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THE AIMS OF METEOROLOGY.

THE exquisitely printed work, mentioned below,* puzzles us much. From its style we should without hesitation attribute it to Prof. Abbe, but it contains a second title, which is as follows: Part III. (not iii.A as on the other title). *Report on the Meteorology of Maryland*, prepared by direction of WILLIS L. MOORE, Chief of U.S. Weather Bureau, by CLEVELAND ABBE, O. L. FASSIG, and F. J. WALZ. And yet at the head of the text we again have the first title, and the name of Cleveland Abbe. As it begins with page 219 we infer that it is Part III., or III.A, of a volume to be called "*Report on the, &c.*," but if so, what is meant by "Special Publication, Vol. 1."? It seems rather difficult to see how it is to be catalogued: probably under "Maryland," with references from "Abbe," "Clark," "Fassig," "Moore," and "Walz"!

Although consisting of little more than a hundred pages, this article covers nearly all branches of meteorology, and (except that mathematics are absent) is really the outpouring of the mind of one of the leaders of meteorology of the present day. The *raison d'être* of the work is to tell meteorologists at what they ought to aim; and few persons are so competent to do that as is Prof. Abbe; but he does more, for he packs in a mass of facts and dates which make the perusal of the article not merely an instructive guide to the future, but also very useful as a record of past progress.

So many persons seem to consider that the object and duty of a meteorologist begin and end with punctually reading and recording a barometer, three or four thermometers, and a rain gauge, that we think it will be generally useful to reprint the following section of Prof. Abbe's article:—

SPECIAL OBSERVATIONS AND INVESTIGATIONS.

"While the national bureaus collect data for the study of the atmosphere, they have it in their power to make daily applications

* Maryland Weather Service, Wm. Bullock Clark, Director. The Aims and Methods of Meteorological Work, especially as conducted by National and State Weather Services by Cleveland Abbe. (Special Publication, Vol. I., Part iii.A). The Johns Hopkins Press. Baltimore. July, 1899. Royal 8vo. 111 pages. 13 plates.

of the useful knowledge thus acquired. Those bureaus that cover a large area are generally able to make rational predictions as to the probable weather of the coming twenty-four hours and, especially, to foresee the development and approach of severe storms. This is considered to be a primary duty to the public, since in this way they can render an immediate return for the money spent in the study of the atmosphere. In some bureaus the attention given to practical applications may seem to be too large in proportion to the needs of the fundamental study of the atmosphere. But this is probably an unjust criticism. Theoretical meteorology is not yet the predominating feature in the science. Our progress in unravelling the difficulties of meteorological problems is necessarily so slow and so dependent upon the general progress of mathematical physics that we may compare theoretical meteorology to the slow-growing pines, beeches and oaks of the forest which, when young, are protected by the rapid-growing and short-lived trees, but become the masters of the forest when the latter have died away.

"While, therefore, keeping alive the study of theoretical meteorology, most of the national weather bureaus have developed appropriate lines of useful work in addition to the daily storm and weather predictions already mentioned. Among these we may enumerate the following :—

1. The continuous record of all features of the weather is kept as an official record for use in the courts of law, especially a record of the high winds that can produce damage or destruction of property ; a record of heavy rains within short periods of time, such as produce destructive floods in cities and rivers ; a record of general rains, on which the general *régime* of the rivers depends.

2. A record of every climatic feature that is supposed to affect local agriculture, especially frosts, droughts, maximum and minimum temperatures, rainfall and sunshine, depth of snow and evaporation.

3. A record of the heights of rivers for the prediction of rising and falling water, and the study of erosion.

4. A record of the amount of sunshine and cloudiness in its bearing on the growth and health of animals and plants.

5. A record of the temperature of the soil at different depths for agricultural studies, and at great depths for geological studies.

6. A record of the amount of evaporation from the surface of fresh water and its bearing upon the storage of water for irrigation.

7. The record of thunderstorms and of damage by lightning, hail and wind gusts.

8. Observations on terrestrial magnetism, especially in case that this is not otherwise provided for by some other office or bureau of the respective governments. This record is not kept because any very important relation has yet been shown to exist between meteorology and terrestrial magnetism ; but there is a widespread belief that intimate relations of this character do exist and that the two subjects must be considered as cognate branches of terrestrial physics.

Continuous photographic records of the movements of the magnetic needle and of earth currents are kept for comparison with other phenomena, astronomical or terrestrial.

9. Earthquakes and seismic phenomena belong to geology, but in the absence of systematic attention to the subject by other bureaus, the meteorological records are often the principal source from which observations are drawn. It is also recognized that occasionally earthquakes and volcanic eruptions may be determined by meteorological conditions. In general, both earthquakes and oceanic tides and a certain class of atmospheric phenomena may be simply different manifestations of the tidal forces of the sun and moon, and it is appropriate that the meteorologist should join with other students of terrestrial physics in contributing to elucidate the phenomena.

10. The registration of tides in the ocean and fluctuations in the levels of the lakes with a study of these as far as they are affected by atmospheric changes.

11. The climatic conditions that affect health, disease and death for the students of hygiene.

12. The observation of the dust in the atmosphere, both as to its quantity and character and a study of its relations to disease, organic life, the production of fog and rain and the radiation of heat, and other phenomena.

13. The registration and study of atmospheric electricity and the elucidation of its origin and function in meteorology.

14. The observation of aqueous vapour, ozone, carbonic acid gas, ammonia, and other chemicals dispersed in small quantities through the otherwise pure air, and the study of their diverse influences on rock weathering, on animal and vegetable life.

15. Optical phenomena, such as the blueness of the sky and its relation to photographic effects, and its dependence upon the free moisture in the air: The polarization of sky light and its dependence on the moisture: solar and lunar halos and coronæ, their dependence upon moisture and their relation to storms.

16. The study of the clouds, their structure and method of formation; their altitude and motions.

17. Observations of evaporation and its relation to irrigation, water-storage and the growth of plants.

18. The depth of frost in the ground and its relation to the foundations of roads and buildings.

19. The relation between rainfall and evaporation on the one hand, and the quantity of water flowing in the rivers on the other.

20. The formation of frost-work at the surface of the ground and its relation to the soil beneath.

21. The formation of sleet or ice on the branches and leaves of trees and plants or on telegraph wires, and the injury done thereby to agriculture and business.

22. The record of the flow of water from springs, the flow of underground water, the temperature of spring water, all in relation to the water supply.

23. The comparison and standardization of meteorological instruments and apparatus, especially of the thermometers, barometers, anemometers, rain-gauges, sunshine recorders, actinometers, sextants and other apparatus used by explorers who keep meteorological records; the improvement and invention of self-registering apparatus.

24. The study of atmospheric absorption of solar energy by means of thermal, optical and chemical methods.

25. The study of the radiation of heat by the earth and air, the clouds and the invisible vapour.

26. The resistance to the motion of the air when opposed by various obstacles, or the effect of the wind on sails and buildings.

27. A record of the phenomena of the aurora, and the study of its connection with magnetic disturbances and natural electric currents on telegraph wires, and with the condition of the atmosphere as to wind and moisture.

28. Records of the audibility of sound and the visibility of signals in fogs, for use in marine signalling.

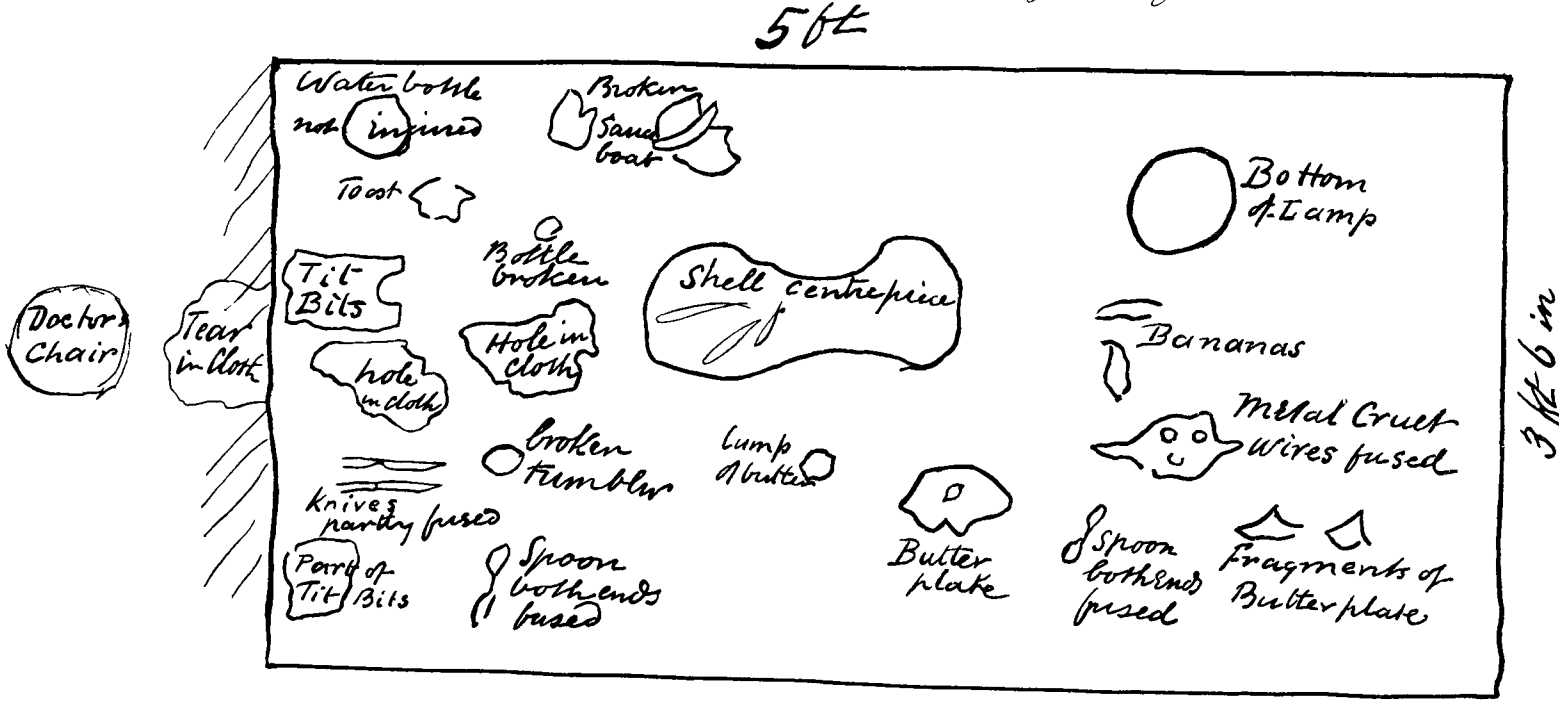
29. The education of the public, and the dissipation of popular errors by teaching, lecturings and popular writings."

There may be some errors in the work, but we have not noticed one of any importance. Those Englishmen who are always expatiating upon the errors of aneroids may perhaps feel a little indignant at the (perfectly true) remark on page 230, that "The aneroid barometer is not affected by the changes in the force of gravity," while others may feel their "gravity" (of another kind) slightly and pleasantly disturbed.

There is one sentence on page 287 which we regret to see: "The value of the lightning rod as a protection is still considered problematic by many; the question should be settled by careful enquiry." This, in an official publication in the country of Franklin, by one of the most able men in the country, and more than a century after the lightning rod began to save thousands of lives, is certainly remarkable. It will be seen that the author does not personally adopt the view, but he writes of the "many," and says that the question "should be settled," which implies that it is not settled yet. Probably the foundation of his doubt is the bad practice of a *genus homo*, which is, we believe, only to be found in the U.S.A., viz.: "the Lightning Rod man."*

* See the section on "Lightning Rod Swindles," in *Plain Directions for the Construction and Erection of Lightning Rods*, by J. PHIN, C.E. New York, 1873.

"Plan of the Table after the Lightning Stroke."



LIGHTNING AT DINNER.

AT 7.30 p.m., on Sunday, the 13th August, 1899, Labuan, North Borneo, was visited by a very severe thunderstorm, during which the house of the Government Medical Officer, the Medical Officer himself, and a tree near the Deputy Governor's house, were struck by lightning. The quarters and offices of the Eastern Extension Telegraph Company, which are situated midway between the above mentioned places, and within a quarter of a mile from them, escaped injury.

The Medical Officer's house is what is known as a native house, that is to say, it is built of wood, thatched with ripa palm leaves, and partitioned with palm leaves. It stands on wood piles about 4 feet long.

The lightning struck the point of one of the gables, passed down the king-post immediately beneath it, to the beam supporting the lower end of the king-post, thence it jumped about 8 feet to an iron rod, from which a large metal lamp was hanging, beneath which the table was laid for dinner, from the lamp to the handle of the centre-piece immediately below it, through the tablecloth, the table, down the doctor's clothes and legs, through the floor, down two piles, to earth. In transit it split the king-post into two pieces; the detached pieces knocked a hole in the roof, and then fell part way down through the ceiling into the dining-room below.

The iron rod from which the lamp was suspended, and the horizontal beam, were uninjured. Secured to the bottom of the lamp by thumbscrews was a brass plate, for catching drops of oil; this was knocked off on to the table. From the bottom of the lamp to the handle of the centre-piece below was about 15 inches. The centre-piece was composed of a pair of pearl shells, mounted, with an ornamental handle of metal, and stood on four metal legs screwed into the shells, the handle and legs not being in contact. The top of the handle was slightly fused. There was a join in the wood top of the table under one of the legs of the centre-piece, the lightning split a piece of wood off the edge of the join, and knocked a hole in the tablecloth that could be covered by a full-sized outstretched hand; a portion of the cloth so torn was doubled underneath and led into another hole, which could be covered by a closed hand.

The flash then appears to have gone through the table, making a small hole at the end of the join, which was slightly blackened, as from smoke, on the underneath side; it then jumped on to the hanging portion of the tablecloth, carrying away a piece 15 in. broad.

The doctor was having dinner, and sitting at this end of the table; having just come in from a long round, he had not troubled to dress, but changed into native costume, consisting of a loose jacket and sarong (a piece of cloth fastened round the waist and reaching to the ground)

The lightning having passed down the end of the tablecloth which was resting in the doctor's lap, continued its way down his sarong, tearing it in a similar manner, paralysing his legs from the knees downward, and making several superficial burns. He was also knocked off his chair and rendered insensible for a moment. He remembered seeing sparks, but not hearing anything of the thunder. He had just finished his fish. "Tit Bits" was lying at his side on the table, and he was reading it while he was having his dinner, this necessitated his leaning forward. The flash came just at the instant that the boy was changing his plate—the doctor having sat back to enable him to do so; this was most fortunate, as had he been leaning forward reading he would most probably have been struck on the head. A piece of "Tit Bits," the size of half a cheese-plate, was torn out of the top of the newspaper. The clean plate which the boy was putting on to the table was knocked out of his hand, himself being uninjured.

The floor was not close-jointed, so the flash probably found its way down through the cracks, thence it jumped about four feet on each side, and split two of the piles, eight inches in diameter, into eleven pieces. These pieces were lying about nine feet from the holes, where the ends were in the earth. They were split longitudinally, with the ends pointing towards the respective holes.

A sideboard, standing about five feet from the table, had some glasses broken that were standing on the top; the door and bottom of the left hand cupboard were affected, the former being blown open, and the latter downwards, letting a lot of aërated water fall through on to some more below, most of it being smashed.

The accompanying sketch will give the best idea of the state of the dinner table.

Absence of marks of burning, in bad conductors like wood, cloth, &c., and no horizontal timbers being marked or damaged, were the peculiarities of the occurrence.

[We are indebted to Mr. G. C. Bompas for the foregoing critical study of the effects of lightning by Mr. Rawlin Buckland, of the Eastern Extension Telegraph Company.—ED.]

EFFECTS OF FOG.

MR. WRIGHT sent to the Scientific Committee, Royal Horticultural Society, on November 7th, some vine leaves from Chiswick, to show the injurious effects of the recent fogs in the gardens of the Royal Horticultural Society. The Muscat class of grapes were most injured, the foliage being all scorched and the fruit more or less covered with a deposit. It was observed that the fog was remarkably early in the season. Prof. Church noticed that it was peculiarly pungent, causing a hundred buds of a Camelia to fall in a single day. Injury was also done to Orchids in Chelsea and Gunnersbury. The real cause of the injury is the presence of sulphurous acid gas, as well as the mechanical accumulation of sooty matters.—*Journal of Horticulture.*

REVIEWS.

The Altitude of the Aurora above the Earth's surface, by PROF. CLEVELAND ABBE. Reprint from *Terrestrial Magnetism*, Vol. III., 1898. Roy. 8vo. 68 pp.

WE have been reading with great interest the valuable papers which our able contemporary has had the privilege of publishing, and are glad to receive the above reprint.

All who desire to understand the formation of the beautiful phenomenon which we call aurora, must read and study the facts which Prof. Abbe has stated with clearness and precision. Taking in chronological order, all, or nearly all, who have dealt with the subject of the altitude of auroral appearances above the surface of the earth, he not merely points out their discrepancies but shows that their inconsistencies prove that there must be in the observations themselves some unconsidered source of error, as the observers have mostly been so competent that errors of observation cannot be accepted as the real explanation. Prof. Abbe does not (as far as we have seen) refer to the old theory that auroræ in temperate latitudes occur at a great height, and, as we approach the poles, at decreasing altitudes. He seems to confine himself to proving that the observations of those very persons who have deduced great altitudes afford internal evidence of their untrustworthiness, and to suggesting methods whereby all such observations can be tested; he accepts, as beyond dispute, the records of auroræ in arctic regions reaching almost to the ground, but we do not see any distinct expression of opinion as to the altitude in lower latitudes. Where so great an authority is silent, it is of course presumptuous for us to speak, but the impression left upon our mind is, that perhaps the altitude may not differ very widely from that of the mean snow line. Be that as it may, the paper is one which will give pleasure to all thoughtful readers.

Meteorological Observations taken at Kenilworth, Kimberley, during the year 1898, by J. R. SUTTON, B.A. [Excerpt, Report of the Cape Meteorological Commission]. Fcap. folio, 26 pages.

WE have, on one or two occasions, had the pleasure of printing letters from Mr. Sutton, but the above is the first annual report from him which we have seen. We congratulate him upon the splendid equipment which the De Beers Company has placed in his charge, and we thank these chiefs of the Diamond world for the valuable information which such instruments, under such a Superintendent, are supplying.

We have thus, in the centre of South Africa, in long. 24° 27′ E., and lat. 28° 42′ S., at an altitude of 3,950 ft., a meteorological observatory, certainly better equipped than Greenwich, and, having few, if any, equals in the British Isles. And the director is worthy

of the instruments, for though the present report is chiefly a statement of the results of the year's work, Mr. Sutton has dropped, on almost every page, hints which could, with advantage, be considered by meteorologists in the Old Country.

It would hardly be expected that a single year would give an accurate determination of the Diurnal Range of the Barometer—a datum much needed for the reduction of African observations. Here, however, are the Kimberley values:—

Midnight	+ ·006	6 a.m.	+ ·019	Noon	+ ·010	6 p.m.	— ·034
1 a.m.	+ ·003	7 ,,	+ ·031	1 p.m.	— ·011	7 ,,	— ·021
2 ,,	— ·001	8 ,,	+ ·040	2 ,,	— ·031	8 ,,	— ·007
3 ,,	— ·003	9 ,,	+ ·043	3 ,,	— ·041	9 ,,	+ ·002
4 ,,	·000	10 ,,	+ ·040	4 ,,	— ·046	10 ,,	+ ·008
5 ,,	+ ·007	11 ,,	+ ·029	5 ,,	— ·042	11 ,,	+ ·008

If these values are plotted, the resultant curve is one which will, we think, carry conviction as to its accuracy to all conversant with the subject.

Kimberley being so high (nearly 4,000 ft.) the air is generally dry, and rarely hot; the absolute max. was 101°·0 on December 15th, and the min. 22°·2 on August 2nd, when the grass min. fell to 18°·4. The rainfall was about 18 in., and Mr. Sutton has returns from ten stations in the neighbourhood.

In conclusion, we may perhaps state one or two "wishes." We should like some illustrations, plan of the station, views of the instruments, map of the district showing the sites of the rain gauges, we also hope to hear that either the anemometer pole, or the evaporator, has been moved. The evaporation work is extremely important, but it must be carried on under perfect conditions.

Then will the best African station be even better than it is.

UNUSUAL SNOW CRYSTALS.

To the Editor of the Meteorological Magazine.

SIR,—Perhaps the substance of this note may be suited for admission to the pages of the *Meteorological Magazine.*

The morning of December 12th was in this locality ushered in by a considerable fall of snow (4½ inches), the first in the present season. The night of the 10th was very cold, the minimum in screen down to 20°. On the morning of the 11th a *few* flakes of snow fell, but the shape of the crystals was in my experience unusual—flat, opaque, six-pointed star-shaped figures having blunt rounded points, in size about 3–16ths of an inch in diameter.

It would be of some interest if your readers have ever traced any connexion between the two, *viz.*, a fall of snow 4 or 5 inches deep preceded within 24 hours by snow crystals of the above form.

Yours very truly,

WILLIAM L. W. EYRE.

Swarraton Rectory, Hants, December 13th, 1899.

KITES AND METEOROLOGY.

[WE much regret that the following note, received long since, from the inventor of the well-known "Eddy" Kite, has been accidentally buried. Although many of the facts mentioned have been recorded in our pages, some have not, and it will, we think, be convenient to have them in chronological order on Mr. Eddy's authority.—ED.]

1749. As far as I can find out, the first attempt to raise instruments into the air by means of kites was made by Wilson and Melvill, at Camlachie, near Glasgow, who sent up a thermometer in 1749.

1836. Admiral Bach, commanding the *Terror*, used a kite for the purpose of sending up a thermometer in Hudson Strait.

1837. The Franklin Kite Club of Philadelphia, Penn., used kites in a scientific way in 1837, and observed that approaching clouds caused vertical ascending air currents, as shewn by increased elevation of the kites.

1847. On September 14th, 1847, Birt, of Kew Observatory, used a kite to test temperature, humidity, wind velocity, &c.

1882. Archibald, of England, used kites in 1882, to support anemometers.

1891. On February 4th, 1891, at Bayonne, N.J., the writer sent to a height of 600 feet, a Hicks thermometer, sustained by kites. At the earth the temperature was 10° Fahrenheit, and aloft, 5°.

1891. Again, on February 14th, 1891, with the same thermometer, the temperature aloft was 28° Fahrenheit, and at the earth 30°. In the first observation, published in the *American Meteorological Journal*, July, 1891, a cold wave was sweeping in along the west, the earth not having cooled to the temperature of the upper air.

1894. On August 4th, 1894, at Blue Hill Observatory, the first ink recording thermograph was sent to a height of 1,400 feet, by means of five Eddy tailless kites.

1896. On October 8th, 1896, a meteorograph was raised to 9,375 feet above the sea level, or 8,744 feet above the summit of Blue Hill, by means of seven Eddy and two Hargrave kites. A fall of 26° Fahrenheit was recorded.

32, East 3rd Street, Bayonne, New Jersey, U.S.A. W. A. EDDY.

ROYAL METEOROLOGICAL SOCIETY.

THE opening meeting of this Society for the present session was held on Wednesday evening, November 15th, at the Institution of Civil Engineers, Mr. F. C. Bayard, LL.M., President, in the chair.

The undermentioned were elected Fellows of the Society:—S. Campbell-Bayard, Wallington, Surrey; John Chadwick, Bletchley, Bucks; Alfred Mander, Belle Vue Pharmacy, Malvern; C. H. Millard, 70, Market Street, Wigan; Ernest Oxley, Melbourne

Lodge, Clay Cross; Dr. G. C. Walker, Junior, 19, Preston Road, Southport; C. L. N. Wilson, Assoc.M.Inst.C.E., Western Villa, Bilston.

Mr. R. H. Curtis read a paper on "The Diurnal Variation of the Barometer in the British Isles." The principal features of a curve exhibiting the diurnal march of barometrical pressure are two minima and two maxima, the first minimum occurring early in the morning, and the second in the afternoon, while the first maximum falls in the forenoon, and the second not far from 10 o'clock in the evening. In the tropics the oscillation may amount to as much as 0·10 in., but its amplitude decreases as the latitude increases, and the greatest amplitude in the British Isles amounts to not much more than 0·03 in. The author discusses the mean hourly readings of the barometer from 25 years' observations, 1871-95, at four observatories maintained by the Meteorological Council, viz., Kew, Aberdeen, Falmouth, and Valencia. The author is of opinion that the primary cause of the diurnal oscillation of the barometer is solar radiation, and that its amplitude is chiefly determined by the temperature of the lower strata of the atmosphere. The relative magnitudes of the different phases of the barometer oscillation, as observed, depend largely upon the geographical position and physical surroundings of the place of observation, in so far as these are capable of modifying its temperature conditions, and especially the relative distribution of temperature over the regions immediately surrounding it.

Mr. G. J. Symons, F.R.S., gave the results of observations which he made during the hot weather in July, 1899, with two thermometers 1 ft. below the surface of the ground, with the view of ascertaining (1) the influence of slight shade; (2) the amount of daily range; and (3) the approximate curve of daily fluctuation at that depth.

* WONDERFUL STORY OF A THUNDERBOLT!

To the Editor of the Meteorological Magazine.

SIR,—As far as I can gather, the newspaper account was rather exaggerated, and compiled from hearsay evidence. I have seen Mrs. Atkin, and she seems very much confused as to what really did happen. Her account is that she was sitting at a table between the fireplace and the door—the fire was low and she rose to attend to it. As she was leaving the fire-place something came down the chimney, passed her, scorching the hair on one side of her head, and her eyebrow. There was immediately a loud explosion outside the house, followed by a large flash or flame at the roadside. That seems to be all. The fire in the grate was untouched. If anything came down the chimney it must have gone straight out of the door, exploding when outside, and leaving no trace of anything. That it lay on the road and "burned fiercely," was a myth, The woman was certainly scorched. The station-master saw her hair singed afterwards, and a blister followed between her eye and ear.

I hope that this may clear the matter up.—Yours truly,

The Vicarage, Deeping St. James, Nov. 20th, 1899. SAM W. SKENE.

* See *Met. Mag.*, November, 1899, p. 150.

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

NOVEMBER.

YEAR.	RAINFALL.				TEMPERATURE.										CLOUD.
	Total.		Max. Fall.	Falls of 1 in. or +	Dry. Mean, 9a.&9p.	Wet. Mean, 9a.&9p.	Shade Max		Shade Min		Sun Max. Black.		Grass Min.		
	Depth	Days					Abs.	Aver	Abs.	Aver	Abs.	Aver	Abs.	Aver	Aver
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	in.		in.		°	°	°	°	°	°	°	°	°	°	0–10
1858..	·53	8	·17	0	39·4	38·3	56·0	46·0	20·1	33·6	..	..	..	..	6·3
1859..	2·90	12	·68	0	41·9	40·0	59·2	48·0	24·3	36·4	..	..	..	..	5·7
1860..	2·72	13	·52	0	40·8	39·3	53·2	46·0	31·2	36·2	..	..	24·3	31·6	7·0
1861..	4·65	18	1·42	1	39·7	38·4	57·6	47·3	21·8	34·2	..	..	15·9	29·4	5·5
1862..	1·13	10	·51	0	39·6	38·5	56·9	43·9	23·7	34·4	..	..	17·2	29·7	6·1
1863..	1·84	13	·50	0	45·5	44·0	59·5	50·7	27·3	40·1	..	..	20·2	35·1	6·8
1864..	2·49	9	1·01	1	42·0	40·5	54·5	48·8	26·2	35·3	..	..	25·5	32·4	6·0
1865..	1·96	18	·38	0	44·6	42·9	57·0	50·6	31·2	40·0	..	..	26·5	35·8	5·4
1866..	1·73	14	·37	0	44·7	43·3	62·4	51·0	27·4	38·4	..	..	24·4	34·3	5·9
1867..	·86	4	·73	0	42·0	40·6	62·6	47·7	26·4	35·9	..	..	18·8	31·0	5·9
1868..	1·03	11	·39	0	41·7	40·1	59·3	47·2	25·4	36·5	..	..	22·2	33·8	7·2
1869..	2·38	14	1·03	1	43·3	41·4	58·2	49·1	27·6	37·4	..	..	..	(33·4)	6·1
1870..	1·76	13	·75	0	41·5	40·4	56·4	48·0	27·3	36·2	92·0	65·5	24·8	32·7	6·7
1871..	·60	8	·22	0	36·9	35·4	52·5	43·6	21·0	32·8	87·8	62·3	17·5	29·7	5·9
1872..	3·98	21	·65	0	45·1	43·5	61·2	50·9	31·7	40·2	90·0	70·1	28·2	37·4	6·4
1873..	1·87	14	·44	0	44·1	42·5	58·1	50·1	27·7	38·8	90·0	65·3	23·9	34·6	6·3
1874..	2·21	15	·90	0	41·8	40·6	60·0	47·4	25·6	36·9	89·2	62·1	24·8	34·6	6·5
1875..	3·36	20	·67	0	42·5	41·2	58·8	48·1	29·0	37·2	91·8	64·1	25·6	34·9	7·3
1876..	3·07	16	·46	0	43·6	42·5	61·4	49·7	27·6	38·8	90·6	66·8	24·1	35·7	7·1
1877..	3·88	22	·87	0	45·4	43·8	59·1	52·3	31·2	39·6	95·7	70·5	26·2	35·4	5·6
1878..	2·95	17	·51	0	39·5	38·1	53·5	44·9	29·4	34·8	87·0	61·2	24·6	31·9	7·1
1879..	·72	8	·27	0	38·3	36·8	55·2	44·1	23·0	34·4	84·7	63·7	17·8	30·1	6·0
1880..	1·85	13	·54	0	42·3	40·7	58·0	48·7	24·6	36·6	89·6	67·6	21·3	32·1	6·2
1881..	2·75	16	·55	0	48·9	47·2	62·5	54·2	31·9	43·3	95·2	70·2	27·2	38·5	7·4
1882..	2·57	18	·43	0	42·8	40·9	61·8	49·4	25·4	38·2	91·8	70·0	23·3	34·3	5·7
1883..	2·78	16	·40	0	43·4	41·7	55·8	49·9	28·7	37·2	82·0	65·7	20·3	32·6	6·5
1884..	1·92	12	·79	0	42·2	40·6	60·2	48·3	25·3	37·3	84·6	60·8	21·4	31·6	6·7
1885..	3·31	18	·68	0	43·3	42·0	58·7	48·5	28·3	38·6	82·2	57·7	17·8	33·7	7·3
1886..	2·71	14	·54	0	43·9	42·7	58·8	50·0	30·0	39·3	82·1	64·1	22·2	32·6	6·0
1887..	3·40	18	·60	0	40·6	39·2	55·4	45·7	22·1	36·4	89·9	59·3	18·7	32·6	7·3
1888..	4·38	20	·91	0	46·9	45·5	59·9	51·0	34·6	43·3	78·9	59·3	28·2	39·1	7·7
1889..	·89	8	·38	0	43·9	42·8	60·3	49·5	27·8	40·0	97·3	60·8	24·4	35·7	6·9
1890..	1·62	17	·34	0	42·8	41·4	58·1	48·8	20·8	37·4	87·5	62·9	17·8	32·3	6·7
1891..	1·98	18	·40	0	43·0	42·0	57·2	48·7	29·0	38·4	83·4	62·1	22·9	33·5	7·1
1892..	2·53	15	·77	0	45·0	44·0	60·8	50·2	30·8	40·6	86·8	58·6	25·6	36·2	7·8
1893..	2·16	15	·59	0	41·5	39·8	59·8	47·9	27·8	36·0	83·0	61·0	24·4	33·1	7·2
1894..	2·85	14	·66	0	45·8	44·4	63·9	52·0	31·3	41·5	98·1	67·0	26·1	37·3	6·2
1895..	3·17	19	·58	0	47·0	45·5	63·5	52·4	32·0	41·5	87·4	62·7	25·1	37·0	7·0
1896..	1·17	10	·43	0	40·0	38·5	50·3	46·0	25·4	34·9	80·1	59·3	19·1	29·2	6·0
1897..	1·05	14	·31	0	45·3	44·0	59·1	51·0	28·0	40·3	84·1	60·2	23·9	36·7	7·8
Mean ...	2·30	14	·58	0·1	42·8	41·4	58·4	48·7	27·2	37·7	88·0	63·6	22·8	33·7	6·6
Extremes	4·65	22	1·42	1	48·9	47·2	63·9	54·2	34·6	43·3	98·1	70·5	28·2	39·1	7·8
	·53	4	·17	0	36·9	35·4	50·3	43·6	20·1	32·8	78·9	57·7	15·9	29·2	5·4

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, JUNE, 1899.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, CamdenSquare	87·1	5	42·3	15	75·5	52·1	49·4	64	134·6	37·0	1·49	6	4·7
Malta	87·7	11	58·8	1	79·7	65·1	61·7	73	151·6	52·9	·55	4	2·6
Cape of Good Hope	79·9	12	37·7	3	64·0	46·6	45·8	84	...	...	2·01	11	5·0
Mauritius	77·4	8	55·0	18	74·4	63·8	59·6	73	149·7	48·1	1·63	13	4·8
Calcutta	97·2	1	73·2	11	90·6	78·3	77·5	82	157·0	73·6	16·94	16	8·6
Bombay	92·0	8	74·7	16	86·7	78·9	76·2	80	137·5	73·8	20·81	22	7·9
Ceylon, Colombo	87·7	1*a*	73·0	4	86·0	76·5	72·9	79	140·0	67·0	9·23	24	6·6
Melbourne	63·8	26	34·6	18	56·0	43·1	44·5	86	116·7	28·1	3·04	15	6·0
Adelaide	66·5	19	37·8	17	59·5	47·3	45·0	76	129·0	29·0	3·04	19	6·3
Sydney	68·3	23	43·3	29	59·1	49·4	47·7	83	105·6	33·9	10·89	23	5·8
Wellington	59·0	13*b*	35·0	5	54·4	42·7	41·4	77	105·0	28·0	2·66	15	4·7
Auckland	63·0	1	39·0	25	59·2	48·2	44·0	69	112·0	32·0	4·76	14	6·0
Trinidad	95·0	6	68·0	Sev.	90·2	70·0	72·5	80	169·0	65·0	7·63	17	...
Grenada	87·0	5	69·8	11	84·1	75·1	68·9	70	150·2	...	6·14	17	3·1
Toronto	88·0	23	46·0	11	76·6	54·7	55·4	70	104·0	39·0	·66	8	3·7
New Brunswick, Fredericton	85·5	14	38·3	30	72·4	47·7	47·6	60	...	...	3·38	15	5·0
Manitoba, Winnipeg	83·8	30	30·0	8	74·3	50·7	...	75	...	...	3·68	15	6 3
British Columbia, Esquimalt	...	...	...	...	...	...		...	...	...	...	...	...

a—and 22. *b*—and 14.

REMARKS.

MALTA.—Adopted mean temp. 71°·1, or 0°·5 below average. Mean hourly velocity of wind 10·0 miles, or 1·3 above average. Mean temp. of sea 71°·7. TSS on 2nd, 3rd, and 4th. L on 19th. J. F. DOBSON.

Mauritius.—Mean temp. of air 0°·9; of dew point 1°·0; and rainfall ·34 in., below their respective averages: mean hourly velocity of wind 10·2 miles, or 1·2 miles below average; extremes, 25·3 on 2nd and 29th, and 1·9 on 9th and 13th; prevailing directions, S.E. by E., and E.S.E. T on 6th. A. WALTER.

CEYLON, COLOMBO.—Mean temp. of air 80°·3, or 0°·7 below, of dew point 1°·2 below, and rainfall ·89 in. above, their respective averages. Mean hourly velocity of wind 10 miles; prevailing direction S.W. Max. velocity on 4th, at rate of 20 miles an hour, for 8 hours. Max. rainfall intensity 2·75 in. per hour for about 17 minutes on 4th. L on 3rd. TS on 4th. H. O. BARNARD.

Adelaide.—Mean temp. of air 0°·1, and rainfall ·25 in., above their respective averages for 42 years. Another good seasonable month, with good general rainfall over the whole of the colony. C. TODD, F.R.S.

Sydney.—Temp 0°·2 below; humidity 4·1 above; and rainfall 5·06 in. above, their respective averages. H. C. RUSSELL, F.R.S.

Wellington.—The weather during the month was unpleasant in consequence of the frequent, though not heavy, rains; the wind was variable and moderate, the temp. generally rather below the average; fogs occurred on 7 days. Mean temp. 0°·5 below, and rainfall 2·43 in. below, their respective averages. R. B. GORE.

Auckland.—Wet and disagreeable through the greater part of the month. Mean temp. and rainfall close to the average of 32 years. T. F. CHEESEMAN.

TRINIDAD.—Rain ·41 in. below the average of 30 years. J. H. HART.

SUPPLEMENTARY TABLE OF RAINFALL, NOVEMBER, 1899.

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

Div	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	3·71	XI.	Builth, Abergwesyn Vic.	6·10
II.	Dorking, Abinger Hall .	5·62	,,	Rhayader, Nantgwillt ...	6·05
,,	Birchington, Thor	2·04	,,	Lake Vyrnwy	4·07
,,	Hailsham	4·59	,,	Corwen, Rhug	3·60
,,	Ryde, Thornbrough	5·19	,,	Criccieth, Talarvor	2·45
,,	Emsworth, Redlands ...	4·34	,,	I. of Anglesey, Lligwy..	3·55
,,	Alton, Ashdell	6·09	,,	I. of Man, Douglas	2·94
III.	Oxford, Magdalen Coll..	2·44	XII.	Stoneykirk, Ardwell Ho.	2·79
,,	Banbury, Bloxham	1·99	,,	New Galloway, Glenlee	10·26
,,	Northampton, Sedgebrook	1·71	,,	Moniaive, Maxwelton Ho.	8·11
,,	Stamford, Duddington..	...	,,	Lilliesleaf, Riddell	3·75
,,	Alconbury	2·00	XIII.	N. Esk Res. [Penicuick]	4·85
,,	Wisbech, Bank House...	1·93	XIV.	Glasgow, Queen's Park..	5·85
IV.	Southend	3 98	XV.	Inverary, Newtown	8·98
,,	Harlow, Sheering..... ...	...	,,	Ballachulish, Ardsheal...	10·90
,,	Colchester, Lexden	3·31	,,	Islay, Gruinart School ...	1·39
,,	Rendlesham Hall	2·23	XVI.	Dollar.....	4·33
,,	Scole Rectory	2·79	,,	Balquhidder, Stronvar...	13·73
,,	Swaffham	2·27	,,	Coupar Angus Station...	2·83
V.	Salisbury, Alderbury ...	3·47	,,	Dalnaspidal H.R.S.....	...
,,	Bishop's Cannings	3·14	XVII.	Keith H.R.S.....	1·68
,,	Blandford, Whatcombe .	5·36	,,	Forres H.R.S.	2·00
,,	Ashburton, Holne Vic...	5·05	XVIII.	Fearn, Lower Pitkerrie..	1·79
,,	Okehampton, Oaklands.	4·60	,,	S. Uist, Askernish	6·21
,,	Hartland Abbey	3·43	,,	Invergarry.....	13·07
,,	Lynton, Glenthorne ...	4·24	,,	Aviemore H.R.S.	4·75
,,	Probus, Lamellyn	2·77	,,	Loch Ness, Drumnadrochit	5·51
,,	Wellington, The Avenue	2·62	XIX.	Invershin	3·37
,,	North Cadbury Rectory	3·65	,,	Durness	7·62
VI.	Clifton, Pembroke Road	3·12	,,	Watten H.R.S.....	1·71
,,	Ross, The Graig	2·30	XX.	Dunmanway, Coolkelure	7·32
,,	Wem, Clive Vicarage ...	1·60	,,	Cork, Wellesley Terrace	2·75
,,	Wolverhampton, Tettenhall	1·49	,,	Killarney, Woodlawn ..	6·10
,,	Cheadle, The Heath Ho.	1·46	,,	Caher, Duneske	3·33
,,	Coventry, Priory Row ..	1·62	,,	Ballingarry, Hazelfort...	2·46
VII.	Grantham, Stainby	1·20	,,	Limerick, Kilcornan ...	1·29
,,	Horncastle, Bucknall ...	1·19	,,	Miltown Malbay	4·48
,,	Worksop, Hodsck Priory	1·21	XXI.	Gorey, Courtown House	2·83
VIII.	Neston, Hinderton	1·53	,,	Moynalty, Westland ...	3·31
,,	Southport, Hesketh Park	2·08	,,	Athlone, Twyford	3·98
,,	Chatburn, Middlewood.	3·05	,,	Mullingar, Belvedere ...	2·50
,,	Duddon Val., Seathwaite Vic.	10·70	XXII.	Woodlawn	3·21
IX.	Melmerby, Baldersby ...	1·85	,,	Crossmolina, Enniscoe ..	6·33
,,	Scarborough, Observat'y	...	,,	Collooney, Markree Obs.	4·78
,,	Middleton, Mickleton ...	2·72	,,	Ballinamore, Lawderdale	...
X.	Haltwhistle, Unthank H.	3·52	XXIII.	Warrenpoint.....	2·03
,,	Bamburgh	2·19	,,	Seaforde..	4·41
,,	Keswick, The Bank.....	9·65	,,	Belfast, Springfield	3·62
XI.	Llanfrechfa Grange	4·81	,,	Bushmills, Dundarave..	2·47
,,	Llandovery	4·12	,,	Stewartstown	3·11
,,	Castle Malgwyn	4·72	,,	Killybegs	5·97
,,	Brecknock, The Barracks	4·67	,,	Horn Head	3·85

NOVEMBER, 1899.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1880-9.	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	4·13	+ 1·47	1·36	3	10	61·8	2	29·9	30	3	6
II.		Tenterden ...	3·18	— ·21	·73	5	11	63·5	2	33·0	15*c*	0	12
,,		Hartley Wintney ...	4·30	...	1·38	3	10	60·0	10	26·0	30	4	6
III.		Hitchin ...	3·53	+ ·85	·89	5	13	61·0	2, 4	28·0	17	6	...
,,		Winslow (Addington) ...	2·69	— ·24	·77	3	10	61·0	2, 4	24·0	18*d*	5	6
IV.		Bury St. Edmunds (Westley)	2·91	+ ·36	·98	3	10	59·0	4	33·0	21	0	...
,,		Norwich (Brundall) ...	2·72	...	·74	5	12	61·0	10	31·6	18	1	10
V.		Winterbourne Steepleton ...	5·77	...	1·50	9	9	58·9	4	26·8	19	2	6
,,		Torquay (Cary Green)	4·54	...	1·02	9	9	59·3	4	33·9	19	0	2
,,		Polapit Tamar [Launceston]..	3·66	— ·68	·96	3	14	58·9	4	24·0	19	5	7
VI.		Stroud (Upfield) ...	2·63	— ·70	·81	3	12	61·0	4	28·0	18	...	...
,,		ChurchStretton(Woolstaston)	1·67	— 1·85	·44	3	13	58·5	2	30·0	19	1	3
,,		Worcester (Diglis Lock) ...	1·72	— 1·12	·57	3	11	...	...	...	...	...	...
VII.		Boston ...	1·08	— 1·12	·30	5	11	60·0	2, 4	25·0	19	5	...
,,		Hesley Hall [Tickhill]...	1·05	— ·97	·30	7	11	63·0	2	25·0	18	3	...
,,		Breadsall Priory ...	1·46	...	·38	7	8	...	...	25·0	18	2	...
VIII.		Manchester(PlymouthGrove)	1·58	— 1·42	·30	5	13	64·0	3	28·0	18*d*	3	4
IX.		Wetherby (Ribston Hall) ...	1·44	— ·63	·39	11	11	...	...	...	...	...	...
,,		Skipton (Arncliffe) ...	5·53	— 1·22	·95	7	17	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·20	— ·81	·45	7	7	62·0	2, 5	27·0	18*d*	3	6
X.		Newcastle (Town Moor) ...	1·19	— 1·21	·23	9	12	...	..	...	...	...	...
,,		Borrowdale (Seathwaite)...	15·95	+ 1·16	2·65	4	24	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)...	2·84	— 2·07	·85	3	13	...	...	...	...	...	...
,,		Haverfordwest	3·40	— 2·46	·86	7	13	59·7	5	34·0	18	0	4
,,		Aberystwith (Gogerddan) ...	2·97	— 2·14	·83	7	11	63·0	9	...	...	...	4
,,		Llandudno...	2·34	— ·75	·55	3	14	...	...	...	...	...	
XII.	SCOTLAND.	Cargen [Dumfries]	6·42	+ 1·86	1·13	2	12	57·0	5	27·0	18	2	...
XIII.		Edinburgh (Blacket Place)...	3·26	...	1·01	3	16	59·3	2	33·5	18	0	3
XIV.		Colmonell	5·99	...	1·23	3	17	59·0	11*a*	30·0	17	...	...
XV.		Tighnabruaich	5·23	...	·95	3	21	54·0	4	33·0	17	0	...
,,		Mull (Quinish)...	6·13	— ·86	·61	10	25	...	...	...	...	...	...
XVI.		Loch Leven Sluices ...	4·00	+ ·04	1·10	4	14	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	2·50	— ·20	·50	3, 9	16	57·8	2	29·0	16	2	...
XVII.		Braemar	6·70	+ 2·12	2·10	7	20	56·8	4	12·2	16	6	14
,,		Aberdeen (Cranford)	1·35	...	·21	10	16	58·0	23*b*	29·0	14*e*	5	...
,,		Cawdor (Budgate) ...	2·83	— ·02	·88	3	19	...	...	...	...	...	...
XVIII		Strathconan [Beauly] ...	6·00	— ·56	·89	9	14	...	...	...	...	...	...
,,		Glencarron Lodge...	16·79	...	...	...	28	60·9	4	29·4	15	2	...
XIX.		Dunrobin ...	2·52	— ·31	·58	3	21	57·0	8	32·0	15	1	...
,,		S. Ronaldshay (Roeberry) ...	3·36	— ·06	·46	19	21	55·0	4	35·0	19*f*	0	...
XX.	IRELAND.	Darrynane Abbey...	2·51	...	·83	2	15	...	...	...	...	...	...
,,		Waterford (Brook Lodge) ...	2·86	— ·81	·62	7	11	58·0	4	40·0	4*g*	0	...
,,		Broadford (Hurdlestown) ...	2·65	...	·59	2	15	...	...	...	...	...	...
XXI.		Carlow (Browne's Hill) ...	2·40	— ·66	1·39	7	13	...	...	...	...	...	...
,,		Dublin (FitzWilliam Square)	1·96	— ·87	·39	3	13	64·9	4	38·1	18	0	2
XXII.		Ballinasloe	3·66	— ·25	·84	2	18	58·0	4	29·0	19	3	...
,,		Clifden (Kylemore)	8·93	+ 4·72	1·17	2	18	...	...	...	...	...	...
XXIII		Waringstown ...	3·00	— ·10	·92	3	8	57·0	18	34·0	21	0	2
,,		Londonderry (Creggan Res.).	3·27	— 1·25	·52	3	20	...	...	...	...	...	...
,,		Omagh (Edenfel) ...	3·04	— ·83	·47	3	18	60·0	4	31·0	18	1	3

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

a—and 17. *b*—and 24, 27. *c*—and 20, 30. *d*—and 19. *e*—and 15. *f*—and 24. *g*—and 12, 18, 19, 27, 29.

METEOROLOGICAL NOTES ON NOVEMBER, 1899.

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.

LONDON, CAMDEN SQUARE.—A remarkable November. With a total rainfall 79 per cent. above the average, and only twice exceeded in 40 years, there was absolute drought for 19 days; the longest on record in November. The mean temp. (47°·7) is 4°·7 above the average, and has been exceeded in November only in 1881. The temp. rose above 50° on 24 days (a number exceeded only in 1881), and above 60° on 3 days.

TENTERDEN.—Very wet from 2nd to 9th, but absolute drought for 16 days from 15th to 30th, with scarcely any sunshine. The gales, so common at the end of November, were conspicuous by their absence. Duration of sunshine, 64 hours. L on 8th.

HARTLEY WINTNEY.—The whole of the R fell in the first 10 days, the remaining 20 being very fine and dry, though dull, with extremely light S.W. winds. Dahlias, roses, verbenas, and geraniums were in flower until cut down by frost on 30th. Ozone was registered on 13 days, mean 4. L on 5th, 6th, 7th, and 10th. Fog on 17th, 18th, 19th, and 30th.

WINSLOW, ADDINGTON.—The first part of the month was wet and stormy, but not a drop of R fell after the 11th. There was a good deal of fog at times, very dense on the night of the 19th, ·01 in. of water being deposited in the rain gauge.

BURY ST. EDMUNDS, WESTLEY.—The mildest November for many years. Till the 9th, very wet, then very fine and dry to the end. T on 2nd, 6th, and 11th.

NORWICH, BRUNDALL.—The mildest November since the record commenced in 1886; rainy during the first week, afterwards dry. Dahlias in bloom in the open at the close. L on 8th. T L and H on 11th.

WINTERBOURNE STEEPLETON.—The earlier part of the month was very wet, and it followed a wet week, the rainfall for the 18 days ending 11th being 7·54 in. After that date no R fell. The temp. was high (mean 47°·8) and there was very little frost.

TORQUAY, CARY GREEN.—Rainfall ·62 in. above the average. Mean temp. (50°·8), 3°·5 above the average. Duration of sunshine 64 hours 40 minutes, being 4 hours above the average; 10 sunless days.

POLAPIT TAMAR [LAUNCESTON].—The first 10 days were wet and stormy; the remainder of the month was remarkable for general calm and absence of strong wind, the average daily velocity for the last 20 days being only 34·5 miles, while for the whole month it is 121·8 miles. T and L on 8th. Thick fog till 11 a.m. on 19th.

CHURCH STRETTON, WOOLSTASTON.—The early part of the month was wild and stormy, with heavy gales on 3rd, 7th, 8th, and 9th, but scarcely any R fell after the 11th. T and L on 8th. Fog on 14th and 15th. Mean temp. 47°·0.

WALES.

HAVERFORDWEST.—The month was unusually fine and mild, with temp. above the average, but very little sunshine. From the 1st to the 10th the weather was wet and stormy, but from that date to the end every day was fine, a little R falling in the night. Springs still somewhat low. L on 2nd and 7th.

ABERYSTWITH, GOGERDDAN.—Very mild throughout the month.

LLANDUDNO.—T and L at night on 2nd. S on the hills on 11th.

SCOTLAND.

CARGEN [DUMFRIES].—November opened with a spell of wet, boisterous weather, which continued until the 11th, when exceptionally fine weather set in, and lasted during the remainder. The mildness of the temp. was remarkable, the mean being the highest recorded in 40 years, and there was almost entire absence of frost. The warmth of the last 7 days was remarkable; the mean temp. being 50°·5, while the min. exceeded 50° on 3 nights, and averaged 48°·7. In the first 7 days 4·25 in. of R fell, while on 2nd, 3rd, and 7th, the fall exceeded an inch. Southerly winds prevailed on 21 days, and S. gales occurred on 4th, 7th, and 8th. Sunshine was much below the average, 15 days being sunless. T on 3rd and 4th.

EDINBURGH, BLACKET PLACE.—A remarkably mild month, with no frost, the mean temp. (47°·4) being 6°·5 in excess of the average of 135 years, and the highest in the period 1764 to 1899. The temp. rose above 50° on 23 days. Rainfall 20 per cent. above the normal. Gale with H and R on 3rd. Gale and heavy squalls on 7th.

COLMONELL.—Rainfall ·85 in. more than the average of 23 years. Mean temp. (48°·6) 7°·5 above the average. Between 7.30 a.m. and 3 p.m. on 3rd 1·69 in. of R fell. Gales on 5 days. H on 11th.

TIGHNABRUAICH, CRAIGANDARAICH.—A wet and windy month, with high temp. Mean 45°·2.

MULL, QUINISH.—T, L and H showers on 5th.

BRAEMAR.—A fine open month, notwithstanding a heavy rainfall. Hurricane and L on 12th.

ABERDEEN, CRANFORD.—A fine and very warm November, the temp. rising to 58° on several days.

S. RONALDSHAY, ROEBERRY.—An unsettled and windy month. The latter part very mild. Mean temp. 46°·5, or 3°·5 above the average of 9 Novembers.

IRELAND.

DARRYNANE ABBEY.—A dry month on the whole. From 1st to 10th, 2·14 in. of R fell, and these 10 days were very wild and stormy. The rest of the month was very fine and warm, and many days were quite spring-like. A severe TS occurred between 8 p.m. and 8.30 p.m., on 7th.

WATERFORD, BROOK LODGE.—A heavy gale, blowing down trees, and H showers, occurred on 3rd, a heavy S.W. gale on 7th, and T and L at night. The latter half of the month was very mild and calm.

BROADFORD, HURDLESTOWN.—A very fine November. Rainfall ·64 in., and rainy days 5, less than the average of 15 years. T on 5th, T and L on 8th.

DUBLIN, FITZWILLIAM SQUARE.—A record month for warmth, the mean temp. being 50°·7, compared with 50°·3 in November, 1881, and an average of 44°·7. The first half of the month was very stormy, wet, and generally unsettled, and on 3rd a tempest of wind and R swept over, doing much damage to trees and buildings. During the second half high pressure prevailed, with cloudy skies. High winds occurred on 16 days, and gales on 7. H fell on 8th and 11th. L was seen on 7th, 8th, 9th, and 14th.

BALLINASLOE.—L on 5th and 10th. W. gales on 10th and 11th.

EDENFEL [OMAGH].—The weather of the first 10 days was very mild, and very wet, nearly all the R of the month having fallen within that period, but for the remainder, calm, often clear, abnormally mild, and comparatively rainless weather, made November remarkable.