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THE PARIS EXHIBITION AND ITS CONGRESSES.

IN 1878 we were able to begin our articles descriptive of the Paris Exhibition in our May number, but it would not have been wise to do so this year, owing to the backwardness of the exhibitors. Our notice of the exhibits, and of the utilization of the Eiffel Tower, must now stand over until the autumn. Meanwhile our French friends are very desirous that the Congresses, of which they have arranged a multitude, should be largely attended.

There are two which chiefly concern meteorologists—and, rather inconveniently, they are not consecutive—so that visitors must either make two journeys, give up one of the two Congresses, or remain in France from September 19th to October 10th, or 20th, if they stop for the excursion to the Thermal establishments in the Vosges.

The precise dates are :—

Meteorology, September 19th to 26th.

Hydrology and Climatology, October 3rd to 10th.

Excursion to health resorts, October 11th to 20th.

METEOROLOGY.

Members will consist of all persons interested in the science, and who send 12 francs to the President of the Congress, M. Renou, 7, Rue des Grands Augustins, Paris.

They will receive a card of admission to all the meetings during the week, and to the excursion, and a copy of the report of the papers read, and of the discussions upon them.

The programme of subjects to be discussed is quite alarming. Some persons might be tempted to say that it includes all branches of meteorology. It does not, but it certainly gives a remarkable proof of the development of this branch of science, and on that account we translate it *in extenso*.

Pressure.—On the reduction of barometer readings to sea level pressures. Verification of the relations between the barometric gradient and the velocity of the wind. Difference between the effects of equal gradients in summer and in winter.

Temperature.—Comparison between the temperature indicated on various thermometer stands and that shown by the *thermomètre fronde*. Decrease of temperature with altitude. Distribution of solar heat over the globe. Secular change of climate.

Wind.—Choice and graduation of anemometers. Results of recent measures of the vertical component of the wind.

Vapour.—Measure of the water in a liquid state suspended in the atmosphere. Accurate measure of evaporation from different surfaces.

Clouds.—Progress made in various countries in the observation of cirrus. Measurement of altitude of clouds. Cloud photography. Classification. Definition of nimbus.

Precipitation.—What progress has been made in the measurement of very slight rains, and of dew. Rainfall at sea. Study of floods, and of warnings against them, in various countries.

Influence of cosmic phenomena.—Lunar and solar atmospheric tides. Influence of sunspots on meteorological phenomena. Lunar influences.

Weather forecasting.—Researches destined to improve it.

Various.—Measure of the intensity of solar radiation. Actinometry. Polarisation of the atmosphere. Transparency of the atmosphere for various rays of the spectrum. Scintillation of the stars. Optical phenomena.

Magnetism.—Relation between magnetic phenomena and earthquakes. Magnetic disturbances and sunspots. Study of earth currents. Magnetic observations at sea.

Electricity.—Modes of observing atmospheric electricity. Relations between electricity and other meteorological phenomena. Aurora.

Storms.—Recent progress in the study of. Barometric oscillations during.

Applications of Meteorology.—Relation between meteorological phenomena and phenological phenomena. The migration of birds and appearance of insects. Application of meteorology to agriculture and to hygiene.

Our verdict upon this programme is, that if it be carried out, the members will have to be carried out also, and will certainly have to spend the interval between it and the Hydrological Congress on October 3rd, under medical care. In fact, it will be only the trip to the Vosges, October 11th to 20th, which will restore them to mental equilibrium. The programme cannot be fully carried out, but it is useful as indicating the field outside of which the discussions must not wander.

HYDROLOGY AND CLIMATOLOGY.

THIS is the second meeting of the Congress, of which the first was held at Biarritz in October, 1886. We yield to no one in our esteem for M. Renou, the director of the Parc St. Maur Observa-

tory, but we cannot help thinking that somebody has imposed too much on his good nature, in asking him this year to preside over this congress as well as over that upon meteorology. Of the Meteorological one, he, as President of the Meteorological Society, could hardly refuse the Presidency, but we cannot help thinking that it is, as we say, "working the willing horse too hard" to have thrown the Hydrological Congress also upon him.

The general arrangements are much the same as for the Meteorological Congress, except that members have to send 20 francs instead of 12, and that the 20 francs has to be sent to M. Doin, 8, Place de l'Odéon, Paris, and that it is proposed to circulate *in advance* printed copies of the papers to be discussed.

The programme of subjects for discussion is very much shorter than that for the Meteorological Congress; it is divided into three sections, of which we omit the one dealing with Medical Hydrology.

Scientific Hydrology.

1. Precautions necessary for determining accurately the temperature of thermal springs.
2. Relations between mineral waters and geological formations.
3. On micro-organisms in mineral waters, and their influence on the composition and properties of those waters.
4. On the influence of theories as to microbes on thermal therapeutics.
5. On the origin of the gas contained in mineral waters, and on the share which it has in their properties.
6. On the vapours escaping from mineral waters, and on their transformations.
7. Programme of instruction in Hydrology.

Climatology.

1. Conditions which should govern the establishment of a Meteorological Observatory established chiefly for medical purposes.
2. Organization for announcing coming weather at health resorts; rules for weather forecasting.
3. Climatology of various health resorts.
4. Comparison and classification of health resorts according to their climate.
5. On the action of mountain climates on affections of the lungs.
6. On the action of maritime climates in tubercular affections.
7. Programme of instruction in Climatology.

The general meetings will be at the Trocadéro, the sectional ones at the Faculté de Médecine; the latter will usually last from 9 a.m. till noon, and from 2 till 5 p.m.; during the week there will be an excursion to Pierrefonds and Compiègne, and two others, one to Enghein and the other to the Observatory at Parc St. Maur.

On October 11th will commence an excursion of nine days in the Vosges, starting from Nancy, and visiting, among other places,

Plombières, Luxeuil, Contrexéville and Bourbonne-les-bains. As was the case with the excursion to the Pyrenees, the railway companies will allow members to travel at half-price.

We ought not to omit to state that, as regards this congress and excursion, it is expressly stated that ladies can qualify as members by the same payment as gentlemen, and will enjoy similar rights and privileges.

THE DORSETSHIRE WATERSPOUT OF JUNE 7TH.

Thanks to the Rev. H. J. Poole, of Stowell Rectory, Somerset, who has visited the district, photographed some of the damage, and favoured us with copies, and with notes of what he saw, we are able to add considerably to the note on page 75 of our last number and to give a compact account of what occurred.

In Dorsetshire, 15 miles North of Weymouth, and 12 miles inland from the English Channel, near Bridport, is the small town of Cerne Abbas, which is to be found on almost every map. About two miles N. of Cerne Abbas there is a range of hills running generally W.-E., and from the Northern slope of these hills several small streams flow, which eventually form the river Yeo, which passes Yeo-vil, joins the Parrett, and finally discharges into the Bristol Channel. The highest point on these hills is known as High Stoy, and that it is a commanding position is proved by its having formerly been a station for one of the old semaphores—the word “telegraph” remaining on the Ordnance Map.

It was close to this that the waterspout fell. *The Times* reporter said, “It has now been ascertained that a waterspout burst on Batcombe Hill. * An eye-witness described it as a solid stream of water of about the thickness of a man’s body. It tore up the ground to a considerable depth, and forced a channel for its escape down the hillside.” Mr. Poole had evidently never before seen the effects of a waterspout, and, while recording with strict accuracy what he saw, was rather puzzled. He approached High Stoy from the west, and says, “The road all the way up was much washed, deep pits occurring at intervals. About 7 or 8 ft. below the summit, or plateau of High Stoy, I found the deepest excavations of all; they were then (June 18th) filled in, but the roadmen assured me that they were 8 or 9 feet deep. The road was slightly washed above these pits, and the course of the torrent could be so far easily traced, but above and around them there was not the slightest trace of any disarrangement of the soil. The mystery is—supposing that this was a very heavy fall of rain in a thunderstorm, the water concentrating

* Batcombe is a village at the foot of Batcombe Hill, the eastern extremity of which is sometimes called Batcombe Hill, sometimes (and more appropriately) High Stoy.

at the union of the two combs down which it poured—how came these deep pits very nearly at the summit ? ”

Evidently the facts are, as Mr. Poole points out, quite inconsistent with the effects of a heavy rain, which would cause most mischief where the water was brought together by the configuration of the country—but though there was very heavy rain—perhaps 4 or 5 inches—that would not tear holes 8 or 9 feet deep in a road on the flat top of a hill. Such damage is by no means rare—a closely parallel case in Yorkshire is described in the *Meteorological Magazine* for July last (p. 84)—and there is no doubt that *The Times* correspondent's statement as to the “ solid stream of water about the thickness of a man's body ” is strictly correct. It is only by such a column of water as he describes that these holes can be excavated, and there is no doubt that over the small area (probably less than a yard across, but moving) the fall of water would have to be measured, not by inches, but by feet or yards ; most of the water ran away northwards, but some southwards through Minterne and Upcerne, where damage occurred.

Mr. Poole followed the Northern portion, which went through Batcombe and Heniford to Chetnole, and he has sent us interesting photographs of the damage. At Batcombe the rush of water undermined the front of a cottage, so that it had to be shored up, and the pig sty at the end was completely washed away. About a mile further down the stream was Heniford Mill, the damage to which was reported in our last. A mile further is the village of Chetnole, and there the very well-built garden wall perhaps 100 feet in length, of Major Digby's house, was thrown over in large masses, and a greenhouse overturned.

The nearest rain gauge stations to the High Stoy are Cattistock Lodge, which is five miles S.W. ; Melbury, which is five miles W.N.W. ; and Hazelbury Bryan, which is seven miles E.N.E. of High Stoy—we have the pleasure of adding at the end reports from the observers at these stations. It is much to be regretted that the Rev. H. Pix, who used to observe at Minterne, removed from there in 1887, and did not succeed in finding any one to continue the record, otherwise that would have been the nearest station, being within a mile of High Stoy.

There are just two remarks which we desire to add in concluding our notice of this subject.

(1) That Mr. Poole's visit, photographs and report, well illustrate the excellent service which the widely-distributed rainfall observers can and do render to the progress of knowledge.

(2) That it is much to be regretted that no record seems to have been preserved as to whether the water was fresh or salt. Our impression is that it was probably sea water lifted from the English Channel by a whirlwind, and dropped upon the top of High Stoy.

SIR,—I am sending a report of the very big rainfall of Friday last, the 7th of June. The thunder and lightning were incessant, accompanied by torrents of rain lasting for three hours, from 2.45 till 5.45 p.m., when I ventured out to measure the fall, it being no less than 3.78 inches; for the 24 hours ending Saturday morning the fall was 3.84 inches. This is an accurate report; no one could be more precise in measuring.

I may mention that it was about four miles from here, where a waterspout burst on Batcombe Hill the same day, as reported in the *Standard* of Monday last.

ARTHUR CHAPPLE.

Cattistock Lodge, Dorchester, June 14th, 1889.

P.S.—I forgot to say that the fall for the 24 hours ending at 8 o'clock Friday morning 7th, was .96 in.; as no rain fell on Thursday, 6th, till after 6 p.m., more than $4\frac{1}{2}$ inches of rain fell in the 24 hours ending 6 p.m. on 7th.

SIR,—In answer to your enquiry as to the fall of rain here at the beginning of June it was :—

		in.	
June	1st .....	.18	
	„ 6th.....	.20	Thunder and lightning.
	„ 7th.....	.32	„ „
	„ 9th.....	.20	
	„ 10th .....	.07	
	„ 11th.....	.03	
		<hr/>	
		1.00	

No more afterwards up to the present time. We had continuous thunder and lightning all through the 6th and 7th, and on the latter it was considered somewhat fearful, but we had not torrents of rain as at Batcombe, &c. High Stoy is at the north or north-east end of Batcombe-hill, a road runs along the top from Evershot station to Minterne. The hill, as seen on the western side, has a sharp-edged appearance, but on the top it is strikingly flat for a considerable distance; towards Batcombe village (which lies in a curve at the bottom) the top narrows. On the other and Cerne Abbas side is a steep, narrow valley leading to Sydling. Traces of the storm are all about; the road leading down to Batcombe village was quite impassable in the lower parts; great holes washed out, the size of some of the stones, too, quite surprising.

T. C. ELLIOTT.

Melbury House Gardens, July 6th, 1889.

SIR.—The rainfall here on June 7th was less than an inch, .95 in.

R. F. WHEELER.

Hazelbury Bryan.

THE DROUGHT.

THE general table on page 94 is peculiar, in that not one station in the British Isles had its average rainfall in June. Generally a dry month in one part of the British Isles is a wet one in another. But here we have Seathwaite with very little more than half as much as London, and a dry month everywhere. We append a few letters from correspondents in very widely scattered localities, and at the end of them a few cuttings illustrative of the effects of the drought.

CAMDEN SQUARE, LONDON.—There was from the 16th of June until July 7th, an absolute drought of 22 days—the only longer ones since 1857 have been 1863, June 27th to July 20th, 24 days; 1865, June 4th to June 28th, 25 days; 1880, March 8th to March 30th, 23 days; 1880, August 9th to September 5th, 28 days; 1887, June 9th to July 3rd, 25 days.—G. J. SYMONS.

INGLESIDE, KENLEY, SURREY.—I herewith send you particulars of a dry period here which has just terminated, and which may be interesting to you.

	in.	
June 11th.....	·02	
„ 15th.....	·03	
July 7th.....	·01	21 days absolute drought.
„ 8th.....	·10	
„ 9th.....	·33	28 days ·16.

The dry period has been very favourable for the hay gathering, the crop of which is said to be larger, and obtained in better condition, than for 20 years.—HAROLD SMITH.

TENTERDEN.—The three weeks from June 16th to July 6th were absolutely rainless, except for a little moisture on July 3rd, which did not give ·005 in. Last night we had ·30 in., and on 7th and 8th, ·13 in. and ·10 in. The drought was beginning to be felt at last. Only ·91 in. in June, and 1·30 in. in May, giving a total less than in 1887, and nearly as small as in 1870, though 50 per cent. more than in 1868 and 1884. Three days with temp. above 80° in June, more than I have had since 1881.—J. ELLIS MACE.

SEDGEBROOK, NORTHAMPTON.—From June 10th to July 8th there was here a partial drought, the amount of rain being only ·10 in., which fell on two days; and from May 29th to July 8th the total fall was only ·65 in. This is the longest drought here since 1887, when there was an absolute drought from June 4th to July 3rd, and from June 4th to July 13th a partial drought, for only ·15 in. fell. During the period mentioned, this year, there was no great heat, the highest shade temperature being 78°·9, and the weather uniformly pleasant.—C. A. MARKHAM.

BLOFIELD, NORWICH.—Rainless from June 11th to July 6th, both inclusive; only ·01 in. on 7th, and no rain on 8th; ·48 in. on 9th closed the drought.—A. W. PRESTON.

BECKFORD, TEWKESBURY.—The welcome rain has come at last, terminating the drought, which has lasted just a month.

From June 11th to July 8th, both inclusive, or for a period of 28 days, no rain fell at Beckford.

This is almost equal to the absolute drought in 1887, when we had 31 consecutive rainless days.—FREDK. SLADE.

ROTHERBY HALL, LEICESTER.—Total rainfall June, 1889, .59 in. Driest June in previous 20 years, 1874, .64 in.—J. HAINES.

FOX HILL, FRODSHAM.—I give particulars of the rainfall, as it is the smallest in any month that I have recorded in the 16 years I have kept a gauge—June 1st, .18 in. ; 2nd, .08 in. ; 8th, .10 in. ; 9th, .03 in. ; total, .39 in.—JAMES REYNOLDS.

ALEXANDRA PARK, MANCHESTER.—June was remarkably dry, and the authorities are beginning to be anxious about the water supply, and have already recommended the greatest economy.—J. CASARTELLI.

HURST BANK, HEATON, BOLTON.—The longest drought, or rather the longest period with the least rainfall, registered by me since I commenced taking the rainfall in 1863, has just come to an end.

On the 1st and 2nd June .58 in. fell—chiefly during a TS from 7.45 to 8.15 a.m. on the 2nd—after which day, until the 9th July, only .09 in. fell, namely, .03 in. on the 8th, and .03 in. on the 14th June, and .03 in. on the 6th July. An absolute drought reigned from 15th June to 5th July inclusive—21 days ; and a partial one from June 3rd to July 8th inclusive—36 days, during which only only .09 in. fell.

The rainfall on the 9th July was .32 in., with every prospect of a continuance.

The next longest drought was in 1887, when, from June 4th to July 8th inclusive—35 days—only .21 in. fell, and there was an absolute drought from June 9th to July 3rd inclusive—25 days.—JAMES WATKINS, F.R.MET.SOC.

PAWSTON, CORNHILL-ON-TWEED.—June proved an unusually dry month, beating even the record of the Jubilee year. After the thunderstorm of the 2nd, only .23 in. of rain fell up to July 3rd ; all pastures are much burnt, and corn prospects have been very much spoilt by the three weeks or so of drought.—B. P. SELBY.

TREVALYN HALL, WREXHAM.—The period of drought, which has now terminated, has been unusually protracted, and absolute for 25 days. I therefore send you the rainfall for last month and up to the present date, showing that, with a very slight exception (on June 13th), an absolute drought prevailed here from June 8th to July 9th, a period of 30 consecutive days. It has been a glorious time for securing the hay crop, which, owing to a wet April and a showery May, has been very abundant. We had a remarkable hail-storm on June 2nd, the hail consisting of very large and irregularly-

shaped cubes of ice, which caused much destruction to greenhouses in this locality.—B. T. GRIFFITH-BOSCAWEN.

Rainfall at Trevalyn Hall, Rossett, Denbighshire. Above sea level, 58 feet.

		in.	
June	1st.....	·16	
„	2nd	·30	Thunder and hail, 3 p.m.
„	8th	·12	
„	13th	·02	
July	9th	·09	Bar. falling and drought apparently terminated.
Total fall in 39 days		·69	

BLACKET PLACE, EDINBURGH.—No rain fell here from June 15th to July 2nd, and only ·08 in. in 27 days.—R. C. MOSSMAN.

BUSHY HILL, CAMBUSLANG.—I send note of drought and rainfall :—

Absolute drought from June 15th till July 5th, both inclusive—20 days—0·00 in.

Partial drought from June 3rd till July 8th, both inclusive—36 days—0·11 in.

0·83 in. of rain fell on 2nd June, 0·60 in. on 9th July from 5 p.m. till 9 a.m. of the 10th.—HENRY MUIRHEAD.

SCARCITY OF WATER AT GLOSSOP.—The extensive paper mills belonging to Messrs. Olive and Partington, at which a large number of hands is employed, will be stopped shortly if the present fine weather continues, owing to scarcity of water.—*Sheffield Independent, June 28th.*

SCARCITY OF WATER AT GLOSSOP.—A large number of employés at Captain Partington's extensive paper mills, Glossop, are working only three and four days a week, owing to the scarcity of water, and it is stated that, if the present drought continues much longer, it is probable the whole of the hands will have to work short time. Other large mills in the town are seriously affected by the dry season.—*Sheffield Telegraph, July 5th.*

LANCASHIRE AND DISTRICT.—The prolonged dry weather is causing much anxiety to those connected with the supply of water to the public in this district. At Manchester particularly is this the case, and the continuance of the drought is beginning to tell heavily upon the supply in store, the springs which feed the reservoirs being at a very low ebb indeed. The consumption, on the other hand, seems to be increasing daily, and reaches as much as seven million gallons per day in excess of the quantity consumed under ordinary conditions. Still, there is a very fair quantity in store, and up to now the Water Works Committee have not thought it needful to limit the supply in any way. In some of the outer districts of Rochdale the supply is giving out, and the inhabitants have to resort to wells and springs, which are generally available as a last resource.

In some parts of Cheshire also much inconvenience is being met with, while in North Wales several quarries are at a standstill owing to the lack of water to work the machinery used. Unless rain speedily falls, some thousands of men employed at the quarries will be thrown out of employment. Altogether matters are getting serious, and a smart downfall of rain would be hailed with satisfaction throughout the district, especially as the farmers have practically got their hay safely barned.—*Gas and Water Review*, July 6th.

WATER FAMINE IN CHESHIRE.—Owing to the protracted drought, no rain having fallen since the hail and rain storm a month back, there is a water famine in all the Cheshire villages which depend upon local or irregular supplies. At Saughall a meeting of residents is summoned to consider the question, as wells and water pits are all dried up.—*Notts Daily Guardian*, July 18th.

THE DROUGHT IN LINCOLNSHIRE.—The continued absence of rain is causing serious misgivings respecting the crops in Lincolnshire. No rain has fallen for over a month, and the growing crops are sadly in need of moisture. The roots are especially suffering, and it is feared, if the dry weather continues much longer, the mangolds and turnips will be a failure. In many parts of the district the dykes and ponds are rapidly drying up, and farmers are in some instances under the necessity of carting water to their cattle.—*Sheffield Telegraph*, July 10th.

ROYAL METEOROLOGICAL SOCIETY.

THE last meeting of this Society for the present session was held on June 19th, at the Institution of Civil Engineers, 25, Great George-street, Westminster, Dr. W. Marcet, F.R.S., President, in the chair.

Mr. T. J. Moss-Flower, Mr. A. H. Halder, Mr. R. A. Naylor, and Mr. C. B. Penlington were elected Fellows.

Mr. W. Marriott gave an interesting account of the thunderstorms which prevailed over the country during June.

On Sunday, June 2nd, a thunderstorm passed in a northerly direction from Wiltshire about 3 a.m., and reached Edinburgh by 10.44 a.m. It travelled at the rate of about 50 miles an hour. It is possible that this storm travelled still further north, and reached Kirkwall at 3.37 p.m. A severe thunderstorm prevailed over the neighbourhood of the Tweed between 11 a.m. and noon, and was accompanied by hail of very large size, some of the stones being five inches in circumference. A very destructive storm occurred over the whole of the North-west of England and South of Scotland during the afternoon of the same day; much damage was caused by lightning, and very large hail fell over an extensive area. Some of the hail-stones measured seven inches in circumference and weighed seven

ounces. During the night of the same day a severe thunderstorm prevailed over Norfolk, which was also accompanied by very large hailstones, some of which were five to six inches in circumference.

On Thursday, the 6th, thunderstorms prevailed during the afternoon over the whole of the South-east of England. That which passed over the Metropolis about nine o'clock was remarkable for the brilliant and continuous display of lightning. During the same night, and in the early morning of the following day, a very destructive storm prevailed over the Eastern Counties, much damage being done by the lightning in the North-west of Norfolk. Severe hailstorms occurred between 2 and 3 a.m., both at Margate and Ipswich.

During the afternoon of the 7th, destructive thunderstorms prevailed over the whole of the Southern Counties, much damage being done by lightning, while at Tunbridge Wells there was a most remarkable hailstorm. One of the hailstones, which was weighed, was actually half-a-pound in weight.

An interesting collection of more than 40 photographs of lightning taken during the storm on June 6th was exhibited to the meeting. In addition to the sinuous, ribbon and meandering flashes of lightning, several photographs showed knotted, multiple and dark flashes.

The following papers were also read :—

“The Climate of British North Borneo,” by Mr. R. H. Scott, M.A., F.R.S.

“On the Variation of the Temperature of the Air in England during the period 1849 to 1888,” by Mr. W. Ellis, F.R.A.S., F.R.Met.Soc.

“Atlantic Weather and Rapid Steamship Navigation,” by Mr. C. Harding, F.R.Met.Soc.

“Meteorological Phenomena observed during 1875-87 in the neighbourhood of Chelmsford,” by Mr. Henry Corder.

“Rainfall in China, and Meteorological Observations made at Ichang and South Cape in 1888,” by Dr. W. Doberck, F.R.Met.Soc.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, DECEMBER, 1888.

STATIONS. (Those in italics 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	58·9	5	25·9	31	46·2	36·2	38·5	91	69·9	19·2	1·29	9	5·6
Malta	71·2	1	43·7	9	63·2	53·9	50·1	79	117·4	36·5	1·67	7	6·4
Cape of Good Hope. ...	92·5	25	50·2	28	75·2	58·9	...	...	...	...	1·23	6	5·2
Mauritius	85·0	18	66·0	18	82·3	72·4	69·4	79	137·3	59·3	12·64	23	7·1
Calcutta	79·2	1	51·3	26	75·0	54·6	53·4	60	130·6	41·5	·00	0	0·6
Bombay	90·4	18	67·0	30	86·0	71·3	65·0	64	136·6	52·4	·00	0	0·8
Ceylon, Colombo	91·0	18	69·8	31	85·4	72·6	70·0	78	150·5	65·6	6·93	11	6·7
Melbourne	96·4	26	47·2	2	78·6	56·2	54·6	66	149·4	34·7	2·72	9	5·2
Adelaide	107·5	25	48·9	22	86·8	62·9	51·7	45	155·4	42·7	·28	8	4·2
Wellington	71·0	24	44·3	14	64·0	50·3	50·5	78	140·0	34·0	2·43	14	4·0
Auckland	75·0	23	43·0	14	66·6	52·4	48·3	67	139·0	36·0	1·26	9	5·0
Jamaica, Kingston	93·5	3	66·1	15	89·3	70·1	69·7	76	...	...	1·11	...	...
Barbados .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	46·7	25	0·0	22	35·7	23·1	25·3	78	...	—10·0	·83	22	8·1
New Brunswick, Fredericton	50·3	27	— 7·6	14	29·9	12·4	20·2	78	...	...	3·59	16	6·7
Manitoba, Winnipeg ...	35·2	4, 9	—14·0	13	22·1	2·3	12·3	90	...	...	·48	10	4·8
British Columbia, Victoria	59·0	3, 4	26·0	24, 25	48·2	37·7	...	...	...	...	1·96	13	...

REMARKS, DECEMBER, 1888.

MALTA.—Mean temp. $57^{\circ}\cdot 7$; mean hourly velocity of wind 9·8 miles. Sea temp. fell from $65^{\circ}\cdot 4$ to $62^{\circ}\cdot 1$. TS on 19th; L on 4th and 27th. R only half the average. J. SCOLES.

Mauritius.—Mean temp. of air $0^{\circ}\cdot 4$ below, of dew point $1^{\circ}\cdot 7$ above, and R $6^{\circ}\cdot 83$ in. above their respective averages. Mean hourly velocity of wind 9·3 miles, or 2·0 miles below average; extremes 19·8 on 8th and 2·0 on 21st. Prevailing direction, E. by N. T on 3rd, 24th, and 31st. T and L on 30th. Inundation in some parts of the island on 28th. C. MELDRUM, F.R.S.

Melbourne.—Mean temp. of air $3^{\circ}\cdot 2$, of dew point $4^{\circ}\cdot 0$, humidity 1, R $\cdot 23$ in., and pressure $\cdot 070$ in. above average; mean amount of cloud $0\cdot 4$ below average. Prevailing winds S.E. and S.; strong on 8 days. Very sultry and oppressive on 9 days. T and L on 13th, and heavy TS on 31st. R. L. J. ELLERY, F.R.S.

Adelaide.—The hottest December, with one exception, on record, the mean temp. being $3^{\circ}\cdot 8$ above the average; the hottest Christmas-day ever known in Adelaide. Mean min. considerably higher than any previously recorded. R one-third of the average. On the 31st the drought had commenced to break up in the far N. and extreme W., and on January 1st, 1889, some of the heaviest floods recorded were experienced over the colony generally. Total fall of R for the year $14^{\circ}\cdot 57$ in., one of the smallest amounts on record, the fall having been less in only three years since the foundation of the colony. C. TODD, F.R.S.

Wellington.—Fine weather generally, but strong winds from W. and N.W.; showery at the commencement, during the middle, and at the end of the month, but the total rainfall small. Distant T and L on 9th. Mean temp. $3^{\circ}\cdot 6$ and R $1^{\circ}\cdot 51$ in. below the average. R. B. GORE.

Auckland.—An unusually cold month, the mean temp. being 5° below the average. R not half the average; pressure rather above the average. T. F. CHEESEMAN.

SUPPLEMENTARY TABLE OF RAINFALL,
JUNE, 1889.

[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.
II.	Dorking, Abinger Hall.	1·00	XI.	Castle Malgwyn	·71
"	Margate, Birchington...	1·61	"	Rhayader, Nantgwillt..	·99
"	Littlehampton	·88	"	Carno, Tybrith ...	·46
"	Hailsham	·24	"	Corwen, Rhug	·66
"	Ryde, Thornbrough	·66	"	Port Madoc	·57
"	Alton, Ashdell	·92	"	I. of Man, Douglas	·36
III.	Oxford, Magdalen Col...	1·90	XII.	Stoneykirk, Ardwell Ho.	·90
"	Banbury, Bloxham	1·31	"	New Galloway, Glenlee	·86
"	Northampton	·88	"	Melrose, Abbey Gate...	·98
"	Cambridge, Beech Ho...	2·41	XIII.	N. Esk Res. [Penicuik]	1·50
"	Wisbech, Bank House..	1·26	XIV.	Ballantrae, Glendrisaig	·49
IV.	Southend	2·10	"	Glasgow, Queen's Park.	·91
"	Harlow, Sheering ...	1·35	XV.	Islay, Gruinart School..	·91
"	Rendlesham Hall	4·22	XVI.	Dollar	·64
"	Diss	1·41	"	St. Andrews, Pilmour Cot	·82
"	Swaffham	1·86	"	Balquhiddel, Stronvar..	1·56
V.	Salisbury, Alderbury...	2·26	"	Dunkeld, Inver Braan..	·56
"	Warminster	2·61	"	Dalnaspidal H.R.S. ...	1·13
"	Bishop's Cannings	1·23	XVII.	Keith H.R.S.	·82
"	Ashburton, Holne Vic...	·41	"	Forres H.R.S.	·32
"	Hatherleigh, Winsford.	·71	XVIII.	Strome Ferry H.R.S....	·76
"	Lynmouth, Glenthorne.	·74	"	Fearn, Lower Pitkerrie.	·64
"	Probus, Lamellyn	·86	"	Loch Shiel, Glenaladale	...
"	Launceston, S. Petherwin	·65	"	N. Uist. Loch Maddy ...	1·35
"	Wincanton, Stowell Rec.	·99	"	Invergarry	·30
"	Taunton, Lydeard Ho...	·57	"	Loch Ness, Drumnadrochit	·33
"	Wells, Westbury	·68	XIX.	Lairg H.R.S.	·97
VI.	Bristol, Clifton	·51	"	Forsinard H.R.S. ....	...
"	Ross	·41	"	Watten H.R.S.	·70
"	Wem, Clive Vicarage ...	·51	XX.	Dunmanway, Coolkelure	1·67
"	Cheadle, The Heath Ho.	·57	"	Fermoy, Gas Works ...	1·96
"	Worcester, Diglis Lock	·97	"	Tipperary, Henry Street	1·64
"	Coventry, Coundon	1·05	"	Limerick, Kilcornan ...	·68
VII.	Ketton Hall [Stamford]	·73	"	Miltown Malbay	1·06
"	Grantham, Stainby	·36	XXI.	Gorey, Courtown House	·26
"	Horncastle, Bucknall ...	·52	"	Navan, Balrath	·00
"	Mansfield, St. John's St.	·59	"	Mullingar, Belvedere ...	·83
VIII.	Neston, Hinderton	1·18	"	Athlone, Twyford	1·49
"	Knutsford, Heathside ...	·66	"	Longford, Currygrane...	·98
"	Lancaster, South Road.	1·61	XXII.	Galway, Queen's Coll...	1·05
"	Broughton-in-Furness ..	1·75	"	Clifden, Kylemore	2·41
IX.	Wakefield Prison	·46	"	Crossmolina, Enniscoe..	1·67
"	Ripon, Mickley	·35	"	Collooney, Markree Obs.	·89
"	Scarborough, West Bank	·37	"	Ballinamore, Lawderdale	·77
"	East Layton [Darlington]	·22	XXIII.	Warrenpoint	·03
"	Middleton, Mickleton...	·14	"	Seaforde	·41
X.	Haltwhistle, Unthank..	·83	"	Belfast, New Barnsley .	·53
"	Shap, Copy Hill	2·31	"	Bushmills, Dundarave...	·78
XI.	Llanfrechfa Grange	·77	"	Stewartstown	·34
"	Llandoverly	·73	"	Buncrana	·78

JUNE, 1889.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						No. of Ni t below 32°					
		Total Fall.	Difference from average. 1870-9	Greatest Fall in 24 hours.		Days on which ·01 or more fell.							
				Dpth	Date.								
		inches.	inches.	in.				TEMPERATURE		In shade	On grass.		
								Deg.	Date	Deg.	Date.		
I.	London (Camden Square) ...	2·03	— ·64	·61	9	6		84·5	6	46·9	1	0	0
II.	Maidstone (Hunton Court)...	1·20	— ·87	·77	9	4		...	...	...	...	...	...
III.	Strathfield Turgiss	1·12	— ·98	·42	2	11		81·1	27	43·0	1	0	0
III.	Hitchin	1·72	— ·41	·70	10	6		80·0	2	48·0	10d	0	0
IV.	Winslow (Addington)	1·45	— 1·06	·43	10	7		82·0	2	44·0	18	0	0
IV.	Bury St. Edmunds (Culford)	...	...	...	...	...		...	...	...	...	...	...
V.	Norwich (Cossey)	·93	— 1·29	·40	10	3		...	...	...	...	...	...
V.	Weymouth(LangtonHerring)	3·55	...	1·89	6	7		77·0	7, 27	47·0	11	0	...
"	Barnstaple	·33	— 2·39	·13	8	5		80·0	23	42·5	12	0	...
"	Bodmin	·75	— 2·46	·20	19	8		74·0	22a	43·0	12e	0	0
VI.	Stroud (Upfield)	·45	— 1·93	·21	2	5		83·0	27	44·0	15	0	...
"	ChurchStretton(Woolstaston)	·45	— 2·42	·18	1	5		76·0	22	45·0	11	0	0
"	Tenbury (Orleton)	·66	— 2·08	·24	1	6		82·5	27	42·0	12f	0	0
VII.	Leicester (Barkby)	·86	— 1·65	·48	8	7		86·0	2, 27	43·0	17	0	...
"	Boston	·28	— 1·97	·11	2	6		90·0	2	44·0	1	0	0
"	Hesley Hall [Tickhill]	·40	...	·16	9, 28	3		83·0	2	45·0	16	0	...
VIII.	Manchester (Ardwick) .....	...	...	...	...	...		...	...	...	...	...	...
IX.	Wetherby (Ribston Hall) ...	·64	— 2·23	·29	9	4		...	...	...	...	...	...
"	Skipton (Arncliffe)	·72	— 3·10	·63	2	4		83·0	27	44·0	22	0	...
"	Hull (People's Park)	·43	— 1·84	·18	7	7		...	...	...	...	...	...
X.	North Shields	·23	— 1·80	·12	8	5		79·5	26	40·5	11	0	0
"	Borrowdale (Seathwaite)	1·11	— 6·70	·52	2	6		...	...	...	...	...	...
XI.	Cardiff (Ely)	·33	— 2·73	·19	1	4		...	...	...	...	...	...
"	Haverfordwest	·51	— 2·52	·27	8	7		76·4	22	40·0	11	0	0
"	Plinlimmon (Cwmsymlog) ...	·48	...	·20	8	3		...	...	...	...	...	...
"	Llandudno	·62	— 1·38	·30	3	5		74·2	22	46·3	16	0	...
XII.	Cargen [Dumfries]	2·14	— 1·03	1·39	6	4		80·8	22	35·2	11	0	...
"	Jedburgh (Sunnyside)	·35	— 2·05	·19	2	5		77·0	26	32·0	11	1	...
XIV.	Old Cumnock	·59	— 2·33	·25	2	8		86·0	21	35·0	9, 10	0	...
XV.	Lochgilhead (Kilmory)	1·44	— 2·40	·53	9	6		...	...	...	...	...	...
"	Oban (Craigvarren)	1·37	...	·50	2	9		75·3	21	41·1	10	0	...
"	Mull (Quinish)	1·51	...	·58	2	10		...	...	...	...	...	...
XVI.	Loch Leven Sluices	·90	— 1·87	·30	3, 7	4		...	...	...	...	...	...
"	Dundee (Eastern Necropolis)	·75	— 1·91	·25	6	5		80·5	26	40·2	10	0	...
XVII.	Braemar	·74	— 2·35	·38	2	8		78·2	21	38·0	11	0	2
"	Aberdeen (Cranford)	·69	...	·42	6	7		77·0	26	38·0	10	0	...
XVIII.	Lochbroom	1·21	...	·50	2	4		...	...	...	...	...	...
"	Culloden	·11	— 2·14	...	...	...		78·0	26	37·0	10	0	2
XIX.	Dunrobin	·95	...	·31	2	7		75·0	21	42·0	13	0	...
"	S. Ronaldsay (Roeberry)	·66	— 1·11	·19	2	9		69·0	25b	45·0	10	0	...
XX.	Cork (Blackrock)	1·76	— 1·79	1·28	1	5		77·0	26	45·0	7g	0	...
"	Dromore Castle	1·71	...	1·00	1	8		78·0	22	41·0	7	0	...
"	Waterford (Brook Lodge) ...	1·15	...	·95	1	5		76·0	6c	...	...	...	...
"	O'Briensbridge (Ross)	·64	...	·26	2	7		75·0	...	42·0	9	0	...
XXI.	Carlow (Browne's Hill)	·86	— 1·80	·57	1	6		...	...	...	...	...	...
"	Dublin (FitzWilliam Square)	·10	— 2·10	·03	8	6		74·8	22	41·2	11	0	0
XXII.	Ballinasloe	1·15	— 2·04	·29	1	12		69·0	24	37·0	10	0	0
XXIII.	Waringstown	·37	— 2·29	·13	2	5		82·0	21	38·0	4	0	0
"	Londonderry (Creggan Res.) ..	·52	...	·20	13	9		...	...	...	...	...	...
"	Omagh (Edenfel)	·41	— 2·64	·17	1	6		78·0	21	41·0	7	0	...

a And 26. b And 26. c And 22, 26. d And 17. e And 13. f And 28. g And 12, 14.

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

METEOROLOGICAL NOTES ON JUNE, 1889.

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.

STRATHFIELD TURGISS.—The R at the commencement of the month started the weeds with much vigour, but the succeeding hot sunshine did great service to the hay and wheat crops; magnificent weather for haymaking, and heavy crops everywhere. TS on 6th. Elder in flower on 6th, dogrose on 9th, fox-glove on 13th, mallow on 19th, and pink convolvulus on 27th.

HITCHIN.—A terrific TS on 6th, the most severe ever experienced. The highest mean temp. for the month in 40 years, with two exceptions.

WINSLOW, ADDINGTON.—A fine month, the latter part all that could be wished for haymaking, and a large quantity was secured in good condition. TS on 6th. T on 5 days.

LANGTON HERRING.—R 1·46 in. above the average of 14 years, 2·66 in. falling between 2 a.m. and 7 p.m. on 6th during terrific TSS. No R whatever fell after the 15th, and the mean temp. has only twice been exceeded in 17 years, 72° being reached or exceeded 12 times. Altogether, a very beautiful month, with splendid weather for securing the heaviest hay crop ever known.

WOOLSTASTON.—A very dry month, R falling on only five days; mean temp. 59°·3.

ORLETON.—On the morning of the 2nd, at 6 a.m., a violent storm of L, T, H, and R passed from S. to N. about four or five miles to the E., here there was only heavy R. The weather after was warm, with occasional falls of R till the 10th, after which there was no measurable R during the remainder of the month, and the weather was generally warm and fine with a few cold, cloudy days. Mean temp. 0°·8 above the average of 28 years. R the smallest in June during 58 years, with the exception of 1844, 1868, and 1870. The bar. was high and remarkably steady. No T was heard after the 2nd. A large quantity of hay was secured without R, but the fruit crops are a general failure.

SKIPTON, ARNCLIFFE.—An unusually dry and sultry month. TS on 2nd, with ·50 in. of R in 30 minutes.

HULL.—The weather during the month was generally fine and calm, but often with a considerable amount of cloud.

NORTH SHIELDS.—An extremely fine, dry, and sunny month. Hay harvest general. TS on the 2nd.

WALES.

HAVERFORDWEST.—One of the finest Junes during 40 years, and the driest with two exceptions. A very small amount of R fell during the first 14 days: the rest of the month was made up of bright, fresh, warm days, with wind mostly from N.W. to N.N.E. and cool, cloudless nights. Dense fogs occurred about sunrise during the last week, and the sky several times assumed a threatening appearance. The country was beginning to look faded at the close from the continued drought. Temp. above 70° on 12 days. Some ash trees had scarcely a fully developed leaf as late as the 12th. No T or L.

SCOTLAND.

CARGEN.—Mean temp. 58°·4, the highest for June since 1865. The nights being generally very clear and cloudless produced low minima and reduced the mean. A sharp TS occurred on 2nd and a very severe one on 6th lasting nearly 11 hours off and on, accompanied by heavy R and H, 1·39 in. falling in two or three hours. E. winds prevailed for 15 days and the wind was generally light and variable. Sunshine 65 hours above the average. The drought which prevailed from the 7th was seriously affecting crops on light soils at the close.

JEDBURGH.—The temp. of the month was generally high, 70° being reached or exceeded on 10 days. Vegetation progressed rapidly. Up to the close of the month the need of R was not much felt, except for particular soils.

BRAEMAR.—A very dry, scorching month. Mean temp. 56°·5.

LOCHBROOM.—Such a June has rarely been experienced in this country. R on only four days and not a drop after the 11th. Such sunshine and heat that everything that is not dried up is three weeks earlier than usual. T and L on 2nd and 3rd.

CULLODEN.—The month was remarkable for the very small R, and crops of all kinds were suffering greatly at the close. TSS very severe on 2nd and 3rd.

DUNROBIN.—A very dry month.

S. RONALDSAY, ROEBERRY.—The driest June since 1871, the R being little more than one third of the average of 20 years; heavy TS on 2nd.

IRELAND.

CORK.—Mostly fine and bright and no R after the 13th. Fall for the first six months of 1889 3·77 in. less than the average of 24 years.

DROMORE.—A very fine month.

ROSS, O'BRIENSBIDGE.—Perfect summer weather all through the month, with an exceptionally small R. Mean temp. 59°·6.

DUBLIN.—This month resembled June, 1887, as one of the driest and warmest months on record. The mean temp. was 2°·8 below that of 1887, but still 1°·7 above the average. E. and N.E. winds prevailed. The R and number of rainy days were remarkably small. High winds on 5 days. The temp. reached 70° in the screen on 10 days, as compared with 17 days in 1887 and only one day in 1888.

WARINGSTOWN.—The driest month recorded. The last fortnight unusually hot, and R much required at the close, but crops still generally good.

EDENFELL OMAGH.—The smallest R in June since 1865, when '40 in. fell, and the drought lasted 17 days. This year the drought has already lasted 18 days with no immediate prospect of a change, but the heat has been moderated by frequently overcast skies and fresh breezes, and as a result vegetation remains fresh and luxuriant. One of the earliest and heaviest hay harvests for many years has been almost completed under the most favourable conditions.

HEAVY RAIN AT ST. ALBANS, JULY 12TH.

To the Editor of the Meteorological Magazine.

SIR,—During a TS here, between 9.30 and 11.30 p.m., on Friday, July 12th, rain fell in "floods" at intervals, and the total was 2·54 in.

E. A. ORMEROD.

Torrington Ho., St. Albans.