained by the Portuguese authorities, on the afternoon of September 17th, called at Mozambique on the 19th, and anchored in Kilindini harbour, Mombasa, on the 22nd. The outline of Pemba Island, the meteorology of which has been frequently reported in these pages, was seen afar off, but Mombasa was the first experience of equatorial land. The sun at noon was so nearly vertical that looking down one could see no shadow, and the shadeless sunshine made a wonderful picture in the narrow streets of tall white houses with glimpses of stately cocoa-nut palms tossing in the strong sea-breeze, massive baobabs and deep green mango trees, with the white surf and blue sea behind. The breeze was so fresh that the solar radiation produced no discomfort, and though we were walking about during three of the hottest hours it did not feel by any means so oppressive as a warm August day at home. Those who lived at the place, however, reminded us that a wet day without wind would have produced a very different impression as to warmth.

We sailed on the 23rd and did not anchor again until October 4th at Suez. In the Red Sea we met the usual southerly wind of the southern half, which, thanks to the slow speed of the steamer, was able to overtake and refresh us; and the northern half of the sea brought a strong warm northerly wind, the temperature of which never exceeded 97°, and so, though with a small margin, it had a cooling effect. A delay of a week in consequence of a block in the Suez Canal, permitted of a visit to Cairo to crown this wonderful expedition, and on the 11th we entered the Mediterranean, disembarked at Marseilles on the 17th, and next evening were inspecting the rain gauges at Camden Square.

THE LOW TEMPERATURE OF OCTOBER, 1905.

THE exceptionally low temperatures experienced during the latter half of October, 1905, particularly in the third week, have called forth a considerable amount of comment. So far as we are able to form an opinion from the information at our disposal, the month ranks among the most notable in the last half century for early and protracted frost.

We have made a brief examination of the October record at Camden Square, and the results as to temperature may be conveniently epitomised in the following table, dealing with the month as a whole:—

OCTOBER.	Mean, 1905.	Diff. from aver., 1858-97.	No. of times lower, 1858-04.	Highest 1905.	No. of times lower, 1858-04.	Lowest 1905.	No. of times lower, 1858-04.	No. of days at or below 32°.
	°	°		°		°		
Mean Temperature ...	45·8	—4·0	3	53·8	...	38·4	...	...
Shade Maximum	53·8	—3·7	5	61·0	3	46·9	17	...
,, Minimum	38·7	—4·6	0	52·1	7	27·8	7	5
Minimum on Grass ...	34·0	—5·0	1	48·0	5	23·7	9	13

This shows that the most noteworthy departure from the average was in the case of the minimum on grass, but that the mean shade minimum alone was absolutely unprecedented. The mean minimum on grass was however only lower on one occasion—in October, 1888, with 33°·1. The meaning of this is that although there have often been colder individual days in October than occurred on this occasion, there has never before been an October with so low an average of minimum readings. Of the 13 frosts recorded by the exposed thermometer, 11 occurred on consecutive nights from 16th to 26th.

Almost equally prominent with the low mean minima and prevalence of frost was the persistently low day temperature. The maximum temperature reached 60° on one day only, a quite exceptional record, and there have been but three Octobers in the previous 47 years in which the maximum has not exceeded that of the past month. The mean temperature, as will be seen, was as much as 4°·0 below the average, and it has been lower only three times. Unfortunately details of the mean temperature for individual days throughout the record are not readily accessible, but in the present instance it is interesting to note that the mean temperature rose above the average for the month on 7 days only, and was below that point every day from the 14th onwards.

The areas in which the cold weather was most severely felt were, generally speaking, the southern half of England and the inland counties of Scotland and Ireland. In all of these districts temperatures below 25° in the screen were pretty widely recorded. Readings of 20° or lower occurred at some half-dozen stations in the South of England and Wales, and also at Markree Observatory in Sligo. The lowest figures we can quote with confidence were 16° at Llangammarch Wells, and 17° at Polapit Tamar, near Launceston.

Frosts occurred in the screen on 10 days or more over very much the same areas except in Ireland, where so protracted a frost was confined to the south. As many as 15 frosts were recorded at a considerable number of places in the south Midlands of England and at a few stations in the Lowlands of Scotland. At Swerford, in Oxfordshire, frosts were reported on ten consecutive days from 17th to 26th; at Clonmel, in Tipperary, from 15th to 24th. At Farnham there were eight from 15th to 22nd, and at Epsom and Rendlesham seven consecutive frosts. At Ross, in Herefordshire, grass frosts occurred on 13 consecutive nights, from 16th to 28th, a record which we believe to be unprecedented for October.

PERIODICITY OF RAINFALL.

By Arthur P. Jenkin.

Referring to my letter in the *Meteorological Magazine* for June, 1904, I am now in a position to carry the investigation a stage farther. I have not had access to many rainfall records, but I find that the reversal to which I called attention will carry back the three-year period through the whole series of Greenwich records, as the following table will show, there being seven or eight periods in each series.

Table I.—*Rainfall at Greenwich.*

		in.	in.	in.	in.	in.
Series A	I.	1843...24·47	1846...25·29	1849...23·58	1852...34·01	1855...23·59
	II.	1844...23·20	1847...17·61	1850...19·53	1853...29·99	1856...23·27
	III.	1845...22·34	1848...30·10	1851...23·53	1854...19·01	1857...21·16
					Means... I.	26·19
					II.	22·72
					III.	23·23
Series B	I.	1858...17·70	1861...20·45	1864...16·38	1867...28·46	1870...18·55
	II.	1859...25·83	1862...26·32	1865...28·70	1868...25·15	1871...22·30
	III.	1860...31·90	1863...19·66	1866...30·72	1869...24·02	1872...30·02
	I.	1873...23·36	1876...24·10		Means... I.	21·29
	II.	1874...19·95	1877...27·28		II.	25·07
	III.	1875...27·97	1878...28·98		III.	27·61
Series C	I.	1879...31·36	1882...25·18	1885...24·00	1888...27·51	1891...25·04
	II.	1880...29·68	1883...21·91	1886...24·21	1889...23·28	1892...22·31
	III.	1881...25·72	1884...18·05	1887...19·86	1890...21·86	1893...20·12
	I.	1894...26·89	1897...22·13	1900...22·31	Means... I.	25·55
	II.	1895...19·73	1898...18·85	1901...20·29	II.	22·53
	III.	1896...22·42	1899...22·33	1902...19·34	III.	21·21

Table II.—*Rainfall at Capetown (in percentages).*

Series A	I.	1845 ... 81	1848 ... 90	1851 ... 79	1854 ... 78
	II.	1846 ... 87	1849 ... 95	1852 ... 90	1855 ... 95
	III.	1847 ... 87	1850 ... 130	1853 ... 82	1856 ... 75
	I.	1857 ... 85	1860 ... 113		Means... I. 88
	II.	1858 ... 86	1861 ... 99		II. 92
	III.	1859 ... 142	1862 ... 124		III. 107
Series B	I.	1863 ... 99	1866 ... 74	1869 ... 125	1872 ... 114
	II.	1864 ... 73	1867 ... 89	1870 ... 109	1873 ... 92
	III.	1865 ... 72	1868 ... 78	1871 ... 78	1874 ... 101
	I.	1875 ... 100	1878 ... 159		Means... I. 112
	II.	1876 ... 103	1879 ... 72		II. 90
	III.	1877 ... 138	1880 ... 69		III. 90
Series C	I.	1881 ... 99	1884 ... 110	1887 ... 89	1890 ... 102
	II.	1882 ... 113	1885 ... 108	1888 ... 140	1891 ... 117
	III.	1883 ... 124	1886 ... 108	1889 ... 120	1892 ... 159
	I.	1893 ... 91	(1896 ... 80)		Means... I. 95
	II.	1894 ... 88	(1897 ... 97)		II. 110
	III.	(1895 ... 92)	(1898 ... 118)		III. 120

The years between brackets are for the Cape Peninsula.

I have also extracted from *Nature*, Vol. **57**, p. 115 and Vol. **71**, p. 7, the records for Capetown or the Cape Peninsula for many years, which show the same result, though the number of periods in a series is here six, and the time of reversal does not coincide with Greenwich, which indeed is not to be expected. These are given in Table II.

If then this reversal is to be recognised, it carries back the three-year period through a great many years and over very widely separated stations. The next step is to suggest some reason for the reversal, which I think is not difficult, for I find if one takes a period of three years and a fraction and converts it into a three-year period, reversal occurs in almost exactly the same way as in actual rainfall figures. For example: if a real period of 3·2 years is plotted and then transformed into a period of 3·0 years, reversal takes place at the end of eight periods, as the following table will show. The resemblance between these figures and those of the Greenwich rainfall is very striking. In plotting it is necessary to assume a basis and a range of variation. I have adopted a mean of 30 inches with a variation of 10 inches in either direction.

TABLE III.—*Result of Transforming an Actual Period of* 3·2 *Years into a Period of* 3·0 *Years. (Mean taken as* 30·0 *in. with a variation of* 10 *up and down).*

		in.	in.	in.	in.	in.	in.	in.	in.
Series A	I.	31·0	33·5	35·8	36·6	36·6	35·8	33·5	31·0
	II.	23·1	23·1	24·2	26·0	28·6	31·0	33·5	35·8
	III.	33·5	31·0	28·5	26·0	24·2	23·1	23·1	24·2
Means...	I.	34·2							
	II.	28·2							
	III.	26·7							
Series B	I.	28·5	26·0	24·2	23·1	23·1	24·2	26·0	28·6
	II.	36·6	36·6	35·8	33·5	31·0	28·5	26·0	24·2
	III.	26·0	28·6	31·0	33·5	35·8	36·6	36·6	35·8
Means...	I.	25·5							
	II.	31·5							
	III.	33·0							

It appears then that the apparent period of three years with reversals is a real period of between *three and four years*, which is just what Sir Norman and Dr. Lockyer have observed in meteorological phenomena in India and other widely separated parts of the Earth, which they connect with the occurrence of solar prominences. The evidence for a period thus seems strong, in spite of the negative results which the French records published in this Magazine for July, 1904, show, for if, as Brückner supposes, there are meteorological zones on the Earth's surface, it might well be that some places would not conform to any general rule, and local conditions, too, have sometimes to be taken into account.

With reference to the period of the Earth's polar motion, referred

to in my letter, it would seem that these very minute changes are of an order of magnitude that might be brought about by widespread barometric changes on the surface of the Earth; for, if my reasoning is correct, the greater equatorial diameter of the Earth forming a belt girdling the globe has, by its additional mass, the effect of steadying the poles. If then we imagine a similar belt placed at an angle of 45° to the equator, the axis of rotation of the Earth would be shifted through an angle of 22° 30′. What then would be required to shift the poles through an angle of 0° 0′ 0″·25, which is the limit of motion? This small angle is 1/324000 of 22° 30′, so that a belt at an angle of 45° of a mass 1/324000 of that at the equator will suffice. The equatorial belt has a thickness of about 70,000 ft. and, supposing the specific gravity to be 2, this will be equal to 140,000 feet of water, or 140,000 inches of mercury, of which half an inch of mercury is 1/280,000, being more than the requisite amount. It may be pointed out, too, that it is not necessary for the belt to be complete as the parts at or near the equator may be ignored. If, then, pressure varies over large areas in a certain way, it is quite possible that changes would be caused in the polar motion, and in fact Mr. Kimura, who called attention to the polar period, suggests the effect of meteorological conditions (*Astronomische Nachrichten*, No. 3932); and to refer again to the work of Sir Norman and Dr. Lockyer (*Nature*, Vol. **70**, p. 177), there seems reason to suppose that some such widespread conditions of pressure may exist.

BOOKS RECEIVED.

Notes on a Daily Weather Chart. By A. S. Helps. [Proe. Cotteswold Nat. Field Club. Vol. XV. Part II. May, 1905.] Gloucester, 1905. Size 10 × 6. Pp. 13.

Koninklijk Nederlandsch Meteorologisch Instituut. No. 96. Observations Néerlandaises pour les Etudes Internationales des Nuages, en 1896-1897. Utrecht, 1904. Size 12½ × 9½. Tables and diagrams.

Koninklijk Nederlandsch Meteorologisch Instituut. Nos. 97 and 98. Jaarboek, 1903. Meteorologie en Aard-Magnetisme. Utrecht, 1905. Size 12½ × 9½, Pp. 246 and 34.

Some Results of the Scottish National Antarctic Expedition. [Including Meteorology by R. C. Mossman.] Edinburgh, 1905. Size 9½ × 6. Pp. 40. Frontispiece and maps.

THE TEN MONTHS' RAINFALL OF 1905.

THE Table of aggregate rainfall for the current year shows that the average of the ten months has been exceeded in the north and west of Scotland, though the excess is slight. In all other parts of the country there is still a deficiency which in two areas at least is somewhat serious. The northern area, in which the rainfall has reached less than 75 per cent. of the average, is a comparatively narrow strip along the east coast from about Hartlepool to near Montrose. The southern area, and apparently the drier, extends from Hull south-westward to beyond Derby. A third, though apparently rather less deficient area, lies in the south-west of England, mainly in Devon, Dorset and Somerset, and in South Wales. The south-east of England has been less affected by the reduction of rainfall than any other part of Great Britain south of the Highlands.

The whole central belt of country from Devonshire north-eastward to Hull and from Hull north-westward to Perthshire has had much less than the average rainfall in 1905, and it is highly improbable that the remaining two months will repair the deficiency there.

In Ireland the deficiency is most marked in the west, but is not so considerable as in Great Britain. Taken as a whole, Scotland shows a general rainfall for the ten months equal to 95 per cent. of the average; England and Wales and Ireland have had about 85 per cent.

So far the year has only had two months which were generally wet, March and June, and from many parts of the country serious complaints have arisen on account of the failure of water supplies.

Although the last three days brought a considerable amount of rain in October, the month as a whole was very dry, and a second dry autumn is a serious menace to water supplies, though it bears the promise of a bountiful harvest next year.

Aggregate of Rainfall for January—October, 1905.

Stations.	Total Rain.	Per cent. of Aver.	Stations.	Total Rain.	Per cent. of Aver.	Stations.	Total Rain.	Per cent. of Aver.
	in.			in.			in.	
London	19·14	93	Bolton	33·30	97	Braemar	26·54	92
Tenterden	21·77	97	Wetherby	18·10	80	Aberdeen	23·42	90
Hartley Wintney	19·48	91	Arncliffe	39·50	81	Cawdor	25·27	104
Hitchin	20·08	100	Hull	16·83	76	Invergarry	43·27	100
Winslow	17·08	78	Newcastle	16·53	73	Bendamph	69·10	102
Westley	18·97	91	Seathwaite	91·99	88	Dunrobin	26·12	105
Brundall	19·86	97	Cardiff, Ely	26·43	77	Killarney	35·42	78
Alderbury	21·44	93	Haverfordwest	30·56	82	Waterford	27·24	88
Winterbourne	23·25	77	Gogerddan	35·52	98	Broadford	25·63	95
Torquay	21·48	77	Llandudno	21·78	88	Carlow	23·53	85
Polapit Tamar	25·59	85	Cargen	27·92	82	Dublin	20·48	90
Bath	18·78	75	Lilliesleaf	22·38	84	Mullingar	25·71	87
Stroud, Upfield	21·47	88	Colmonell	30·95	88	Ballinasloe	23·53	79
Woolstaston	22·03	82	Glasgow	22·87	79	Clifden	50·04	79
Bromsgrove	17·10	84	Inveraray	54·11	110	Crossmolina	33·43	86
Boston	18·11	94	Islay, Eallabus	41·38	112	Seaforde	25·77	83
Hodsock Priory	13·92	68	Mull	45·15	101	Londonderry	28·85	88
Derby	14·30	66	Dundee	16·60	71	Omagh	28.84	94

Correspondence.

THUNDERSTORMS.

To the Editor of Symons's Meteorological Magazine.

WITH reference to the correspondence on this subject which has recently appeared in your pages, I may say that I have, for some considerable time past, been actively engaged in collecting information as to the prevalence of thunderstorms in various parts of the United Kingdom, and that I hope to be able to submit the results of the enquiry to the Royal Meteorological Society in the early part of next year. The period dealt with will be the 25 years ending with 1905.

I have already accumulated and plotted data from a large number of stations, but there are some portions of the country which are at present inadequately represented. These are:—

(*a*) The interior of South Wales—say, Carmarthen or the neighbourhood of Llandilo.
(*b*) Lincoln, Doncaster, or the neighbourhood.
(*c*) Essex—somewhere in the neighbourhood of Colchester.
(*d*) Somersetshire—preferably the Taunton district.
(*e*) The west of Ireland—somewhere in the neighbourhood of Galway or Limerick.
(*f*) The south-east of Ireland—the neighbourhood of Wexford or Waterford.

If any of your readers could supply me with records from any of these districts, or could put me in the way of finding them, I should be extremely obliged. The information required is the number of days in each month of the last 25 years upon which thunderstorms, or thunder only, occurred; sheet lightning is not included in the enquiry.

It is very desirable that the records should extend uninterruptedly over the full period of 25 years ending with 1905, but for some ill-represented districts a record for the last 20 years would be acceptable, if that is the best that can be obtained. For the purpose of my enquiry it is not proposed to deal with any set of observations extending over a shorter period than 20 years.

FREDK. J. BRODIE.

12, Patten Road, Wandsworth Common, S.W.

THE RAINFALL OF OCTOBER.

THE peculiarities of October have been worth recording. The barometer was unusually high up to the 29th, with unusually low readings of the thermometers from the 14th to 28th, and the rainfall amounted only to ·59 in. On the morning of the 29th the barometer had fallen in 24 hours from 30·01 in. to 29·46 in. From that day to

the end of the month I registered 1·28 in. of rain. The barometer continued to fall to 29·01 in. on the 1st, and the rainfall, which resulted from the continuance of the same persistent depression of one inch, amounted to ·74 in. for November 1st and ·09 in. for the 2nd, making a total of 2·11 in. for the six days after a dry spell of twenty-seven days.

T. W. SIDEBOTHAM.

The Bourne Vicarage, Farnham,
3rd November, 1905.

UP to and including the 27th of the month, October had proved remarkably dry here, the total rainfall for the period (9 a.m. Oct. 1st to 9 a.m. Oct. 28th) being only ·43 in.

On the 28th, however, a change set in, and the following falls occurred :—

		For October.
October 28th	·33 in.	= 1·94
,, 29th	·11 ,,	+ ·43
,, 30th	1·30 ,,	
,, 31st	·20 ,,	=2·37 in.
November 1st	·70 ,,	
Total of 5 days	2·64 in.	

D. W. HORNER.

Worthing.

CONTRAST IN TWELVE MONTHS' RAINFALL.

I DON'T know if any of your correspondents have noticed the extraordinary difference in the rainfall in the twelve months from March, 1903, to February, 1904, which was 41·48 in. at this station, and the twelve months immediately following, from March, 1904, to February, 1905, which was 19·16 in., a difference of 22·32 in.

I should think this must be a record difference.

G. B. SHOULTS.

North Finchley, N., Oct. 12th, 1905.

[The contrast pointed out by Mr. Shoults is certainly a striking one, and so far as we can see from a hasty inspection of a limited number of records, few show it to a more marked degree than his. We may quote :—

Station.	Rainfall March—Feb. 1903-4. in.	1904-5. in.	Ratio of 1904-5 to 1903-4. per cent.
North Finchley	41·48	19·16	46
Newbury, Welford Park	47·04	21·78	46
London, Camden Square	40·02	17·88	45
Oxford, Magdalen College.....	37·67	16·65	44

ED. *S.M.M.*]

COLD SOUTH WINDS.

MR. BACKHOUSE, in his letter in the Magazine for October, dated 3rd inst., refers to the cold winds from the south at Sunderland, and suggests snow as the cause. I may remark that here winds from S. and S.W. are often very cold, even in summer, and that there is very little snow.

C. S. PRINGLE.

Whitekirk, Southbourne, Hants, 19th October.

SOME WEATHER PROBLEMS.

THE present year is probably one of maximum sunspots.

A steamer leaving England for the Cape in the end of July, meets (as you tell us) with "surprisingly cool" weather right through the tropics.

Without affirming a causal nexus between these facts (which is obviously unwarrantable), we may be reminded by them of what is perhaps one of the best ascertained relations concerning "sunspots and weather." Some thirty years ago Köppen found in the tropics, heat with minima, coolness with maxima. And recently, Nordmann, bringing the inquiry up to date, arrived at the same result.

"This shows that the sun is hottest (gives out most heat) about minima," say some. Not necessarily. There is more to be said, apparently, for the sun being hottest about maxima. And those who take this view account for the tropical coolness about maxima by increased evaporation, cloud, &c.

Let us now turn to another set of phenomena. It has been shown by Hann that our weather in western Europe, in the winter half especially, is largely ruled by the condition of a permanent low-pressure system having its centre about Iceland. When this is deep, or intense, our coasts get flushed with south-westerly winds, and we have warmth; in the opposite case, there is cold.

Again, there seems to be a sort of see-saw between this low-pressure system and one of high-pressure over the Azores to the south. When the pressure in the latter goes up, that in the former goes down, and *vice versâ*. The Azores pressure is generally, but not always, higher than that over Iceland.

Now, there is some reason to believe that our temperature in the early months of the year, March especially, varies with the sunspot cycle, in the sense of warmth with maxima. Thus, about maxima (as shown by Flammarion and others), there is a tendency to earlier springs and earlier vegetation. Curves of early and late flowering of certain plants have been shown to be in agreement with the sunspot curve.

Can we, then, find in the table of Iceland pressures recently given by Hann, indications of sunspot influence? I think we can. The pressure in March agrees in its larger waves very fairly with the sunspot curve, in the sense of low pressures with maxima.

The view I would offer for criticism is briefly this: Sun hottest about maxima. More air then drawn in and up at the equatorial furnace. More air carried over and down in anticyclonic systems north and south. Hence (among other things), more air descending in March over the Azores and lower pressures over Iceland. Hence, in our region at maxima, much south-westerly wind, early spring and early vegetation.

There may be difficulties about this view which I have overlooked. The behaviour of polar ice in relation to the sunspot cycle is a subject which seems likely to come into prominence erelong, and one on which we greatly need more light. Have any differences been observed in polar regions between times of maxima and minima of sunspots? Some seasons are very open; others the opposite. How are these distributed in the eleven years' period?

The low-pressure system over Iceland, when intensified, tends to stimulate the Gulf Stream on the side next us by south and south-westerly winds, and the Labrador Current on the farther side by north and north-easterly winds. In the former case more warm water is carried to northerly regions, affecting, doubtless, the temperature conditions there; and in the latter more ice tends to be carried down to the Newfoundland region to melt in the warm water of the Gulf Stream. This cooled water, if in that portion of the Stream coming to our shores, probably affects our weather for a time; but we need further light on the subject.

A very interesting paper by Dr. Meinardus, dealing with some of these relations, will be found in the September number of the *Meteorologische Zeitschrift.*

ALEX. B. MACDOWALL.

METEOROLOGICAL NEWS AND NOTES.

DR. W. VON BEZOLD is, we are happy to learn, alive and well. Our note last month was given on the authority of a scientific paper, which had no doubt been misled by a Berlin newspaper, confounding another Herr von Bezold, who died in September, with the distinguished meteorologist. What makes the fact more striking is that almost on the same date the great geographer Baron von Richthofen, died in Berlin seventeen years after having been the victim of a precisely similar mistake.

A LECTURESHIP ON METEOROLOGY has been established in the University of Manchester, and Mr. George C. Simpson has been appointed to the post. He is, we believe, the first University lecturer on Meteorology in this country, and the University of Manchester is to be congratulated on taking such an important step forward.

THE ANTI-TRADES, or south-westerly steady breezes blowing above the north-easterly surface trade winds, have been known since

Humboldt's famous observation on the Peak of Tenerife, but there was no direct measurement of the height at which the direction changed, or any demonstration of the permanence of these upper winds until Mr. A. Lawrence Rotch and M. Teisserenc de Bort took the matter up last summer. Their assistants, Messrs. Clayton and Maurice, made a series of kite and *ballon sonde* observations in the Atlantic, during July and August, 1905, and they report that they were able to penetrate the trade winds on many occasions. The north-easterly surface winds reached to heights varying from about 1500 to about 12,000 feet, and in each case the upper wind was found to have a southerly or westerly component.

DR. MAURITS SNELLEN has retired from his position as director of the department of Terrestrial Magnetism and Seismology in the Royal Meteorological Institute of the Netherlands at de Bilt.

SYNOPTIC WEATHER MAPS are now being published by the daily newspapers in Australia, showing the isobars for the whole continent. A series of these charts has reached us from the Meteorological Branch of the Sydney Observatory, and at a later date another specimen has been received from an Adelaide paper. It would appear that the several States of the Commonwealth are collecting data and producing separate maps and forecasts.

FORTNIGHTLY CONFERENCES on meteorological work have been instituted by the Director of the Meteorological Office, mainly for the purpose of affording the staff of the office, meteorological observers, and others interested, an opportunity of discussing published meteorological works, especially those of colonial and foreign meteorologists, in an informal way. At the first meeting on November 6th, Professor Hildebrandsson's report on the International Observations on Clouds was discussed. On Tuesday, November 21st, the subject will be Professor Pettersson's and Mr. Knudsen's Report on the physical work of the International Council for the Study of the Sea. Such meetings should prove useful and help to increase the growing interest in scientific meteorology.

THE ROYAL METEOROLOGICAL SOCIETY'S new scheme for extending public interest in Meteorology, is now in operation. The exhibit of the Society, which consists of a typical climatological station, instruments for the exploration of the upper atmosphere, a large collection of photographs illustrating meteorological phenomena, models, diagrams and charts, has been shown during the past month in connection with the following local societies :—October 11th, at the Walsall Literary Institute, in the New Town Hall, Walsall. October 25th, at the Rochester Naturalists' Club, in the Mathematical School, Rochester. November 3rd—4th, at the Rochdale Literary and Scientific Society, in the Town Hall, Rochdale. At the latter place the local society arranged with the Education Committee for the teachers of the town to visit the exhibit, and have it explained to them. We understand that altogether about 1400 people have inspected the exhibit at the places named above.

RAINFALL AND TEMPERATURE, OCTOBER, 1905.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables in *British Rainfall* to which each station belongs.]	RAINFALL. Total Fall.	Diff. from average, 1870-99.	Greatest in 24 hours. Depth	Greatest in 24 hours. Date.	Days on which .01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date.	Min. Deg.	Min. Date.	No. of Nights below 32°. Shade	No. of Nights below 32°. Grass
		inches	inches.	in.								
I.	London (Camden Square)	1·40	— 1·45	·36	30	14	61·0	9	27·8	22	5	13
II.	Tenterden	1·88	— 1·72	·88	30	15	58·5	4,9,11	26·0	17	7	15
,,	Hartley Wintney	1·62	— 1·46	·52	29	11	57·0	4	23·0	17, 22	10	14
III.	Hitchin	1·49	— 1·23	·51	29	13	58·0	9	26·0	25	12	...
,,	Winslow (Addington)	1·18	— 1·71	·38	29	13	58·0	8	24·0	22, 25	13	16
IV.	Bury St. Edmunds (Westley)	2·05	— ·61	·84	4	19	60·0	9	28·5	17	...	...
,,	Brundall	4·14	+ 1·16	·48	4	26	58·4	9	28·8	26	5	11
V.	Alderbury	1·74	— 1·66	·57	31	10	63·0	1, 4	22·0	16	14	...
,,	Winterbourne Steepleton	2·31	— 2·02	·64	31	14	62·5	9	22·2	17	13	15
,,	Torquay (Cary Green)	2·30	— 1·79	1·09	31	11	62·1	10	31·9	17	1	8
,,	Polapit Tamar [Launceston]	2·58	— 2·39	·58	30	17	63·1	10	17·0	23	12	12
,,	Bath	1·45	— 1·77	·44	31	12	64·5	9	24·0	17	12	19
VI.	Stroud (Upfield)	1·90	— 1·20	·54	15	14	60·0	9	28·0	21	...	...
,,	Church Stretton (Woolstaston)	1·93	— 2·06	·35	15	14	59·0	9, 10	26·0	19*a*	9	...
,,	Bromsgrove (Stoke Reformatory)	·96	— 1·59	·22	31	10	55·0	9	18·0	21	16	...
VII.	Boston	1·63	— ·99	·38	4	15	64·6	9	27·0	27	12	...
,,	Worksop (Hodsock Priory)	1·17	— 1·60	·34	4, 15	13	64·1	9	26·4	17	10	22
,,	Derby (Midland Railway)	1·20	— 1·57	·39	4	16	61·0	9	27·0	14	5	...
VIII.	Bolton (The Park)	5·06	+ ·34	1·21	14	18	55·6	9	29·1	17	3	17
IX.	Wetherby (Ribston Hall)	1·70	— 1·48	·50	15	12	...	...	...	...	...	...
,,	Arncliffe Vicarage	4·44	— 2·11	·87	4	14	...	...	...	...	...	...
,,	Hull (Pearson Park)	2·00	— 1·26	·48	14	21	63·0	9	30·0	17	3	19
X.	Newcastle (Town Moor)	3·06	+ ·12	·78	14	23	...	...	...	...	...	...
,,	Borrowdale (Seathwaite)	12·01	— 1·34	3·45	14	15	58·0	10	25·8	20, 22	10	...
XI.	Cardiff (Ely)	2·76	— 2·05	·65	31	13	...	...	...	...	...	...
,,	Haverfordwest (High St.)	2·01	— 3·62	·44	29	18	61·6	9	22·2	23	9	15
,,	Aberystwyth (Gogerddan)	3·07	— 2·51	·85	26	10	63·0	9, 10	22·0	22	10	...
,,	Llandudno	4·10	+ ·02	·78	7	17	58·0	1, 9	31·5	22	1	...
XII.	Cargen [Dumfries]	2·80	— 1·59	·58	29	11	62·0	9	24·0	17	9	...
,,	Lilliesleaf (Riddell)	2·28	— ·96	·56	14	17	62·0	9	25·0	17	9	23
XIII.	Edinburgh (Royal Observy.)	2·20	...	·71	14	13	60·9	9	31·1	18	3	9
XIV.	Colmonell	4·89	— ·08	·66	26, 29	15	59·0	9	20·0	19	13	...
XV.	Tighnabruaich	6·07	+ ·35	1·25	3	15	56·0	9	27·0	17*b*	10	10
,,	Mull (Quinish)	6·21	+ ·12	·97	28	27	...	...	...	...	...	...
XVI.	Dundee (Eastern Necropolis)	1·90	— ·81	·70	31	14	62·1	9	27·0	20	6	...
XVII.	Braemar	3·85	— ·20	1·03	30	24	62·4	10	24·3	20	8	...
,,	Aberdeen (Cranford)	3·75	+ ·57	·51	30	25	60·0	9, 10	32·0	13*c*	...	...
,,	Cawdor (Budgate)	4·18	+ 1·33	1·08	31	23	...	...	...	...	...	...
XVIII.	Invergarry	3·84	— 1·70	1·21	19	8	...	...	...	...	...	...
,,	Bendamph	9·76	— ·22	1·80	7	28	...	...	...	...	...	...
XIX.	Dunrobin Castle	3·86	+ ·54	·94	30	19	58·0	10	30·0	28	3	...
,,	Castletown	5·77	...	·97	30	30	57·0	10	29·0	18, 19	3	6
XX.	Killarney	2·97	— 3·08	·81	31	14	69·5	10	27·0	18	...	...
,,	Waterford (Brook Lodge)	·74	— 3·26	·27	27	9	67·0	9	22·5	18	11	...
,,	Broadford (Hurdlestown)	1·93	— 1·19	·68	29	14	56·0	3, 10	27·0	19, 20	8	...
XXI.	Carlow (Browne's Hill)	1·08	— 2·40	·25	29	12	...	...	...	...	...	...
,,	Dublin (Fitz William Square)	1·20	— 1·88	·37	2	16	62·9	9	29·0	21	1	13
XXII.	Ballinasloe	1·50	— 1·95	·40	29	17	66·0	12	...	...	...	...
,,	Clifden (Kylemore House)	4·53	— 3·40	·75	26	13	...	...	...	...	...	...
XXIII.	Seaforde	1·59	— 2·23	·51	29	10	61·0	8	29·0	18*d*	5	8
,,	Londonderry (Creggan Res.)	2·67	— 1·78	·54	14	22	...	...	...	...	...	...
,,	Omagh (Edenfel)	2·10	— 1·62	·31	3, 28	20	62·0	9	22·0	19	8	11

+ Shows that the fall was above the average; — that it was below it. *a* and 20, 21, 22. *b*—and 18, 19. *c*—and 15, 17, 18. *d*—and 19, 21.

SUPPLEMENTARY RAINFALL, OCTOBER, 1905.

Div.	STATION.	Rain. inches	Div.	STATION.	Rain. inches
II.	Dorking, Abinger Hall	1·89	XI.	New Radnor, Ednol	2·55
,,	Ramsgate, West Cliff	1·80	,,	Rhayader, Nantgwillt	4·75
,,	Hailsham	2·65	,,	Lake Vyrnwy	3·73
,,	Crowborough	2·28	,,	Ruthin, Plâs Drâw	2·83
,,	Osborne	2·43	,,	Criccieth, Talarvor	3·96
,,	Emsworth, Redlands	1·57	,,	Anglesey, Lligwy	4·04
,,	Alton, Ashdell	2·38	,,	Douglas, Woodville	3·61
,,	Newbury, Welford Park	2·42	XII.	Stoneykirk, Ardwell House	3·08
III.	Harrow Weald	1·28	,,	Dalry, Old Garroch	4·81
,,	Oxford, Magdalen College	1·28	,,	Langholm, Drove Road	3·43
,,	Banbury, Bloxham Grove	1·04	,,	Moniaive, Maxwelton House	3·59
,,	Pitsford, Sedgebrook	·95	XIII.	N. Esk Reservoir [Penicuick]	2·25
,,	Huntingdon, Brampton	1·18	XIV.	Maybole, Knockdon Farm	3·37
,,	Wisbech, Bank House	1·41	,,	Glasgow, Queen's Park	2·61
IV.	Southend	1·00	,,	Campbeltown, Redknowe	5·74
,,	Colchester, Lexden	·99	XV.	Inveraray, Newtown	6·30
,,	Saffron Walden, Newport	1·29	,,	Ballachulish House	5·13
,,	Rendlesham Hall	1·98	,,	Islay, Eallabus	6·01
,,	Swaffham	3·02	XVI.	Dollar	3·43
,,	Blakeney	3·18	,,	Loch Leven Sluices	1·99
V.	Bishops Cannings	1·78	,,	Balquhidder, Stronvar	4·30
,,	Ashburton, Druid House	2·45	,,	Coupar Angus Station	1·86
,,	Okehampton, Oaklands	3·47	,,	Blair Atholl	2·44
,,	Hartland Abbey	1·94	,,	Montrose, Sunnyside	1·77
,,	Lynmouth, Rock House	3·33	XVII.	Alford, Lynturk Manse	4·78
,,	Probus, Lamellyn	2·07	,,	Keith	7·59
,,	Wellington, The Avenue	1·96	XVIII.	N. Uist, Lochmaddy	4·09
,,	North Cadbury Rectory	2·01	,,	Aviemore, Alvey Manse	4·18
VI.	Clifton, Pembroke Road	2·03	,,	Loch Ness, Drumnadrochit	3·68
,,	Moreton-in-Marsh, Longboro'	1·59	,,	Glencarron	8·77
,,	Ross, The Graig	1·57	,,	Fearn, Lower Pitkerrie	2·97
,,	Shifnal, Hatton Grange	1·24	XIX.	Invershin	4·22
,,	Wem Rectory	1·28	,,	Altnaharra	4·35
,,	Cheadle, The Heath House	2·38	,,	Bettyhill	6·35
,,	Coventry, Kingswood	1·33	,,	Watten	4·67
VII.	Market Overton	1·05	XX.	Cork	·92
,,	Market Rasen	2·44	,,	Darrynane Abbey	2·13
,,	Bawtry, Hesley Hall	1·01	,,	Glenam [Clonmel]	·90
VIII.	Neston, Hinderton	1·87	,,	Ballingarry, Gurteen	1·49
,,	Southport, Hesketh Park	2·87	,,	Miltown Malbay	1·85
,,	Chatburn, Middlewood	3·81	XXI.	Gorey, Courtown House	·86
,,	Cartmel, Flookburgh	3·62	,,	Moynalty, Westland	1·50
IX.	Langsett Moor, Up. Midhope	3·75	,,	Athlone, Twyford	1·39
,,	Scalby, Silverdale	4·48	,,	Mullingar, Belvedere	1·63
,,	Ingleby Greenhow	4·12	XXII.	Woodlawn	2·04
,,	Middleton, Mickleton	1·67	,,	Westport, Murrisk Abbey	2·76
X.	Beltingham	2·47	,,	Crossmolina, Enniscoe	3·00
,,	Font Reservoir, Fallowlees	3·71	,,	Collooney, Markree Obsy	3·53
,,	Ilderton, Lilburn Cottage	3·98	XXIII.	Enniskillen, Portora	2·14
,,	Keswick, The Bank	4·31	,,	Warrenpoint	1·08
XI.	Llanfrechfa Grange	2·55	,,	Banbridge, Milltown	1·17
,,	Treherbert, Tyn-y-waun	4·43	,,	Belfast, Springfield	1·65
,,	Carmarthen, Friary	2·71	,,	Bushmills, Dundarave	3·44
,,	Castle Malgwyn	3·27	,,	Stewartstown	1·59
,,	Plynlimon	8·95	,,	Killybegs	3·16
,,	Tallyllyn	2·30	,,	Horn Head	3·74

METEOROLOGICAL NOTES ON OCTOBER, 1905.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; 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 AND WALES.

LONDON, CAMDEN SQUARE.—The weather was fine as a rule, with many exceptionally beautiful days particularly in the middle. The first half was rather sunless and the latter half decidedly cold,‡ with many frosty nights. Mean temp. 45°·8, or 4°·0 below the average. Duration of sunshine 93·9* hours, and of R 16·3 hours.

ABINGER HALL.—Cold and frosty, with N.W. to N.E. winds for the greater part. The last week was showery and warmer, with strong S. and S.W. winds.

TENTERDEN.—Damp at first, but deficient R till the last three days. Very cold from 17th to 26th, but with sunny days generally. Autumn tints and the fall of the leaf began unusually early. Duration of sunshine 113·2* hours. TS on 30th.

CROWBOROUGH.—Cold but fine, with several brilliant days. Nearly all the R fell during the last week, when the weather became milder. R 1·91 in. below the average. Mean temp. 44°·4. TS with much L and H on 30th.

HARTLEY WINTNEY.—The chief feature was the prolonged period of cold, with persistent N. wind, cloudy days, and absence of fog and gales. The few closing days robbed the month of its distinction as a phenomenally dry one. Ozone occurred on 22 days with a mean of 4·8.

PITSFORD.—Altogether cold and uncomfortable, although many days were bright. R 2·13 in. below the average. Mean temp. 44°·3.

BURY ST. EDMUNDS.—Cold, with R in small quantities on 19 days. Ponds and rivers were nearly dry and deep wells were getting low.

BRUNDALL.—An ungenial month. The mean temp., 44°·8, was the lowest for October since the register was commenced in 1883. The R was excessive, being caused by shallow depressions passing in a southerly direction and affecting the E. coast while the westerly anticyclone kept the weather dry in all places to the W.

TORQUAY.—Mean temp. 49°·3, or 2°·7 below the average. Duration of sunshine 133·0* hours, or 20·4 hours above the average. Mean amount of ozone 4·0.

NORTH CADBURY.—Remarkable for calmness, sunshine, dryness of air, and temp. in every respect much below the normal. It was, however, a pleasant and healthy month, with roads clean and soil in magnificent working order. There was a complete change on 28th to S.W. winds, normal warmth, low pressure and much R.

CLIFTON.—The first week was showery, then fine and dry with occasional slight R till 25th, with northerly winds, low temp. and night frosts. The last few days were mild and rainy with S.W. winds. R little more than half the average.

ROSS.—Unsettled, with frequent light R till 7th, then cold but very dry till 28th. The last three days were wet. There was continuous ground frost every night from 16th to 28th, an unprecedented length of time.

BOLTON.—A cold but dry month. Mean temp. 43°·9, or 3°·0 below the average. The R was above the average, but fell mostly in large amounts, leaving the air remarkably dry. Duration of sunshine 56·7* hours, or 3·8 hours below the average.

SOUTHPORT.—Normal during the first fortnight and towards the close, but remarkably cold from 16th to 26th, under the influence of dry N.N.E. winds. It was exceptionally sunny during the cold period. Mean temp. 3°·3 below the average. Duration of sunshine 23* hours above the average. Total

* Campbell-Stokes. † Jordan. ‡ See p. 177

R 1·07 in. below the average. Mean underground water level lower than in any previous October since the record commenced.

BELTINGHAM.—Very cold nights from 15th to 22nd, especially from 16th to 19th, when the temp. fell to 10° below freezing each night. S on 15th.

LILBURN COTTAGE.—From 1st to 14th seasonable weather prevailed, but on 15th a heavy S storm came on at 3.30 p.m. and lasted for two hours. Heavy S again on 18th. The Cheviots were covered from 15th to the end. R much above the average; very low temp. from the middle till the end.

LLANFRECHFA GRANGE.—Fine with moderate R, but unusually low temp. from 16th to 26th. There was, however, a good deal of warm sunshine.

CARMARTHEN.—Remarkably fine and dry, but cold with morning frosts. Favourable for working on the land, but water supplies getting low.

HAVERFORDWEST.—The coldest and driest October for 56 years, the air being generally dry and keen. Low grass minimum temp. from 16th to 29th. Broken weather from 26th to the end. Duration of sunshine 118·0* hours.

DOUGLAS.—Cold, but with excess of sunshine. The period from 17th to 25th was brilliantly fine. The first and last weeks were wet, the bar. falling to 29·04 in. on 30th, when it was mild and stormy. L on 29th.

SCOTLAND.

CARGEN.—Abnormally cold and dry for the first three weeks. Severe frost from 16th to 25th played serious havoc in the garden and caused an unusually early fall of the leaf.

LANGHOLM.—R 1·47 in. below the average of 29 years. Severe night frost with sunny days from 15th to 25th.

COUPAR ANGUS.—Mean temp. 43°·2, or 1°·4 below the average. Bright sunshine and little R till 15th, followed by severe morning frosts. R again below the average, being with the exception of March the eleventh month in succession with a deficiency.

DRUMNADROCHIT.—R ·19 in., and rainy days 3·5, greater than the average of 19 years. The chief feature was the unusual cold, culminating in the sharp frosts of 14th to 18th, when the exposed iron pipes for the main water supply were frozen.

BETTYHILL.—There was scarcely a whole dry day throughout the month, and the R was unusually heavy. On two occasions more than 1·25 in. fell in 24 hours. There were frequent high winds.

IRELAND.

CORK.—Remarkable both for low temp. and small R, the min. temp. on 18th and 21st, 26°, being the lowest in October for 23 years. The R was the smallest since 1879.

DARRYNANE.—The driest October in 25 years except in 1899, the R being only 39 per cent. of the average. Of the total, 1·44 in. fell in the last six days. It was a cold month, with constant E. wind for the first three weeks.

WATERFORD.—The driest October for 56 years, and with mean temp. much below the average.

DUBLIN.—Generally favourable with a small but frequent R, and almost continuous low temp. after 13th. Mean temp. 47°·2, or 2°·2 below the average of 30 years. Duration of sunshine 110·7* hours. Prevailing winds N.W. and W. Only one stormy day.

MARKREE OBSERVATORY.—On the first few days R fell heavily at times, with fogs and rather low temp. Frost set in on 17th, remaining for a week, being severe on a few nights. Showery towards the end and cold at times.

OMAGH.—A month of chiefly polar and easterly winds, deficient R, and, during the third week, the lowest mean and actual temp. ever registered in October. It was, notwithstanding, a favourable month for farming operations.

Climatological Table for the British Empire, May, 1905.

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.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	83·2	29	35·1	23	66·1	44·5	44·0	68	128·1	28·4	1·18	9	5·3
Malta	89·5	23	53·1	3	74·1	58·9	56·6	76	133·8	48·0	·59	5	2·8
Lagos	92·0	5	72·5	25	87·9	75·7	74·4	72	143·0	65·0	7·15	16	6·6
Cape Town	79·6	5	41·1	21	65·6	49·4	51·3	82	...	...	4·53	17	5·1
Durban, Natal	83·3	2	49·9	29	76·8	58·6	...	...	137·2	...	·81	5	3·3
Johannesburg	71·2	8	30·0	28	63·9	46·0	39·8	64	129·5	29·2	·35	3	1·3
Mauritius	81·7	14	60·6	16	78·6	66·6	65·8	81	140·2	52·2	3·35	20	6·7
Calcutta	100·7	23	67·4	10	92·0	76·8	75·6	78	155·8	65·9	10·01	8	5·4
Bombay	92·1	16	77·2	1	90·7	80·5	76·7	75	141·0	71·6	·00	0	3·0
Madras	107·9	29	76·1	4	96·8	80·4	74·4	70	144·9	74·1	·06	1	3·8
Kodaikanal	74·7	5	50·9	28	69·9	54·8	52·4	74	149·0	43·7	6·52	13	5·3
Colombo, Ceylon	89·4	5	73·8	24	87·2	77·6	75·5	84	151·4	73·0	13·54	26	7·0
Hongkong	89·4	20	68·4	4	83·0	74·3	72·1	82	148·5	...	6·83	11	6·6
Melbourne	83·7	7	38·4	21	63·7	47·6	48·0	79	131·2	32·0	2·97	10	6·5
Adelaide	85·2	6	40·8	10	67·8	51·1	47·2	66	133·8	36·3	3·58	11	5·4
Coolgardie	86·2	3	38·0	7	68·0	49·6	47·7	66	146·9	35·0	1·63	13	5·6
Sydney	76·1	8	47·7	30	65·8	53·3	51·1	82	106·9	39·7	5·20	26	5·3
Wellington	65·5	14	43·0	15	58·6	48·2	46·0	77	111·0	39·0	5·78	15	5·9
Auckland	68·0	4	45·0	18	61·9	50·7	50·0	80	126·0	42·0	2·29	11	5·4
Jamaica, Negril Point	87·5	27	69·0	8	85·8	72·2	72·9	80	...	...	9·80	19	...
Trinidad	91·0	1,2*a*	68·0	30	87·6	71·0	71·9	76	164·0	66·0	4·34	13	...
Grenada	86·0	14	72·0	18	83·9	74·7	69·6	73	144·8	...	4·61	17	3·7
Toronto	75·6	25	31·9	1	62·5	42·9	45·8	71	89·5	26·6	3·23	15	5·6
Fredericton	76·8	26	23·9	13	61·6	38·3	33·6	49	...	...	1·94	11	5·2
Winnipeg	80·5	31	27·0	6	62·5	38·3	...	...	...	...	3·35	11	5·8
Victoria, B.C.	72·2	26	37·8	18	59·2	45·9	...	...	...	...	2·83	13	6·2
Dawson	78·5	25	25·5	2	59·9	38·7	...	...	...	...	·97	4	4·1
Lagos { January	92·0	7	71·0	15	88·8	75·6	70·2	75	139·0	65·0	·04	1	3·5
Lagos { February	91·0	7,9,16	69·0	6	89·1	74·5	70·2	68	139·0	61·5	1·04	1	2·8

a and 15.

MALTA.—Mean temp. of air 64°·8, or 0°·6 above average. Mean temp. of sea 64°·7. Mean hourly velocity of wind 8·8 miles, or 1·2 below average.

Mauritius.—Mean temp. of air 0°·2 below, dew point 0°·5 above, and R ·34 in. below, averages. Mean hourly velocity of wind 9·6 miles, or 1·7 below average.

MADRAS.—Bright sunshine 211·6 hours. Dust storm on 15th.

KODAIKANAL.—Bright sunshine 206 hours. Frequent TSS.

COLOMBO.—Mean temp. of air 81°·8 or 0°·6 below, of dew point 0°·2 above, and R 1·49 in. above average. Mean hourly velocity of wind 9·4 miles; prevailing direction S.W.

HONGKONG.—Mean temp. of air 78°·1. Mean direction of wind E.S.E.; mean hourly velocity 10·1 miles. Bright sunshine 212·0 hours.

Adelaide.—Mean temp. of air 1°·8 above, R ·83 in. above, averages.

Sydney.—Mean temp. of air 1°·2, and humidity 5·8 above averages.

Wellington.—Mean temp. of air 0°·4 above, and R 1·19 in. above, averages.

TRINIDAD.—Rainfall ·41 in. above 40 years' average.