

Symons's Meteorological Magazine.

No. 535.

AUGUST, 1910.

VOL. XLV.

INSURANCE AGAINST WET WEATHER.

By H. J. GOODING.

IN the world of insurance nothing is inviolate. Not only the issues of life and death on which millions hang, but also the issues of birth and marriage have at times paid toll to insurance. Our houses are insured against fire, burglary, and the breakage of glass, our servants against accident, and our carriages or motor cars against collision in the street. If a monarch dies, if war is declared, or if a Chancellor of the Exchequer increases the tax on tea or sugar, many thousands of pounds change hands under insurance policies. Every risk which involves a financial loss is liable sooner or later to become the subject of insurance by an enterprising Company, or by that wonderful institution called Lloyds. Lloyds is not, as so many people imagine, in the nature of an insurance company with which the public can do business direct, but is a place of resort (originally a Coffee House kept by Lloyd) where underwriters congregate, and subscribe such portion of any risk submitted to them as they may be disposed. Many classes of insurance, which are to-day recognized branches of the business, have had their origin at Lloyd's, and as wet weather frequently results in financial loss to the promoters of Agricultural, Horse or Flower Shows, and of Fêtes and Athletic Meetings, it is not surprising that insurance against wet weather is regularly undertaken.

In the absence of reliable or adequate statistics, a novel kind of insurance is based upon empirical methods, at premiums allowing a substantial margin for errors of judgment as well as for working expenses, and as experience is gained the premiums are reduced until the lowest profitable basis in practice is reached, and it frequently happens that this practical value is greater than would appear from the statistics when ascertained owing to the operation of other considerations. In this way, the adequate premium for an insurance against a rainfall of .10 in. during a day of 12 hours or less in the summer months, June—September, has been fixed at 20 to 25 per cent., according to the part of the country involved. This is for the simple risk of rainfall, which in point of fact, however, is seldom asked for, the common form being an indemnity against loss through rainfall, viz., against the receipts for admission falling short of the expenses of the venture in consequence of rain.

This form introduces a second consideration, the attractiveness of the meeting and its power to draw gate-money in spite of wet weather, with the result that premiums which are calculated on the expenses vary considerably. The risks are covered either for loss "reasonably attributable to rain," or upon a rainfall of $\cdot 10$ in., and, in very general terms, the former costs 5 per cent. on the expenses more than the latter. It is evident that a country show which is a regular fixture, and where the show is of more importance than the frocks and frills of the ladies, is less likely to be interfered with by rain than a town fête where Dame Fashion is in the ascendant.

It is somewhat difficult to give a reliable indication of the rates ruling, because, owing to the indifferent weather of recent summers, underwriters with experience have shown an inclination to increase their charges, and, at the same time, others have entered into the business in the belief that lower rates can be charged with safety. However, it may be taken as an approximation, that 10% on the expenses is a normal rate subject to $\cdot 10$ in. of rain falling during agreed hours, usually 9 a.m. to 8 p.m.; and 15% for loss reasonably attributable to rain. In the past, quotations have largely been governed by rule of thumb; but it is a healthy sign that there is now a tendency to consult statistical records, and to discriminate according to the district and the month, as well as the attractiveness of the meeting.

The cost of insurance at these rates naturally forms an appreciable item in the accounts, and while many institutions holding a meeting annually make it a practice to insure regularly, it is amusing to note in the case of those who have not insured before their anxiety to have the insurance, but their reluctance to pay the necessary premium, and not infrequently their strenuous endeavours to cheat the weather, which, it need hardly be said, generally fail. It is usual to stipulate that the premium must be paid three days before the day insured; and in one instance a proposal for £300 was made and accepted for Saturday. On Tuesday it rained heavily; on Wednesday it rained heavily, but no premium was paid. On Thursday it was still raining, and the premium was offered, and although late, accepted. On Friday it poured again, and on Saturday the sun beamed benignly on the gentleman who had attempted to "wait and see."

The nature of the meetings protected by Weather Insurance varies considerably, and the amounts involved frequently run into substantial figures. The form of the insurance itself is occasionally varied to meet particular cases. An important cricket match will be insured for £1,000 spread over the three days, and the policy will be to pay a specified sum if "no ball bowled" during a section of the period; the three days being cut up into six sections, viz., three mornings and three afternoons.

A big open-air political gathering, where there is no charge for admission and the expenses are borne by the Association, may be insured against the actual costs of postponement or abandonment.

Agricultural and Horse Shows, Athletic Meetings, Fireworks and Fêtes will insure from small amounts up to £500 or £600, and the vogue of Pageants and Aviation meetings has created a demand for policies reaching several thousands of pounds in many instances. Possibly the largest weather insurance was one for £8,000 in connection with fêtes at a French town lasting a week. There have been various larger policies, but on the basis of insuring the deficiency between the takings at the gate and a specified sum from whatever cause arising, commonly called "gate insurance;" a form of policy which the present writer has always looked upon as peculiarly hazardous, since it covers not only the risk of weather, but also of calamity and "public taste," the latter being exceedingly difficult to gauge in the case of a meeting which has not been held before. Weather insurance policies stand upon a firmer basis, and the more statistics of daily rainfall become available, the more* will it be possible to discriminate in the rating of risks.

COLD JULIES IN LONDON.

THE chill and gloomy month just past gave rise to many statements in the press as to the weather being of an unprecedented nature, and we had occasion to check many more statements of a similar kind by assuring a host of eager young journalists that the records of the past spoke of several years with a chillier July still.

The unprecedented may be common enough in a short record, but as year is added to year the unprecedented grows rarer and rarer. In the last line of the following table we have extracted the temperature figures for Camden Square in July, 1910, which come nearest the unprecedented, and above them in chronological order similar data for the twelve earlier years in which one or other of the values given was lower.

Temperature Records at Camden Square in July.

YEAR.	Shade Max. Temp.			Mean Shade Temp. of Month.	
	Mean.	Highest.	Lowest.	Mean.	Diff. from average.
1860	69°·9	75°·9	59°·9	59°·6	— 4°·0
1861	71°·9	76°·8	59°·2	62°·2	— 1°·4
1867	70°·9	76°·9	57°·6	61°·0	— 2°·6
1871	72°·6	82°·2	59°·2	62°·5	— 1°·1
1875	69°·8	80°·4	59°·2	60°·3	— 3°·3
1879	67°·7	80°·2	57°·6	59°·1	— 4°·5
1880	72°·5	79°·2	66°·1	62°·6	— 1°·0
1882	71°·5	77°·8	64°·8	61°·3	— 2°·3
1888	67°·1	72°·7	55°·7	58°·9	— 4°·7
1890	69°·3	76°·2	58°·1	60°·4	— 3°·2
1892	70°·5	81°·7	55°·5	60°·7	— 2°·9
1909	70°·4	77°·6	62°·6	61°·4	— 2°·2
1910	68°·5	79°·2	59°·2	59°·9	— 3°·7

By this it will be seen that July, 1910, comes fourth in respect of low mean temperature, and that it was the fourth occasion in 53 years when the mean temperature of the month was below 60° . The mean temperature this year was however $1^{\circ}0$ above that of July, 1888, which was the coldest July in the record. On no occasion during the month did the maximum temperature of any day mount to 80° , but this has been the case in eight previous Julies, all of which are quoted. The extraordinary frequency of low maxima is made more apparent by the mean daily maximum for the month, which was only $68^{\circ}5$, being $6^{\circ}0$ below the average, and the third lowest on record. The lowest daily maximum of the month ($59^{\circ}2$ on the 9th in 1910) has been lower eight times, the lowest of all on July 17th, 1892, reaching only $55^{\circ}5$. The minimum daily temperature was by no means so remarkable, the monthly mean having been lower in 18 years, and the absolute lowest very frequently. This may probably be attributed to the lack of terrestrial radiation at night on account of the abnormal prevalence of cloud, and the latter is confirmed by the sunshine record. The duration of sunshine has been recorded at Camden Square only since 1904, but even this comparatively short record provides an interesting comparison. Thus, for the three years, 1904-6, the average amount for July was 228.5 hours, for the following three years it fell to 162.4 hours, whilst in July, 1910, only 101.5 hours were observed. At the moment of writing we have just put on record the sunshine measured on August 10th, 10.3 hours, and were struck by the fact that this was the first day since June 20th, seven and a half weeks before, with so much as 10 hours of sunshine. During July, 1910, the greatest daily record was no more than 7.4 hours, and there were twenty-two days which failed to give more than 5 hours of bright sunshine, a state of things which is probably more nearly unprecedented than any other of the conditions of a most unsummerlike month.



THE WEATHER OF JULY.

By FRED. J. BRODIE.

OWING to an unusual prevalence of cool winds, chiefly from between west and north, and to a marked deficiency in the amount of bright sunshine, the eastern and central districts, normally the warmest in the whole kingdom, experienced last month a striking absence of summer heat. On only two occasions did the thermometer in any part of our eastern, midland and southern counties touch 75° , and in some few places it scarcely exceeded 70° . At Hereford on the 21st, and at Greenwich on the 28th, a shade maximum of 76° was registered, but at Westminster the thermometer never rose above 74° , the reading being the lowest absolute maximum recorded in July since the singularly inclement season of 1888, when the temperature

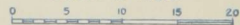
RAINFALL OF THAMES VALLEY - JULY, 1910



ALTITUDE SCALE

Below 250 feet 250 to 500 feet 500 to 1000 feet Above 1000 feet


SCALE OF MILES



in London failed to exceed 72° . The western and northern parts of the United Kingdom experienced also an undue prevalence of cool weather, but between the 12th and 14th, when a large anticyclone which covered the country reached its maximum intensity, the thermometer rose to 80° in several portions of Scotland, North Wales and the north-west of England, and to very nearly as high a level at some inland stations in Ireland. At Rothesay, Newton Rigg and Bettws-y-Coed, the shade maximum on the 13th was as high as 81° , and was 5° higher than anything recorded in the eastern or south-eastern parts of the country. In western and central Ireland the mean temperature of July was not much below the average, but in most English districts the deficiency amounted to between three and three and a half degrees, and in London to more than four degrees. The frequent presence of a heavy cloud canopy was inimical to the progress not only of solar but also of terrestrial radiation, and the night temperatures were, therefore, more nearly in accordance with the normal than the midday readings. Very few minima below 40° were recorded in any part of the country, but at Balmoral the sheltered thermometer on the 11th, and again on the 24th, sank to 31° , the readings on the surface of the grass being respectively as low as 29° and 28° . In London the thermometer scarcely went below 50 degrees, the absolute minimum of 49° on the 3rd, 19th and 24th being higher than in many recent Julies.

Between the 8th and 14th of the month an anticyclonic distribution of pressure was reported over the entire kingdom, and in Ireland and Scotland it continued until about the 18th, many places in all districts experiencing an absence of rain lasting between 10 and 12 days. At all other times a cyclonic type prevailed, the weather of the last 12 days being affected by numerous depressions which came in from the Atlantic. Some of these disturbances, notably that of the 24th–25th, were of unusual intensity for the season, and occasioned gales from between south-west and north-west on many parts of our western and southern coasts. Very few heavy falls of rain were experienced in the eastern districts, but in the west and north such occurrences were more frequent, the principal cases being reported on the 5th, the 20th and the 25th.

The total duration of bright sunshine for the month was considerably below the normal in nearly all parts of England and the east of Scotland. At Westminster only 102 hours were registered, as against an average of 181 hours, the number being smaller than in any July since the record commenced in 1883, with the single exception of 1888, when the total was no higher than 92. In the west of Scotland the duration last month agreed very closely with the average, while in Ireland there was an excess. At Birr Castle the total of 196 hours was 57 in excess of the normal.



Correspondence.

To the Editor of Symons's Meteorological Magazine.

LOW JULY MAXIMUM TEMPERATURE.

THE maximum shade temperature to-day (Stevenson screen, Kew verified thermometer) was $56^{\circ}7$.

According to the Greenwich Observatory Temperature Tables, 1841—1905, the lowest maximum for the 18th July was $64^{\circ}5$ in 1883, nearly 8° warmer than to-day.

Is not such a low maximum very unusual in the south of England in the middle of July?

H. K. G. ROGERS.

Glenart, Weybridge, 18th July, 1910.

A BEAUTIFUL RAINBOW AFTER SUNSET.

THE sun had apparently set here this evening at about 7.30 behind a belt of trees, and the sky above it had a brilliant golden red glow. In the opposite direction a flame shot up from the horizon, the sky around it being suffused with orange and red, and the remark was made to me that there must be a fire in Watford. Presently the flame, rising higher, was seen to be curved, and proved to be a rainbow, which by 7.40 formed a complete arch, apparently on light clouds rather than on rain. Outside the bow the sky glowed with red, but inside down to the horizon in the centre of the arch it was uniformly much lighter, being of a pale gold colour, the contrast being very marked. This appearance lasted until 7.47, at least a quarter of an hour after the sun had entirely disappeared, and it seemed to fade from rain becoming general rather than from the setting of the sun. It was the most beautiful and peculiar rainbow effect I have ever seen, although the different colours of the rainbow itself were not so distinct as usual.

JOHN HOPKINSON.

Westwood, Watford, August 4th, 1910.

CLOUD FORMS SIMULATING A WATERSPOUT.

ON Sunday morning, July 17th, just after 11 a.m., a cloud form, closely allied to a waterspout, was seen from Detling over the Weald of Kent. The weather at the time was rough and stormy with heavy rain, cumulo-nimbus with pendulous banks of nimbus suspended at a low elevation being the prevalent cloud forms, the whole moving rapidly from an easterly point. In the rear of an exceptionally heavy rain squall violent disturbances were visible in these cloud

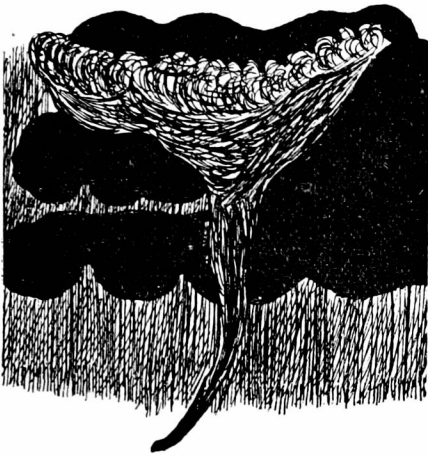


FIG. 1.



FIG. 2.

forms, developing rapidly into the shape of a waterspout, silhouetted very plainly against the clouds, with the end of the spout apparently below the nimbus. The nimbus appeared as though rapidly drawn up by the cumulo-nimbus and then deposited equally rapidly by a current with a spiral motion, rain descending in sheets. A well marked seething prevailed at the apex of the spout. The phenomenon was of short duration, with rapid alterations in shape and size.

Fig. 1 shows the general appearance at 11.14 a.m. from a rapid sketch made at the time, and Fig. 2 just prior to the landscape being entirely blotted out by a pall of nimbus.

Epsom, July 30th, 1910.

SPENCER C. RUSSELL.

PARISH RECORDS AND WEATHER.

THE enclosed extract from the Churchwardens' Book, 1672, in *Archæologia Cantiana*, vol. xxii., page 46, may be of interest in continuation of my previous letters on the subject.

“Munday the 30th day of December, 1672, between 12 and 1 in the morning arose a storm of lightning and thunder, a hard gale of wind and some raine out of the south-west, which set fire to the steeple at Benenden, whereby the said steeple with the rooffe and all the timber work of the church was consumed in four or five howers time, the five large bells melted; also five houses ajoyning to the churchyard gate on the north side burnt to the ground. The steeple was built of timber from the ground.”

RICHARD COOKE.

COMETS AND THE WEATHER.

By F. W. HENKEL, B.A., F.R.A.S.

(late of Markree Observatory).

IN general, comets were not regarded by the ancients as heavenly bodies at all, but as purely transient atmospheric "meteors," and they are accordingly not even mentioned in Ptolemy's great work, the *Almagest*. Aristotle, whose ideas on all subjects were held in the utmost reverence up to about two centuries ago, considered these bodies to be in general exhalations or vapours arising from the Earth. These vapours are drawn upwards and rising to the "region of fire" there condense and burn, being visible so long as the combustible material of which they are composed lasts.* Xenocrates and Theon of Alexandria call comets "light clouds," to which Xenophanes adds the epithet of "wandering," but though this is in a sense true, their idea of the nature of cloud was very different from our own. Pliny's Natural History is full of references to cometary phenomena and their supposed influences. He divides these bodies into no less than 12 different kinds according to their form, and speaks of Sword Comets (*Xiphiae*), Disc-shaped Comets (*Discei*), Horse-manes (*Hippii*), &c. Many pages might be filled with quotations from ancient and modern writers, but we propose to confine ourselves as closely as possible to supposed influences on the weather and other meteorological phenomena.

Pliny in his Natural History says: "They distribute poison throughout the atmosphere when they appear in the head of the Northern or the Southern Serpent, it is not an unimportant matter whether they dart their beams towards certain regions or no, their influence varies accordingly." In curious contrast to this view we have another that the poisonous exhalations of the atmosphere rise up and are consumed in the form of comets, the latter thus serving to purify and not pollute the air! Virgil in the first "Georgic" referring to supposed portents at the time of Caesar's death, alludes to the darkening of the sun by day, and direful comets in the sky occurring with lightning in otherwise clear skies at night. Seneca, who almost alone amongst the classical writers, held sensible and consistent views as to the nature of comets, regarding them as distant planets returning at regular intervals, nevertheless says: "The comet which appeared during the Consulate of Paternulus and Vopiscus (A.D. 62) has been attended with the consequences that Aristotle and Theophrastus have attributed to this kind of star. Everywhere there have been *violent and continual storms*, in Achaia and Macedonia

* According to Aristotle the air is divided into three regions; (1) that in which animals and plants live, immovable like the earth on which it rests; (2) an intermediate region intensely cold; (3) the upper region contiguous to the region of fire, or the heavens, partaking of the diurnal motion of the latter. The vapours rising from the Earth ascend to this region and are heated, engendering igneous meteors and comets.

several towns have been overthrown by earthquake." Strabo and Diodorus Siculus in their works refer in a similar manner to the supposed connection between the apparition of brilliant comets and remarkable storms or earthquakes.

Throughout the writers of the middle ages, in addition to the "wars, pestilences and death of princes," supposed to be portended by comets, we find continual references to remarkable conditions of weather attributed with equal reason to the influence of these bodies. "In (536 A.D.) the ninth year of the reign of Justinian I. there occurred a darkness lasting through the greater part of that year and part of the following one" (Gregorius, *Abu'l Faragius*). "In the second year of Justinian II. (567 A.D.) there appeared a *flame of fire in the heavens* near the North Pole and it remained for a whole year, darkness was cast over the world from three o'clock until midnight so that nothing could be seen, and something resembling dust and ashes fell from the sky" (*Abu'l Farag.*). Humboldt has conjectured that this phenomenon may have been a long lasting magnetic storm (*aurora borealis*) and been followed by darkness and showers of meteoric dust. Many other quotations of a similar character might be given, the principle of *post hoc ergo propter hoc* being thought sufficient evidence of the causal connection between cometary and terrestrial phenomena.

Yet, though the wide spread and long continued belief in the influences of comets upon the weather has even survived the belief in their direct baleful influence upon the fortunes of humanity, we must, nevertheless, place it in the same category as the supposed lunar influence. In the words of the late Professor Young, we may say that "there is no *observable* change of temperature or of any meteorological condition, nor any effect upon vegetable or animal life produced by a comet, even of the largest size." Arago, more than half-a-century ago, made some attempts to deal statistically with the question. He took the mean temperature at Paris for the years 1735 to 1853, placing side by side the number of comets observed in each year, and thus showed that years fruitful in comets, such as 1808, 1819 and 1846, were marked by temperatures lower or hardly equal to those of years in which few or no comets were seen. Sixty-nine years with comets gave a mean annual temperature of 51°·46 F., twenty-seven years in which no comets were seen gave a mean of 50°·94. He considered this slight difference as explained by the fact that years without comets were most frequently more cloudy than the others, the prevalence of clouds concealing comets from observation. Arago alludes to a singular modern fancy as to the influence of comets upon harvests, vintages, &c., and Humboldt states, "in our own day a singular belief has arisen ascribing to these once ill-omened bodies a beneficial influence on the ripening of the vine in German vineyards. The year 1811 was distinguished by the apparition of a particularly brilliant comet, and in France, at least, the vintage was especially good and abundant, and the wine thence pro-

duced was long known as the "Comet wine." A letter quoted by Arago runs thus: "Through the influence of the comet of 1811, the winter following was very mild, the spring was wet, the summer cool, and very little appearance of the sun to ripen the produce of the earth, yet the harvest was not deficient, and some fruits were not only abundant but deliciously ripe. Very few wasps appeared, and the flies became blind and disappeared early in the season. *A large number of females produced twins, some had more, and one woman was the mother of four children at one birth!* After the appearance of Halley's comet in 1835-6, the mild temperatures of the months of October and November were ascribed by some to the passage of the comet." On this Arago made the following remarks: "People wish to attribute the mild temperature of the north of France during these eight weeks to the influence of the comet! I could instance on the one hand Octobers and Novembers still milder when no comets were visible; on the other hand I could give instances of great cold being experienced during the same months when brilliant comets were in sight, but to come more directly to the point, I will remark that at the end of 1835, while Paris was enjoying a very mild temperature, it was especially cold in the south, so that if the temperature depended on the comet's influence, this action must vary with the position of the place!"

In a similar manner, the warm weather experienced about May 20th of the present year, and the colder weather later have, with equal reason, been attributed to the proximity of this comet to our own Earth. Coggia's comet of 1874 was visible at the hottest time of the year, and that summer in France was unusually hot, but in 1873 no less than seven comets passed their perihelion, and yet that year was not so hot as the following one.

Another meteorological phenomenon, the "dry fog," examples of which at times lasted for a month or more, has also been attributed to comets with about as much reason.

The great comet of 1861 passed very close to the Earth on June 30th of that year, and it was the opinion of Hind, Liais, and other astronomers that our planet was actually involved in its tail. Nothing definite seems to have been observed at the time, though one or two persons recorded a peculiar phosphorescence in the sky, and Mr. Lowe of Nottingham compared the appearance to that of a diffuse aurora borealis, "yet being daylight such aurora would be scarcely noticeable." It seems not improbable that a similar encounter between the Earth and what remains of Biela's comet took place in 1872, when a remarkable meteor shower was seen. Humboldt (*Cosmos*, vol. i.), however, records meteor showers seen by Capocci before the separation of the comet, so that it is by no means certain that "Biela's comet was shedding over us the pulverised products of its disintegration" at that time. The proximity of Halley's comet to the Earth during the present year has caused much interest to be manifested in the questions as to the possibility of detecting any action of this body upon terrestrial phenomena.

It seems probable that when nearest to us in the early morning of May 19th, the tail did not reach so far as the Earth, so that the suggested bottling of sample portions of our atmosphere to detect any new or unusual gases could have no result. Though there is no doubt of the existence of a strong action possibly of an electrical nature between the comet and the sun, all efforts to detect any influence of the former upon terrestrial magnetism have so far had negative results, the records at Kew and other magnetic observatories showing no unusual phenomena.

All that we know of these still mysterious bodies bears witness to the excessive tenuity of the substance of which they are composed. The faintest stars are visible with undiminished brightness through enormous thicknesses of cometary matter, though the least cloud in our own atmosphere would impair their lustre, render them invisible. Their paths are enormously affected by their approaches towards the planets, but no effect has ever been produced in the motions of these latter, "we have no balance delicate enough to weigh them (the comets)." Two centuries ago the fancy of Whiston attributed the "universal deluge" to the approach of a comet, causing an unprecedented tide in the waters of the globe, and he also ventured to predict that the same body will some day accomplish the destruction of our world by fire, but we now know that such speculations are utterly groundless. Laplace, at one time, amused himself with speculating on the consequences of a collision between a comet and the Earth, on the supposition *that the mass of the comet was comparable with that of our planet*, and even supposed that in some such way the "cataclysms" of the older geologists might be explained. The novelist, Edgar Allen Poe, in his "Extraordinary Histories," relates a conversation supposed to have taken place between Eiros and Charmion, after the destruction of the world by a comet. The comet approaching by its action removed the whole of the nitrogen of the terrestrial atmosphere, leaving pure oxygen. "Thus resulted an irresistible, all devouring, omni-prevalent combustion. A shouting and pervading sound, while the whole incumbent mass burst at once into a species of intense flame. . . . This ended all!" The cause for the abstraction of the nitrogen is not given, as is, perhaps, hardly to be expected from a novelist.

In conclusion, we may say that though the volume of a comet is often enormous, sometimes many times greater than that of the sun itself, yet the mass even of the largest comet is excessively small. Matter in such a condition must possess properties altogether different from any of which we have experience, the residual gas in the most perfect vacuum obtained by artificial means being a massive plenum by comparison. We may thus conclude that there is but the smallest possibility of any detectible influence of a comet upon terrestrial meteorological conditions, since the gravitational effect is absolutely imperceptible.

RAINFALL TABLE FOR JULY, 1910.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1875— 1909. in.	1910. in.
Camden Square.....	London.....	51 32	0 8	111	2·57	2·53
Tenterden.....	Kent.....	51 4	*0 41	190	2·21	2·32
Steyning.....	Sussex.....	50 53	0 20	80	2·55	3·31
Southampton (Cadland) ..	Hampshire.....	50 50	1 22	52	2·42	2·88
Hitchin.....	Hertfordshire ..	51 57	0 17	238	2·55	1·70
Oxford (Magdalen College).	Oxfordshire.....	51 45	1 15	186	2·43	1·68
Bury St. Edmunds (Westley)	Suffolk.....	52 15	*0 40	226	2·68	3·62
Geldeston [Beccles].....	Norfolk.....	52 27	*1 31	38	2·37	4·03
Rolapit Tamar [Launceston]	Devon.....	50 40	4 22	315	2·74	2·49
Rousdon [Lyme Regis]	".....	50 41	3 0	516	2·68	3·08
Stroud (Upfield).....	Gloucestershire..	51 44	2 13	226	2·75	2·23
Church Stretton (Wolstaston)..	Shropshire.....	52 35	2 48	800	2·58	2·43
Coventry (Kingswood)	Warwickshire ...	52 24	1 30	340	2·60	...
Market Overton.....	Rutland.....	52 44	0 41	475	2·64	...
Boston.....	Lincolnshire.....	52 58	0 1	25	2·35	2·36
Worksop (Hodsock Priory).	Nottinghamshire	53 22	1 5	56	2·35	2·49
Macclesfield.....	Cheshire.....	53 15	2 7	501	3·41	5·99
Southport (Hesketh Park)..	Lancashire.....	53 38	2 59	38	2·92	3·74
Wetherby (Ribston Hall) ...	Yorkshire, W.R.	53 59	1 24	130	2·56	3·03
Arneliffe Vicarage.....	".....	54 8	2 6	732	4·75	5·09
Hull (Pearson Park)	"..... E.R.	53 45	0 20	6	2·39	2·73
Newcastle (Town Moor) ...	Northumberland	54 59	1 38	201	2·90	2·22
Borrowsdale (Seathwaite) ...	Cumberland.....	54 30	3 10	423	8·91	9·16
Cardiff (Ely).....	Glamorgan.....	51 29	3 13	53	3·26	3·05
Haverfordwest.....	Pembroke.....	51 48	4 58	95	3·39	2·89
Aberystwyth (Gogerddan)..	Cardigan.....	52 26	4 1	83	4·03	5·47
Llandudno.....	Carnarvon.....	53 20	3 50	72	2·52	3·11
Cargen [Dumtries].....	Kirkcudbright...	55 2	3 37	80	3·20	...
Marchmont House.....	Berwick.....	55 44	2 24	498	3·30	4·05
Girvan (Pinmore).....	Ayr.....	55 10	4 49	207	3·73	5·46
Glasgow (Queen's Park) ...	Renfrew.....	55 53	4 18	144	2·91	5·26
Inveraray (Newtown)	Argyll.....	56 14	5 4	17	4·72	5·44
Mull (Quinish).....	".....	56 36	6 13	35	4·12	3·96
Dundee (Eastern Necropolis)	Forfar.....	56 28	2 57	199	2·84	3·57
Braemar.....	Aberdeen.....	57 0	3 24	1114	2·65	3·51
Aberdeen (Cranford)	".....	57 8	2 7	120	3·00	2·38
Cawdor.....	Nairn.....	57 31	3 57	250	3·14	4·74
Fort Augustus (S. Benedict's)	E. Inverness ..	57 9	4 41	68	2·98	3·12
Loch Torridon (Bendamph)	W. Ross.....	57 32	5 32	20	5·35	5·64
Dunrobin Castle.....	Sutherland.....	57 59	3 56	14	2·91	3·56
Wick.....	Caithness.....	58 26	3 6	77	2·67	2·49
Killarney (District Asylum)	Kerry.....	52 4	9 31	178	3·53	3·37
Waterford (Brook Lodge)....	Waterford.....	52 15	7 7	104	3·13	2·15
Nenagh (Castle Lough)....	Tipperary.....	52 54	8 24	120	3·02	3·40
Miltown Malbay.....	Clare.....	52 52	9 26	400	3·59	5·41
Gorey (Courtown House) ..	Wexford.....	52 40	6 13	80	2·90	1·99
Abbey Leix (Blandsfort)....	Queen's County..	52 56	7 17	532	2·99	2·80
Dublin (Fitz William Square)	Dublin.....	53 21	6 14	54	2·60	2·40
Mullingar (Belvedere)	Westmeath.....	53 29	7 22	367	3·16	3·27
Ballinasloe.....	Galway.....	53 20	8 15	160	3·07	2·36
Crossmolina (Enniscoie)....	Mayo.....	54 4	9 18	74	3·26	3·69
Collooney (Markree Obsy.).	Sligo.....	54 11	8 27	127	3·36	5·94
Seaforde.....	Down.....	54 19	5 50	180	3·32	3·84
Bushmills (Dundarave).....	Antrim.....	55 12	6 30	162	3·28	3·26
Omagh (Edenfel).....	Tyrone.....	54 36	7 18	280	3·34	4·59

RAINFALL TABLE FOR JULY, 1910—*continued.*

RAINFALL OF MONTH (<i>con.</i>)					RAINFALL FROM JAN. 1.				Mean Annual 1875-1909.	STATION.
Diff. from Av. in.	% of Av.	Max. in 24 hours.	No. of Days	Aver. 1875-1909.	1910.	Diff. from Aver. in.	% of Av.	in.		
		in. Date.		in.	in.					
— .04	98	.55	5	17	13.53	14.66	+1.13	108	25.11	Camden Square
+ .11	105	.55	5	14	13.65	16.23	+2.58	119	27.64	Tenterden
+ .76	130	.77	5	16	16.39	23.27	+6.88	142	33.58	Steyning
+ .46	119	.62	16	14	15.73	17.07	+1.34	109	31.87	Cadland
— .85	67	.46	5	15	13.36	13.69	+ .33	102	25.16	Hitchin
— .75	69	.58	5	14	13.03	12.89	— .14	99	24.58	Oxford
+ .94	135	.69	17	16	13.44	16.24	+2.80	121	25.40	Westley
+1.66	170	.96	17	17	11.98	17.52	+5.54	146	23.73	Geldeston
— .25	91	.38	28	18	18.62	23.88	+5.26	128	38.27	Polapit Tamar
+ .40	115	.62	17	15	17.01	17.74	+ .73	104	33.54	Rousdon
— .52	81	.80	5	12	15.83	16.50	+ .67	104	29.81	Stroud
— .15	94	.56	5	13	16.88	15.93	— .95	94	32.41	Wolstaston
...	...	...	...	...	15.35	...	...	...	28.98	Coventry
— .36	86	.60	5	16	14.13	14.49	+ .36	103	27.10	Market Overton
+ .01	100	.81	5	16	12.21	12.95	+ .74	106	23.35	Boston
+ .14	106	.42	5	14	13.15	12.42	— .73	94	24.46	Hodsock Priory
+2.58	176	1.29	20	14	18.17	21.48	+3.31	118	34.73	Macclesfield
+ .82	128	1.16	20	12	15.88	18.94	+3.06	119	32.70	Southport
+ .47	119	.86	5	13	14.19	18.32	+4.13	129	26.87	Ribston Hall
+ .34	107	1.30	5	15	31.97	39.69	+7.72	124	61.49	Arneliffe
+ .34	114	.67	5	15	13.47	13.99	+ .52	104	26.42	Hull
— .68	77	.54	5	16	14.45	15.08	+ .63	104	27.94	Newcastle
+ .25	103	1.66	28	18	65.29	76.74	+11.45	117	129.48	Seathwaite
— .21	94	1.15	24	12	20.48	26.64	+6.16	130	42.28	Cardiff
— .50	85	.72	20	17	22.84	21.58	— 1.26	94	46.82	Haverfordwest.
+1.44	136	1.91	20	14	22.15	30.29	+8.14	137	45.46	Gogerddan
+ .59	124	1.22	5	10	14.89	19.34	+4.45	129	30.36	Llandudno
...	...	...	...	...	22.26	...	...	...	43.47	Cargen
+ .75	123	.90	25	14	17.68	14.88	—2.80	84	33.76	Marchmont
+1.73	146	.80	20	16	24.83	32.26	+7.43	130	49.77	Girvan
+2.35	181	1.09	25	15	18.42	23.07	+4.65	125	35.97	Glasgow
+ .72	115	.90	5	17	34.04	40.42	+6.38	118	68.67	Inveraray
— .16	96	1.17	27	17	27.67	29.92	+2.25	108	56.57	Quinish
+ .73	126	.71	25	17	14.86	13.11	—1.75	88	28.64	Dundee
+ .86	132	...	...	...	17.80	22.24	+4.44	125	34.93	Braemar
— .62	79	.76	21	14	17.02	14.85	—2.17	87	32.73	Aberdeen
+1.60	151	1.81	25	9	15.65	19.70	+4.05	126	29.33	Cawdor
+ .14	105	.86	24	16	23.20	28.38	+5.18	122	44.53	Fort Augustus
+ .29	105	.72	29	13	42.74	53.10	+10.36	124	83.61	Bendamp
+ .65	122	.80	25	14	17.19	16.22	— .97	94	31.90	Dunrobin Castle
— .18	93	1.28	25	19	15.38	15.24	— .14	99	29.88	Wick
— .16	96	.72	28	18	28.40	36.22	+7.82	127	54.81	Killarney
— .98	69	.60	28	13	20.53	18.64	—1.89	91	39.57	Waterford
+ .38	113	.65	20	17	20.53	26.67	+6.14	130	39.43	Castle Lough
+1.82	151	2.00	28	16	22.30	27.88	+5.58	125	45.11	Miltown Malbay
— .91	69	.52	28	11	18.32	18.01	— .31	98	34.99	Courtown Ho.
— .19	94	.66	20	18	18.83	25.05	+6.22	133	35.92	Abbey Leix
— .20	92	.52	5	16	14.75	21.03	+6.28	143	27.68	Dublin
+ .11	103	.58	20	16	19.17	24.15	+4.98	126	36.14	Mullingar.
— .71	77	.61	28	16	19.22	21.80	+2.58	113	36.64	Ballinasloe
+ .43	113	.66	29	17	26.64	33.98	+7.42	127	52.87	Enniscoe
+2.58	177	1.13	28	18	22.19	34.17	+11.98	154	42.71	Markree
+ .52	116	.63	5	16	20.74	20.59	— .15	99	38.91	Seaforde
— .02	99	.48	20	18	18.77	22.94	+4.17	122	37.56	Dundarave
+1.25	137	.60	28	18	20.44	26.32	+5.88	129	39.38	Omagh

SUPPLEMENTARY RAINFALL, JULY, 1910.

Div.	STATION.	Rain inches	Div.	STATION.	Rain. inches
II.	Warlingham, Redvers Road	3.17	XI.	Llangyhanfal, Plâs Draw...	3.56
"	Ramsgate	2.25	"	Dolgelly, Bryntirion	7.19
"	Hailsham	2.53	"	Bettws-y-Coed, Tyn-y-bryn	4.85
"	Totland Bay, Aston House.	3.02	"	Lligwy	2.54
"	Stockbridge, Ashley	1.83	"	Douglas, Woodville .....	...
"	Grayshott	2.73	XII.	Stoneykirk, Ardwell House	3.51
"	Reading, Calcot Place.....	2.09	"	Dalry, The Old Garroch ...	5.25
III.	Harrow Weald, Hill House.	2.33	"	Langholm, Drove Road.....	6.75
"	Pitsford, Sedgebrook	1.75	"	Moniaive, Maxwellton House	6.02
"	Huntingdon, Brampton.....	2.22	XIII.	St Mary's Loch, Cramilt Ldgc	5.29
"	Woburn, Milton Bryant.....	2.22	"	Edinburgh, Royal Observty.	3.92
"	Wisbech, Monica Road	3.44	XIV.	Maybole, Knockdon Farm..	3.88
IV.	Southend Water Works.....	1.93	XV.	Campbeltown, Witchburn...	4.05
"	Colchester, Lexden.....	1.55	"	Glenreasdell Mains.....	3.77
"	Newport	1.93	"	Ballachulish House.....	3.41
"	Rendlesham	2.49	"	Islay, Eallabus	2.75
"	Swaffham	3.40	XVI.	Dollar Academy	4.36
"	Blakeney	4.14	"	Balquhidder, Stronvar	7.67
V.	Bishops Cannings	2.30	"	Coupar Angus	4.79
"	Winterbourne Steepleton ...	3.52	"	Blair Atholl.....	4.16
"	Ashburton, Druid House ...	3.58	"	Montrose, Sunnyside Asylum	2.23
"	Honiton, Combe Raleigh ...	2.88	XVII.	Alford, Lynturk Manse ...	4.43
"	Okehampton, Oaklands.....	3.61	"	Keith Station	4.89
"	Hartland Abbey	2.37	XVIII.	Glenquoich, Laon	6.25
"	Lynmouth, Rock House ...	3.35	"	Skye, Dunvegan.....	4.01
"	Probus, Lamellyn	2.27	"	N. Uist, Lochmaddy	2.99
"	North Cadbury Rectory ...	3.25	"	Alvey Manse	2.80
VI.	Clifton, Pembroke Road ...	2.14	"	Loch Ness, Drumnadrochit.	3.79
"	Ross, The Graig	1.63	"	Glencarron Lodge	4.37
"	Shifnal, Hatton Grange.....	1.79	"	Fearn, Lower Pitkerrie.....	3.82
"	Blockley, Upton Wold	3.66	XIX.	Invershin	3.94
"	Worcester, Boughton Park.	1.97	"	Altnaharra .....	...
VII.	Market Rasen	2.95	"	Bettyhill	2.25
"	Bawtry, Hesley Hall.....	2.79	XX.	Dunmanway, The Rectory..	2.61
"	Derby, Midland Railway ...	2.84	"	Cork	2.12
"	Buxton.....	5.74	"	Mitchelstown Castle	4.13
VIII.	Nantwich, Dorfold Hall.....	3.11	"	Darrynane Abbey	3.08
"	Liscard	4.00	"	Glenam [Clonmel]	2.22
"	Chatburn, Middlewood	3.36	"	Nenagh, Traverston	4.01
"	Cartmel, Flookburgh	3.37	"	Newmarket-on-Fergus, Fenloe	...
IX.	Langsett Moor, Up. Midhope	3.25	XXI.	Laragh, Glendalough	4.33
"	Scarborough, Scalby	2.96	"	Moynalty, Westland	3.08
"	Ingleby Greenhow	2.65	"	Athlone, Twyford	2.83
"	Mickleton.....	2.71	XXII.	Woodlawn	4.26
X.	Bardon Mill, Beltingham ...	4.06	"	Westport, St. Helens	4.42
"	Ilderton, Lilburn Cottage...	2.73	"	Achill Island, Dugort	6.19
"	Keswick, The Bank	5.53	"	Mohill	3.99
XI.	Llanfrechfa Grange.....	2.39	XXIII.	Enniskillen, Portora	2.64
"	Treherbert, Tyn-y-waun ...	8.17	"	Dartrey [Cootehill].....	3.66
"	Carmarthen, The Friary....	4.15	"	Warrenpoint, Manor House	3.85
"	Castle Malgwyn [Llechryd].	2.06	"	Banbridge, Milltown	3.98
"	Plynlimon.....	12.30	"	Belfast, Springfield	5.38
"	Crickhowell, Ffordlas.....	2.90	"	Glenarm Castle.....	3.05
"	New Radnor, Ednol	3.85	"	Londonderry, Creggan. Res.	4.34
"	Rhayader, Tyrmynydd	5.57	"	Killybegs	6.09
"	Lake Vyrnwy .....	...	"	Horn Head ...	3.62

METEOROLOGICAL NOTES ON JULY, 1910.

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; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Unusually cold and cheerless throughout with very scanty sunshine records (see p.). Cold winds from some N. point prevailed until 19th, after which the direction was generally S.W. with frequent showers. Duration of sunshine, 101·5* hours, and of R 40·5 hours. Mean temp. 59°·9, or 3°·7 below the average, and with three exceptions the lowest in 53 years. Shade max. 79°·2 on 28th; min. 47°·3 on 19th. F 0, f 0.

TENTERDEN.—A very dull and bad haymaking month though not specially wet. Duration of sunshine, only 117·0† hours, of which 25 per cent. was recorded in the last four days. Shade max. 73°·5 on 28th; min. 45°·5 on 4th. F 0, f 0.

RYDE.—Many damp and dull days and a lack of sunshine. Shade max. 74°·0 on 14th; min. 49°·0 on 4th.

PITSFORD.—R 1·96 in. below the average. Mean temp. 58°·6. Shade max. 76°·5 on 28th; min. 42°·6 on 19th. F 0.

ROUSDON.—Dull, changeable weather; a continuation of the weather of June with no genial warmth. Shade max. 70°·4 on 14th, this being the only day the temp. reached 70°.

ROSS.—The average shade max 67°·3 was the lowest with five exceptions in any July since 1861. Shade max. 77°·8 on 14th; min. 44°·4 on 14th. F 0, f 0.

HODSOCK PRIORY.—Shade max. 74°·9 on 14th; min. 40°·8 on 19th. F 0, f 0.

SOUTHPORT.—Duration of sunshine 215·3* hours, and of R 69·4 hours. Mean temp. 57°·8, or 1°·9 below the average. Shade max. 78°·2 on 14th; min. 45°·2 on 18th. F 0, f 0.

HULL.—Cloudy and unsettled generally with fresh winds and varying temp. Shade max. 74°·0 on 31st; min. 47°·0 on 4 days. F 0, f 0.

HAVERFORDWEST.—Fine and warm generally to 16th, but wet and stormy after. The hay crops were good and well saved. Shade max. 72°·5 on 8th; min. 40°·6 on 17th. F 0, f 0.

LLANDUDNO.—Shade max. 77°·0 on 13th; min. 49°·0 on 18th. F 0, f 0.

MARCHMONT HOUSE.—Duration of sunshine, 146·6* hours. Shade max. 71°·0 on 13th; min. 42°·0 on 3rd. F 0, f 0.

EDINBURGH.—Shade max. 70°·0 on 4th; min. 46°·1 on 2nd. F 0, f 0.

COUPAR ANGUS.—The wettest July since 1883. The month opened wet with a dry, warm period from 7th to 20th, followed by persistent and heavy R to the close. Mean temp. 57°·4. TSs were prevalent throughout. Shade max. 76°·0 on 13th; min. 37°·0 on 24th.

FORT AUGUSTUS.—Shade max. 68°·5 on 28th; min. 40°·3 on 11th. F 0.

WATERFORD.—Shade max. 76°·0 on 14th; min. 44°·0 on 9th. F 0.

DUBLIN.—The beginning was cold and showery, and the end, while showery, was seasonably warm. Mean temp. 58°·0, or 2°·5 below the average. Shade max. 72°·2 on 27th; min. 47°·1 on 8th. F 0, f 0.

MARKREE.—The first few days were wet and stormy, after which no R fell until 19th when wet weather again set in until the close. There was a strong gale on 25th, and heavy R on 28th causing considerable damage to roads and crops. Shade max. 78°·3 on 14th; min. 37°·3 on 9th. F 0, f 1.

WARRENPOINT.—A fine month until 19th when continuous and heavy R set in. Temp. below the average. Shade max. 71°·0 on 13th; min. 51°·0 on 17th. F 0, f 0.

* Campbell-Stokes.

† Jordan.

Climatological Table for the British Empire, February, 1910.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain		Aver. Cloud.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	
	Temp.	Date.	Temp.	Date.									
								0.100			inches		
London, Camden Square	56°0	17	27°5	5	48°3	36°3	39°0	89	91·2	21·1	2·96	21	6·4
Malta	61·7	20	44·5	14	57·0	50·7	47·3	83	137·8	...	3·33	14	5·5
Lagos	91·0	5*	75·0	3*	89·9	77·0	74·8	71	150·0	73·0	0·8	2	7·1
Cape Town	98·4	6	47·8	9	80·5	62·1	58·0	64	...	...	·39	4	2·5
Durban, Natal ... ..	...	...	...	...	...	...	...	...	...	...	...	...	...
Johannesburg	79·1	19	50·3	15†	72·3	55·3	56·7	83	146·0	49·6	3·94	11	6·8
Mauritius	87·5	6	65·2	20	85·2	71·0	69·4	76	163·4	58·1	4·00	17	5·8
Calcutta... ..	92·3	25	53·3	3	84·1	59·1	56·7	61	...	47·7	·44	1	8·6
Bombay... ..	89·1	1	64·8	18	85·3	69·1	63·6	64	135·6	56·9	·00	0	0·6
Madras	90·9	21	62·5	9	87·5	69·2	67·8	73	139·4	59·5	·00	0	2·3
Kodaikanal	67·5	13	40·8	8	63·6	47·0	40·5	59	131·4	23·2	1·30	7	3·4
Colombo, Ceylon	91·7	5	67·0	7	88·2	72·4	71·9	78	161·8	63·3	1·00	4	5·8
Hongkong	74·9	25	47·6	2	64·7	55·9	53·6	78	136·1	...	·41	6	6·4
Melbourne	102·3	19	46·8	13	81·2	58·6	52·0	53	160·3	41·9	·38	5	3·9
Adelaide	105·9	16	51·4	9	89·2	63·5	52·5	44	167·0	45·8	·06	2	3·3
Coolgardie	103·4	12	55·0	22	87·0	62·3	53·9	49	175·2	53·0	·88	6	4·2
Perth	103·0	17	57·7	21	98·4	66·4	58·3	51	157·7	49·1	·05	2	3·8
Sydney	89·1	7	56·4	14	79·0	64·2	60·8	67	...	45·5	·65	16	4·4
Wellington	78·2	25	49·8	1	70·7	58·5	55·5	72	135·0	44·0	4·25	7	6·1
Auckland	82·0	23	56·0	2	76·7	64·6	63·6	78	156·0	50·0	6·05	11	5·5
Jamaica, Kingston	87·6	22	60·4	5	84·7	65·5	63·5	70	...	...	·02	2	1·7
Grenada	86·6	2	69·0	28	81·5	71·8	66·7	74	141·0	...	5·36	23	5·0
Toronto	43·4	27	10·2	6	29·2	12·8	...	...	56·9	15·5	3·21	17	6·6
Fredericton	72·0	6	20·0	12	54·0	35·1	...	76	...	...	4·10	10	6·0
St. John's, N.B.	44·0	27	2·0	8	30·9	15·6	...	79	...	...	4·09	14	6·0
Victoria, B.C.	49·0	26	19·0	21	41·7	31·7	...	80	...	...	4·73	20	8·0
Dawson	5·0	10	54·0	2	15·0	31·2	...	...	...	...	·22	5	5·2

* days. † and 24.

MALTA.—Mean temp. of air 53°·1. Average bright sunshine 5·4 hours per day.

Johannesburg.—Bright sunshine 197·3 hours.

Mauritius.—Mean temp. of air 0°·8, of dew point 1°·5, and R 3·35 in., below averages. Mean hourly velocity of wind 8·1 miles, or 2·7 below average.

KODAIKANAL.—Bright sunshine 231 hours.

COLOMBO.—Mean temp. of air 78°·0, or 2°·2 below, of dew point 1°·3 above, and R 1·01 in. below, averages. Mean hourly velocity of wind 7·8 miles. TSS on 2 days.

HONGKONG.—Mean temp. of air 60°·0, or 2°·0 above, bright sunshine 141·2 hours, or 53 hours above, averages. Mean hourly velocity of wind 16·2 miles. R 1·35 in. below average.

Melbourne.—Mean temp. of air 2°·7 above, and R 1·34 in. below, averages.

Adelaide.—Rainfall ·52 in. below average.

Coolgardie.—Mean temp. of air 1°·1 below average.

Perth.—Mean temp. of air 3°·6 above average.

Sydney.—Mean temp. of air 0°·6 above, and R 4·04 in. below, averages.

Wellington.—Mean temp. of air 2°·3 above, and R 1·03 in. above, averages.