SYMONS'S

METEOROLOGICAL MAGAZINE.

No. CCCCXLV.] FEBRUARY, 1903. VOL. XXXVIII.

THE CANADIAN CLIMATE.

By R. F. STUPART, Director Meteorological Service, Dominion of Canada.

CANADIANS reading newspapers and journals published in Great Britain, cannot fail to be struck with the profound misconception which appears to be fairly general regarding the climate and geographical position of Canada. Perhaps Canadians may be to a certain extent guilty of having unwittingly assisted in spreading the erroneous notions regarding their country, by, annually at Christmas time, disseminating photographs of winter scenery to friends in the old land. It is the Christmas pictorial newspapers with their Santa Claus and reindeer, snowbanks and ice-palaces, fur-coats and snow-shoes, which find their way most frequently to England. It is at Christmas that persons wish to send home some small remembrance; what more interesting than a winter scene with people walking about dressed in furs with snow-shoes slung over the shoulder, or pictures of people sliding down ice covered hills in the wildly exhilarating sport of tobogganing? This going on year after year has constantly had a tendency to make Britishers associate Canada with the Polar Regions. As there is certainly fallacy in the conception of Canada as an exceedingly cold country, the writer will endeavour briefly to present certain facts regarding the Canadian climate in the hope that at least some erroneous impressions may be removed.

Canada is the northern half of a continent which stretches from the subtropics to the Arctic Sea, and the older provinces of the Dominion, viz., Ontario, Quebec and the Maritime Provinces lie wholly further south than does any portion of Great Britain. Toronto is 550 miles further south than London, Montreal 418 miles further south, and Halifax 478 miles further south. It may surprise many that a large portion of Ontario lies as far south as the South of France and northern Spain and Italy; Toronto is further south than Florence, and the southern point of Ontario is further south than Rome. In addition to this, portions of the North West Territories, a strip of territory 70 miles in width including parts of Manitoba, Assiniboia and Alberta are also further south than any portion of England. No portion of Canada's present wheat fields in Manitoba and the North West Territories lies as far north as Scot-

land, but it is the writer's belief that in the not distant future, some of the choicest grazing land of America will be found under the shelter of the Rocky Mountains in the basin of the Great Mackenzie River; from a latitude corresponding to the Scottish border, northward nearly to the Arctic circle. These geographical facts being recognized, is it not worth while stopping to consider whether erroneous notions regarding the Canadian climate may not be rather too prevalent in Europe? An English gentleman interested in meteorology, has, within the last three months, expressed surprise on discovering that our Canadian climate is milder than that of Siberia!

Canada stretches the whole breadth of the North American Continent, from the Atlantic on the east to the Pacific on the west; from the International boundary on the south to the Arctic Circle on the north, and in this vast extent of country we may expect to find a varied climate—the writer, therefore, proposes to give a brief synopsis of the more salient climatic features of each of the provinces which comprise our Canadian Dominion, hoping that such information may be of value to intending emigrants and others.

Vancouver Island, in the Pacific Ocean, occupies somewhat the same position in relation to the American continent that Great Britain, in the Atlantic, does to Europe; lying between nearly the same parallels of latitude. The climate, as in all other parts of British Columbia, varies much with the orographical features of the country. The annual rainfall along the exposed western coast of the island is very great, generally exceeding one hundred inches, but in the more eastern districts it is less than half that amount. May to September is usually a comparatively dry period, while copious rains fall between September and March. The mean monthly and mean annual temperatures correspond very closely with those found in parts of England; the summers are quite as long and severe frost scarcely ever occurs.

Crossing the Strait of Georgia to the mainland and considering the country south of the Canadian Pacific Railway, we are still in latitudes corresponding to the southern half of England. We here find a warm summer, and a winter increasing in severity as we ascend the Fraser valley and reach higher levels. At Agassiz, on the lower Fraser, about seventy miles from Vancouver, is situated one of the Dominion experimental farms; the average mean temperature of January at this place is 33° and of July 64°, with a daily range of 10° in the former month and 26° in the latter; the lowest temperature on record is $-13°$ and the highest 97°. Frosts seldom occur in May and there is no record of any during the summer months. The annual rainfall is 67 inches, 66 per cent. of which falls between October 1st and March 31st. This shows very approximately the climate of the lower Fraser valley.

To the eastward of the Coast Range in the Yale and West Kootenay districts the climate is distinctly different; the summers

are warmer and the winters are colder, and the rainfall rather scant; bright dry weather is the rule. The cold of winter is, however, scarcely ever severe, and the hottest days of summer are rendered pleasant from the fact that the air is dry and the nights are cool. In this region March is distinctly a spring month, and the temperature of April corresponds very closely with that of the same month in England. Grapes and peaches thrive, and tobacco is a crop which is yearly proving a greater success. In the mountainous region of East Kootenay the winters are colder again, but even here the summers are warmer and the winters not as cold as in St. Petersburg.

Passing to the eastward of the Rocky Mountains we come to the Prairies of the North-West, first the vast ranching areas of Alberta and western Assiniboia, and then the wheat-growing districts of eastern Assiniboia, Saskatchewan and Manitoba. In all the prairie country one of the most noticeable features is the crisp dryness of the winter air, and the almost constantly clear sky. The winters are cold, at times very cold, but all persons residing in the country are agreed that the dry cold of the prairies is not comparable with the more moderate cold of a damp climate; it is not uncomfortable, and persons can go about their daily avocations with the temperature at $-20°$ without experiencing inconvenience. Near the mountains spring opens earlier than in Manitoba, and the early part of April in Alberta often sees much spring ploughing, while in Manitoba it is usually the end of that month before the ploughing is well under way. Early in May the prairies are carpeted with flowers, and for six months the delightful exhilarating prairie air is perhaps to the settler an ample offset to the months of cold between November and March—particularly when in September, days of railway travel may be spent in passing through the finest and most prolific wheat fields of the world, or further west the eye may roam over the boundless prairie, dotted here and there with countless herds of fat cattle which cannot fail to enrich the rancher.

Ontario, with an area of 222,000 square miles, has its most northerly point in latitude 52°, a little further north than London in England, and its most southerly point in 41° 40′, a little further south than Rome. It forms the northern and eastern shore line of four of the Great Lakes of America—Superior, Huron, Erie and Ontario—and its western limits are over a thousand miles from its eastern confines; truly a magnificent territory. Its northern districts, rich in forests and minerals, have a colder climate than its southern districts, where the peach and grape ripen as readily as in southern France under skies scarcely less sunny and in latitudes the same as northern Spain. There is no component of the weather more necessary to the success of one of the largest industries of northern Ontario than a fairly heavy winter snowfall; the lumberman requires a good snow covering in order to draw out his timber to the streams easily, and again a small snowfall will mean low water in the spring freshets, which is disastrous, as the logs may not

be floated to the great water courses and the mills. The Ontario lumberman, the farmer, and the business man all pray for a winter with lots of snow and steady cold; these are conditions which mean prosperity, and when the snows begin to melt in March all may look forward with confidence to a short spring followed by a long delightful summer, which fades gradually into autumn with its golden tints which last to the middle of October, and not infrequently into November. The climate of southern Ontario is very appreciably warmer than that of the more northern parts of the province; were the month of March a little warmer it would be well nigh a perfect climate. Signs of spring begin to multiply early in April or indeed in March, and between the middle of May and the middle of September the whole district is included between the same isotherms as the greater portion of France, and it is only after a protracted autumn that winter sets in about the beginning of December. The winters are by no means severe, and the summers seldom oppressively hot; this being due to the tempering influence of the Great Lakes by which this portion of Ontario is surrounded. In the more southern and western counties of the province the April mean temperature corresponds nearly to that of the south of Scotland, and in May the mean temperature of the whole district is slightly higher than for the south of England. The summer months proper are distinctly warmer than in England, but in few districts does the mean temperature exceed 70°, hence the heat is by no means excessive. A gentleman who has now spent two winters in Canada, about a month ago on leaving for Scotland remarked to the writer, "I wish I were to remain in Canada this summer; I quite realize that Toronto between May and September enjoys a climate that cannot be excelled." The annual precipitation of the whole of Ontario lies between 30 and 40 inches, which is fairly evenly distributed throughout the year; in summer, however, the rain generally falls in thunderstorms, and cloudy wet days are of very rare occurrence.

(*To be continued.*)

THE TEMPERATURE OF AIR AND RIVERS.

THE REV. W. ANDSON, of Ivy Bank, Dumfries, recently read to the local Natural History and Antiquarian Society a paper discussing a series of observations on the temperature of the water of the river Nith and its estuary with reference to the temperature of the air. The observations had been carried on for a year from June 1st, 1901, to May 31st, 1902, and were undertaken at the request of Mr. Calderwood, the Inspector of Salmon Fishing under the Fishery Board for Scotland. At Mr. Calderwood's suggestion a maximum and a minimum thermometer were used, placed in a perforated copper vessel and hung in the current in such a way as to be continuously immersed. The thermometers were read daily, those in

the river at Dumfries being under the charge of Mr. Andson, those in the estuary at Glencaple under the charge of the Rev. James Malcolm. In the course of his paper Mr. Andson gave the following table, which we reprint with a summary of his explanatory remarks :—

Months.	River Water. Mean Temp.		Estuary. Mean Temp.		Air. Mean Temp.	
	°		°		°	
December	37·1		37·6		37·0	
January	38·1	36·5	40·0	37·5	39·2	36·7
February	34·5		34·9		34·0	
March	42·8		43·0		43·8	
April	45·2	46·0	44·0	45·6	46·0	45·7
May	50 0		50·0		47·3	
June	57·2		58·2		56·0	
July	66·1	61·0	65·6	61·9	64·6	59·9
August	59·9		62·1		59·2	
September	55·4		57·2		55·8	
October	48·5	48·2	49·9	50·1	48·3	48·4
November	40·8		43·1		41·3	

The range of the river temperatures is much more limited than that of the air or land. The highest temperature recorded for the river was 74°, on July 20th, and the lowest was 31°·5, say 32° to avoid fractions, on February 10th, giving a range of 42° for the year. In the air or land observations, on the other hand, the highest temperature was 90° on the same day in July, and the lowest 6°, on a day in February, which would give an annual range of 84°. As the above values, however, were abnormal, it is better to substitute for them a fifteen years' average of the highest single day temperatures, and a similar average of the lowest, which would alter the range to 84° for the highest and 14° for the lowest, and show an annual range of 70° for the air, as compared with 42° for the river. The mean maximum for the year being 49°·9, and the mean minimum 46°·3, the mean daily range would only be 3°·6. For the air the mean maximum was 54°·4, the mean minimum 40°·5, hence the mean daily range would be 14°·4. But now, when we compare the mean annual temperatures of air and water, we find a remarkable agreement. They almost exactly coincide. The one (air) is 47°·7 ; the other (water) is 47°·8. The use of self-registering minimum as well as maximum thermometers to record the temperature is fitted to secure greater accuracy ; and when the yearly mean, founded on such observations, is found to correspond with that of the air for the same period, it is only what might be expected, and may be regarded, indeed, as an evidence of the accuracy of the observations. This coincidence of annual means does not, however, necessarily imply a like coincidence in the monthly means. It will be seen from the table that the months in which they approximate most closely are the autumn and winter months, and those in which

they diverge most are in spring partly, but still more in summer. In August, September, October, November, December, February, and April there is only a difference of a fraction of a degree; but in January, March, May, June, and July from 1° in March to 2°·7 in May. If now we compare the temperature of the river with that of the estuary at Glencaple, we find a different result. The annual means, instead of coinciding, show an excess of almost 1° in favour of the estuary, viz., 48°·7. The annual mean of the river as ascertained by the observations ten years ago, was 48°·5, as compared with 47°·8. The explanation of this is very simple. The observations of the estuary having been taken always at or near high tide, and during the day, would, as a rule, be near the maximum, while those, both of the river and the air, were calculated from the combined maxima and minima of each day; and then the flow of the tide over a large extent of sand in warm, sunny weather must also necessarily have the effect of increasing the estuary temperature.

FOUR MONTHS WINTER RAINFALL, OCTOBER, 1902—JANUARY, 1903.

Stations.	Diff. from Aver.	Per cent. of Aver	Stations.	Diff. from Aver.	Per cent. of Aver.	Station.	Diff. from Aver.	Per cent. of Aver.
	in.			in.			in.	
London	—1·53	82	Arncliffe	+ ·29	101	Braemar	+2·76	121
Tenterden	—1·21	88	Hull	— ·76	92	Aberdeen	+ ·25	102
Hartley Wintney	— ·92	90	Newcastle	— ·06	99	Cawdor	+ ·51	105
Hitchin	—1·57	82	Seathwaite	—4·07	93	Glencarron	+ ·15	100
Winslow	—2·01	77	Cardiff	+2·01	113	Dunrobin	—2·33	82
Westley	—2·74	69	Haverfordwest	+1·87	110	Darrynane	—1·81	91
Brundall	—2·77	69	Gogerddan	— ·86	96	Waterford	+3·79	126
Alderbury	—1·06	91	Llandudno	—1·07	92	Broadford	+1·32	110
Ashburton	+ ·02	100	Dumfries	+1·64	109	Carlow	+2·19	117
Polapit Tamar	+2·84	118	Lilliesleaf	+2·49	122	Dublin	+1·15	111
Stroud	+ ·03	100	Colmonell	+2·19	112	Mullingar	+2·19	117
Woolstaston	— ·65	94	Glasgow	+2·07	114	Ballinasloe	+ ·33	102
Boston	— ·91	87	Inveraray	—1·68	95	Clifden	—1·89	94
Hesley Hall	— ·34	96	Islay	—1·58	92	Crossmolina	+ ·21	101
Derby	— ·13	98	Mull	— ·82	97	Seaforde	+3·27	123
Bolton	— ·27	98	Loch Leven	+1·72	112	Londonderry	—1·26	92
Wetherby	+1·41	117	Dundee	+ ·24	102	Omagh	+1·55	110

It is generally recognised that for water storage, and especially for replenishing the underground supplies in wells and springs, the effective part of the year's rain is that which falls in the winter months, when evaporation and vegetation are at their minimum. We have accordingly compared the rainfall of the four months, October, 1902, to January, 1903, with the average of the corresponding months for the ten years, 1890-99, adjusted to the monthly incidence of rainfall of thirty years. The result is to show that over

by far the greater part of the British Isles the small rainfall of 1902 will not produce any immediate bad effects, because the heavy rainfall of December and January, though but a small part of the annual supply, has come at the most useful time. The figures published above show that over Cornwall, Devon, Somerset, Gloucester, Hereford and South Wales, the winter's rain is so far well in advance of the average. This is true also for the north-east of England, and for the whole of Ireland and Scotland, except their west and north coasts. The only parts of the country which have had as much as 10 per cent. less than the average fall for the four months appear to be the extreme north of Scotland and the south-east of England. The winter has been relatively driest in East Anglia, where the only stations here considered, one in Norfolk and one in Suffolk, report less than 70 per cent. of the normal fall, a very unsatisfactory state of matters.

For the first time for many months the differences from the average in our Rainfall Table are practically all excesses. January has proved a wet month over the whole of the British Isles, though in few places excessively so. As we write news comes in of very heavy rains in the early part of February over the north of England, and especially the south of Scotland, where extensive floods were caused.

ROYAL METEOROLOGICAL SOCIETY.

THE Annual General Meeting of this Society was held on Wednesday, January 21st, at the Institution of Civil Engineers, Great George Street, Westminster, Mr. W. H. Dines, B.A., President, in the Chair.

Mr. F. C. Bayard read the Report of the Council for the past year, which showed that the Society had made steady progress, there being an increase of 20 in the number of Fellows. The Society's Howard Silver Medal, annually awarded to the cadets of H.M.S. *Worcester*, had been gained by Cadet R. T. Snape. The exhaustive Meteorological Bibliography, commenced many years ago by the late Mr. G. J. Symons, was being continued by the Society. As the Bibliography cannot be supposed to be complete, the Council invited the Fellows and others to send to the Society for record, a copy of all meteorological books and papers of which they may be the authors. The Council had also undertaken to furnish for the *International Catalogue of Scientific Literature* the titles of all works bearing on meteorology which are published in the British Isles.

The report having been adopted, votes of thanks were passed to the Council for their services during the past year, and also to the President and Council of the Institution of Civil Engineers for allowing the meetings to be held in the rooms of the Institution.

The President, in his address, dealt with "The method of kite-flying from a steam vessel, and meteorological observations obtained thereby off the West Coast of Scotland." In the spring of 1901 the Royal Meteorological Society appointed a Committee for the purpose

of making an investigation as to the temperature and moisture of the upper air, and the British Association, at the meeting in Glasgow, also appointed a committee to co-operate in the work. At the request of this joint committee Mr. Dines undertook to carry on the enquiry during the summer of 1902, and in this address he gave a full account of what he had done. After describing the apparatus (particulars of which will be found in *Symons's Met. Mag.* for May and October, 1902), he gave an account of the observations at a fixed station and also from a steam tug in the neighbourhood of Crinan, Argyllshire. He had acquired a considerable amount of information concerning meteorological phenomena, having obtained 71 observations of temperature at an average height of 4140 feet, and 38 charts from the self-recording instruments with an average of over 6000 feet. The greatest height attained was 15,000 feet with four kites on the wire. The temperature gradient over the sea was considerably less than its average value over the land, being about 1° for every 350 feet of height. The upper currents were found to differ in direction from those below much less than was expected. As a general rule the humidity increased up to about a mile and then decreased.

A hearty vote of thanks was accorded to Mr. Dines for carrying out the kite observations and also for his services as President during the past year.

The following gentlemen were elected the officers and council for the ensuing year:—

President, Capt. D. Wilson-Barker. *Vice-Presidents*, Mr. W. H. Dines; Capt. M. W. C. Hepworth, C.B.; Mr. E. Mawley and Dr. W. N. Shaw, F.R.S. *Treasurer*, Dr. C. Theodore Williams. *Secretaries*, Mr. F. C. Bayard and Dr. H. R. Mill. *Foreign Secretary*, Dr. R. H. Scott, F.R.S. *Council*, Mr. R. Bentley; Mr. J. Y. Buchanan, F.R.S.; Capt. W. F. Caborne, C.B.; Capt. A. Carpenter, R.N., D.S.O.; Mr. R. H. Curtis; Mr. F. Druce; Mr. W. Ellis, F.R.S.; Mr. C. Hawksley; Mr. J. Hopkinson; Mr. R. Inwards; Mr. B. Latham and Mr. H. Mellish.

The meeting was preceded by a brief ordinary meeting, at which the following were elected Fellows of the Society:—Mr. W. R. Bell; Mr. A. M. Edwards; Mr. J. McConnell; Mr. W. E. Markham; Mr. W. F. Preedy; Dr. W. Prowse; Major V. S. Sandeman and Mr. T. Thornton.

Correspondence.

ON SOME PRECURSORS OF WEATHER CHANGE.

To the Editor of Symons's Meteorological Magazine.

1. *Fine weather preceded by calm at night.*—The fine weather which followed the thundery time August 4th–14th, 1895, was ushered in by a close and marvellously still night. The calm which prevailed was phenomenal, a stillness that might be felt. The whole animal world seemed to share in it. Not a leaf stirred nor a bird broke the

silence. Even the moths seemed to have ceased their nightly wanderings. The same stillness, followed by similar weather, was noted in July, 1900, and recently, 1902, has preceded the lovely harvest weather of September, after a wet Summer.

2. *Fine weather indicated by filmy Strato-cirrus.*—When the deep orange glow and fine crimson-tinted bands of cirrus and cirro-stratus ornament the upper sky, very fine, filmy thread-like lines come into view, being illumined by the rays of the descending sun. This appearance occurred before the glorious harvest weather at the end of August and beginning of September, 1895, before the drought of 1899, and was seen through the drought of 1901.

These lines are quite straight, and are sometimes flecked or barred by cross lines, giving a slightly matted appearance. Their visibility evidently depends on their position with regard to the sun, and they belong probably to the hazy thin sheets of cirrus and cirro-stratus in the upper sky, foreshortened by distance. This cloud showed itself on the evening of July 5th, 1900, about sunset, in very straight form. This was followed by a dry week of great heat, 137° in the sun, 93° in the shade, in London. The same form of cloud preceded the dry summer of 1899, appearing through the mists of early dawn in a rigidly straight line, dipping from S. to W.; 12° N. to E. at sunrise and S. to W. at sunset. It was also common during the drought of 1901.

On August 24th, 1902, a highly prismatic halo presenting in its upper arc two lines of refraction, was visible in the hazy blue-grey upper drift. This halo was right above the loose cirro-cumulus. Believing that it meant a change of atmospheric conditions, I took the following notes. Three fine days followed, not the imaginary storm popularly associated with halos. These optical appearances have been uncommon during the past rainy summer. On August 24th, 25th, the curious dead calm, above alluded to, was most noticeable, and the weather improved from that date. It seems that rooks, by their immensely elevated spiral soaring and their joyous cries and "churring," possess premonitory sensations indicating change to fine weather. At any rate they have shown these lively movements on almost every occasion of recent weather improvement.

SAMUEL BARBER.

Elmsett, Ipswich.

REVIEWS.

Natural Law in Terrestrial Phenomena. A study in the causation of earthquakes, volcanic eruptions, wind-storms, temperature, rainfall, with a record of evidence by WILLIAM DIGBY, C.I.E. London: W. Hutchinson & Co. 1902. Size 9 × 5½. Pp. xlvi. + 370.

THAT the weather of our planet is controlled by the moon is a venerable belief as old as the hills, and it would appear to be almost as easy to remove the hills themselves as to get some people, not

lacking in ordinary intelligence, to realize the fact that modern enquiry has failed to show the existence of any real foundation for its acceptance.

The most recent adventurer in the direction of formulating a theory of the moon's influence on the weather is Mr. Hugh Clements, whose name is probably already familiar to many of our readers as that of a lunarist whose "long distance" predictions of weather have not infrequently appeared in the public press.

A fundamental principle of Mr. Clements' theory is one which is common to nearly all believers in the moon's influence upon our weather—namely, that similar conditions of weather must always recur with the recurrence of the same relative positions of the Earth and moon; and it is upon this axiom that he rests a claim to be able to predict with accuracy the weather "for any number of days, weeks, months, or years ahead, upon a scientific system from which the element of chance is eliminated."

This axiom is elaborated at some length in the volume under review, in which the explanation of Mr. Clements' theory is accompanied by numerous statements intended to support and justify it. The book is not, however, from the pen of Mr. Clements, and this is somewhat curious, because he has already shown himself quite able to expound his own views, whilst Mr. Digby appears to be under the disadvantage of having first approached the study of the subject only a few months before the book was published. We are not told why so important a task was delegated to so recent a disciple; nor can we find that Mr. Digby has made any independent tests of the statements by which his judgment seems to have been convinced.

Put briefly, Mr. Clements finds a full explanation of all terrestrial weather phenomena, and also of seismic and volcanic phenomena, in the "tangential pull of the moon," slightly modified by the position of the sun; and he holds that "when once more the moon appears in the position she occupies to-day, with the sun in like position, the same phenomena as that which is passing under our eyes will be reproduced." This exact recurrence takes place, we are told, every 186 years, and on p. 281 we read that therefore "the years 1692 and 1693 were the exact meteorological counterpart of 1878 and 1879." This is a definite statement, made without qualification; but when a little further on we find the casual admission that no detailed information exists as to the weather of those early years, from which alone it would be possible to decide whether or not they corresponded meteorologically with the later ones named, we think ourselves justified in hesitating to accept without reserve the statement that they did do so.

Many references are made to Mr. Clements' predictions, and to the remarkable way in which they are said to have been fulfilled. Most of these statements cannot easily be verified, owing to the way in which they are given, as *e.g.*, "My predictions for the 17th, 18th, 19th and 20th agreed with Greenwich"; whilst elsewhere they are

exhibited by means of diagrams so drawn that they cannot readily be followed. But on pp. 330–331 there is given in parallel columns what purports to be the Meteorological Office prediction for each day of February, 1895, the weather actually experienced at Greenwich, and Mr. Clements' prediction for the same period. It is to be remembered that the Meteorological Office forecast embracing Greenwich covers the district of "South England," and comprises wind as well as weather; the part relating to wind has, however, been omitted by Mr. Digby.

From a general comparison of the three columns it is perfectly clear that the Meteorological Office forecasts better indicated the weather actually recorded than did those of Mr. Clements. But if we deal with them more specifically, and select for examination one element, viz., precipitation, we find that the Office indicated rain or snow for 21 days, on 13 of which one or the other occurred at Greenwich, whilst on the remainder the weather is described as having been "overcast" or "unsettled"—conditions certainly suggestive of rain. On one day rain fell although the Office had not predicted it. Mr. Clements, on the other hand, predicted rain or snow for 10 days, on only 5 of which did rain or snow occur, whilst on 8 others on which there was rain his prediction did not refer to it. Yet this is a selected forecast put forward in support of the statement that whilst "weather prediction (by the Meteorological Office) has become a by-word and a scorn, a thing for contemptuous comment" (p. 43), and its mistakes have been so grotesque and numerous that "No citizen considers himself so low in the scale of criticism that he feels it would be unseemly for him to jeer at the weather-prophet of Victoria Street" (p. 261), yet Mr. Clements is able by his system to forecast the weather for years ahead with absolute accuracy, "from which the element of chance is eliminated." We have made our comparison from the data given on the pages quoted. We may add, however, that neither the Meteorological Office forecasts for February, 1895, nor the weather actually recorded at Greenwich in that month, agree with Mr. Digby's description of them as given in the table.

On page 295 reference is made to a prediction by Mr. Clements of an earthqnake which should have occurred on the morning of April 17th, 1898. If this earthquake occurred no one seems to have recognized it, but Mr. Clements gravely tells us that since in April of the eight preceding years, "when the lunar and solar positions were similar, earthquakes occurred in either Greece or Italy, or both, therefore tremors or shocks of greater or less force must have occurred on this occasion also."

At the end of the book are a number of "Rules for Weather Prediction," some of which fairly puzzle us. What, for example, are we to understand when we are told that "to predict the daily height of the barometer for a month, a year, or several years, in advance it is necessary to have the mean daily heights for several years in

advance"? Elsewhere in the volume are other statements the exact meaning of which is not self evident; as e.g. when we are told that the "wind force 17" occurred at Greenwich; or again that "the pressure on the square foot was 28 and 36 lbs. respectively on the square inch." Had not the pressure per square inch been quoted elsewhere, more than once, we should have thought the use of the word in this instance accidental; as it is we fear that neither Mr. Clements nor Mr. Digby quite realizes what such figures mean. For the sake of the Astronomer Royal and his staff, not to mention the building itself, we trust the Greenwich Observatory will never have the ill-fortune to be subjected to a wind pressure of 36 lbs. per square inch.

R. H. CURTIS.

The Survey Atlas of England and Wales, a series of 84 plates of maps and plans, with descriptive text, illustrating the topography, physiography, geology, climate, and the political and commercial features of the country. Designed by and prepared under the direction of J. G. BARTHOLOMEW. Under the patronage of the Royal Geographical Society. Edinburgh: J. Bartholomew & Co. Price £2 12s. 6d., in 21 parts at 2s. 6d. each.

THE first part of this Atlas is before us, and the work promises to be as complete and serviceable for England as the similar "Atlas of Scotland" is for the northern kingdom. While the general maps, none of which are included in Part I, will doubtless be full of interest and value, the main ground for recommending the atlas as a whole is in our opinion the unique map of the whole country on the scale of half an inch to a mile. The detail in this map is both full and accurate, while the system of colouring according to altitude allows the physical configuration of the country to stand out in the most real way. Such a map supplies the answer to a multitude of questions regarding climate, for it exhibits at the same time the altitude and the exposure of any given station. The separate sheets have already won their way into the favour of cyclists and motorists, and the atlas when complete will be indispensable in the library of every country house and the study of every meteorologist in England.

METEOROLOGICAL NEWS AND NOTES.

METEORIC STONES have only been seen to fall in the British Isles on four occasions, so far as we are able to ascertain—namely, on December 13th, 1785, near Scarborough; on April 20th, 1876, near Wellington, Shropshire; on March 14th, 1881, at Middlesbrough; and on September 13th, 1902, at Crumlin, near Belfast. The last-named meteorite has just been acquired by the Natural History Department of the British Museum. The stone, which was $7\frac{1}{2}$ inches long, $6\frac{1}{2}$ inches wide, $3\frac{1}{2}$ inches thick, and weighed 9 lbs. $5\frac{1}{2}$ oz., was dug out still hot from a hole about 18 inches deep within a quarter of an hour of the time when it was seen to fall.

SIR JOHN ELIOT, F.R.S., who was knighted on the occasion of the Coronation Durbar at Delhi, on January 1st, will, we understand, resign his position as Meterological Reporter to the Government of India at the end of the present year. Mr. Gilbert T. Walker, of Trinity College, Cambridge, has been appointed Assistant Meteorological Reporter, and will proceed to India to take up his duties at an early date. Mr. Walker, who is a distinguished mathematician and physicist, will, we believe, succeed Sir John Eliot on his retirement.

A WEATHER FORECAST which saved £20,000 is chronicled in the Report of the U.S. Weather Bureau for 1901. On the morning of February 23rd, 1901, a special warning was telegraphed from Washington to Jacksonville, Florida, predicting a frost to occur that night with temperatures of from 20° to 25° F. at Jacksonville, and of 32° as far south as Tampa. More than five hundred telegrams were sent out from the local weather office and the fruit and vegetable growers took precautions to protect the blossom, then at an extremely sensitive stage. The frost came and the damage it would have done, if unforeseen, was estimated at more than 100,000 dollars. It is not often that the money value of scientific prescience can be estimated so definitely.

A REMARKABLE FALL OF DUST was observed at Kew, Invercargill, in the south of New Zealand, during the very wet and stormy weather of October and November last. A correspondent writing on the subject says: "After rain the roof of the house, galvanized iron, was covered with a thick sediment, about half-an-inch deep, of what seemed either volcanic dust, or else dust from the storms in Queensland, which had come down with the rain. It drained off the roof into the water tanks, which had to be emptied and cleaned out before we could get clean water fit for use."

The Abbé Maze.

1836-1902.

THE death of the Abbé Maze, on June 17th, removes an active worker in meteorology, and a prominent member of the French Meteorological Society, who had held the position of Secretary on several occasions. He had also been one of the editors of *Cosmos*, the well-known popular French review of cosmical physics, for nearly thirty years. The published writings of the Abbé were not of much permanent importance; but in announcing his death to the Société de Météorologie, the President stated that he had been engaged in the preparation of a history of the thermometer, for which he had brought together a quantity of material worthy of publication. Another unfinished work was an attempt to establish a periodicity of rainfall in two periods, one of six and one of forty-two years; a memoir on the periodicity of droughts, published at Brussels, in 1895, forming part of this work.

BOOKS RECEIVED.

WE have been unable to find space for the full titles of the following annual reports received last year, and in order to avoid further delay we present the list in an abbreviated form. (The date of publication in each case is 1902.)

Annual Reports of :—

Central Meteorological Observatory of Japan, Part II. for 1897, 1898 and 1899.
Royal Prussian Meteorological Institute for 1891.
Prussian Rainfall Tables for 1897 and 1898 (pub. 1901).
India, Rainfall for 1901.
Mysore, Meteorology for 1901.
Mysore, Rainfall for 1901.
Argentine Republic, Meteorology for 1901.
Ceylon, Meteorology for 1901.
Bouches du-Rhone, Meteorology for 1901.
South Australia, Rainfall for 1899.
Denmark, Nautical Meteorology for 1901.
Denmark, Meteorological Year Book for 1900 and 1901.
Maryland, Magnetic Survey, 1897 to 1901.
Hertfordshire, Meteorology, 1901.
Hertfordshire, Rainfall, 1901.
Margate, Meteorology, 1901.
Dorset, Rainfall, 1901.

Deutsche überseeische meteorologische Beobachtungen Heft XI. Meteorologische Beobachtungen in Deutsch-Ost-Afrika. [Meteorological Observations in German East Africa]. Gesammelt and bearbeitet von Dr. Hans Maurer. Zeil II. Hamburg : Deutsche Seewarte. Size 13 × 10, pp. 272.

Memorandum on the Meteorological conditions prevailing in the Indian Monsoon region before the advance of the south-west Monsoon of 1902, with an estimate of the probable distribution of the Monsoon Rainfall in 1902. By John Murray, M.A. Simla, 1902. Size 13 × 8½. Pp. 27.

The Climate of Hertfordshire, deduced from Meteorological Observations taken during the twelve years 1887–1898. By John Hopkinson, F.L.S. From the "Transactions of the Hertfordshire Natural History Society." Vol. XI., Part 4. Hertford, 1902. Size 5½ × 8½. Pp. 121–134.

Publications of West Hendon House Observatory, Sunderland. No. II. By T. W. Backhouse, F.R.A.S. Sunderland, 1902. Size 11½ × 9. Pp. viii. + 161. 60 plates. [Contains a paper on the frequency and possible periodicity of the aurora borealis.]

Wind Velocity and Fluctuations of Water Level on Lake Erie. U.S. Weather Bureau ; Bulletin J. Prepared by A. J. Henry. Washington, 1902. Size 11½ × 9. Pp. 22 + 26 pp. of plates.

On Rainfall at Batavia as registered by Beckley's Self-Registering Rain Gauge, during 1879–1900, by Dr. S. Figee. Appendix to Vol. XXIII. of the "Observations" of the Royal Observatory at Batavia. Batavia, 1902. Size 14 × 10½. Pp. 21.

Annual Report of the Agricultural Department of the Government of H.H. the Sultan of Zanzibar for 1901. Zanzibar, 1902. Size 7½ × 6. Pp. [32]. [Contains meteorological observations for 1901 at Dunga and Zanzibar Town in Zanzibar Island, and at Banani in Pemba Island.]

Proceedings of the Second Convention of the Weather Bureau Officials, held at Milwaukee, Wis., Aug. 27, 28, 29, 1901. Edited by J. Berry and W. F. R. Phillips, Washington, 1902. Size 9 × 5½. Pp. 246, one plate.

LATE RETURNS IN 1902.

TABLE OF RAINFALL AND TEMPERATURE.

Jan.	Skipton, Arncliffe.....	5·01	—1·37	·97	3	19	..	..	..	..	..	..
June.	Hitchin	3·54	+1·76	·79	12	15	82·0	29	35·0	10	0	..
July.	Broadford, Hurdlestown	1·79	—1·19	·75	25	17	72·0	1& 5	44·0	20	0	..
Aug.	Dunrobin	1·31	—1·24	·30	22	9	67·0	24	40·0	11	0	..
Sept.	Glencarron Lodge	7·63	— ·90	2·33	3	20	67·0	3	34·0	19	0	..

SUPPLEMENTARY TABLE OF RAINFALL.

JANUARY.—Scalby, Silverdale, 1·29; Rhayader, Nantgwillt, 3·57; Enniskillen Model School, 3·69.

FEBRUARY.—Enniskillen Model School, 2·35.

MARCH.—Caher, Duneske, 2·24; Enniskillen Model School, 2·41.

APRIL.—Horncastle, Bucknall, 1·77; Keswick, The Bank, 3·87; Enniskillen Model School, 3·26.

MAY.—Shifnal, Hatton Grange, 3·08; Cork, Wellesley Terrace, 1·61; Enniskillen Model School, 2·68.

JUNE.—Bettyhill, 1·84; Enniskillen Model School, 1·68; Belfast, Springfield, 2·74.

JULY.—Ross, The Graig, ·66; Rhayader, Nantgwillt, 3·27; S. Uist, Askernish, 1·55; Enniskillen Model School, 4·17; Belfast, Springfield, 5·08.

AUGUST.—Beltingham, 2·05; Treherbert, Tyn-y-waun, 4·58; Enniskillen Model School, 1·90; Belfast, Springfield, 3·25.

SEPTEMBER.—Ryde, Beldornie Tower, ·66; Beltingham, 1·03; S. Uist, Askernish, 5·75; Miltown Malbay, 1·72; Enniskillen Model School, 3·14.

OCTOBER.—Enniskillen Model School, 2·53; Belfast, Springfield, 1·99.

NOVEMBER.—N. Esk Reservoir [Penicuick], 1·05; Balquhidder, Stronvar, 7·12; Enniskillen Model School, 4·36.

ERRATA.

CLIMATOLOGICAL TABLES.

Oct., 1901.—Cape Town	Min. on grass *should be* ..	not	50·2
Mauritius.....	,, ,, ,,	50·2	,,	65·8
Calcutta	,, ,, ,,	65·8	,,	66·3
Bombay	,, ,, ,,	66·3	,,	71·0
Colombo	,, ,, ,,	71·0	,,	32·0
Melbourne	,, ,, ,,	32·0	,,	35·3
Adelaide	,, ,, ,,	35·3	,,	40·3
Sydney	,, ,, ,,	40·3	,,	..
Wellington	,, ,, ,,	29·0	,,	41·0
Auckland	,, ,, ,,	41·0	,,	..
Grenada	,, ,, ,,	..	,,	22·7
Toronto	,, ,, ,,	22·7	,,	..
Dec., 1901.—Auckland	Abs. max. temp. ,,	75·0	,,	75·5

REGULAR TABLES.

April.	Broadford, Hurdlestown	diff. from aver. *should be* — ·08	not	+·08
July.	Bury St. Edmunds, Westley ..	,, ,, ,,	—1·69	,,	—·69
Oct.	Aberystwith, Gogerddan	,, ,, ,,	— ·27	,,	—·17

AGGREGATE RAINFALL.

P. 79. Broadford, Hurdlestown ..... diff. from aver. *should be* +1·20 not +1·30

P. 99. Heading *should be* Six months, not Five months.

SUPPLEMENTARY TABLES.

May. Douglas, Woodville, *should be* 3·48, not 3·40

RAINFALL AND TEMPERATURE, JANUARY, 1903.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1890-9.	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date	Min. Deg.	Min. Date.	No. of Nights below 32°. In shade.	No. of Nights below 32°. On grass.
			inches.	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	2·15	+ ·44	·76	4	17	53·8	5	22·1	16	9	16
II.		Tenterden	2·14	+ ·15	·59	4	18	53·2	6	20·0	15	7	13
,,		Hartley Wintney	2·58	+ ·63	·64	4	21	55·0	10	15·0	15	13	17
III.		Hitchin	2·52	+ ·81	·57	4	19	56·0	5	18·0	14*e*	9	...
,,		Winslow (Addington)	2·40	+ ·69	·73	4	19	53·0	5	19·0	14	13	15
IV.		Bury St. Edmunds (Westley)	1·90	+ ·21	·40	4	16	52·5	5, 26	19·0	15	...	...
,,		Norwich (Brundall)	1·68	+ ·01	·36	19	17	54·8	26	27·5	14	9	13
V.		Winterborne Steepleton	3·91	...	·89	4	20	51·8	4	20·8	15	9	12
,,		Torquay	4·03	...	1·19	4	19	54·9	5	30·0	13*f*	6	10
,,		Polapit Tamar [Launceston]..	5·14	+ 1·81	1·20	4	23	53·8	4	17·5	14	9	11
VI.		Stroud (Upfield)	3·33	+ 1·12	·78	4	20	52·0	6, 27	20·0	14	12	...
,,		Church Stretton (Woolstaston)	2·74	+ ·28	·62	4	20	51·5	26	19·0	14	12	...
,,		Worcester (Diglis Lock)	...	...	...	...	...	...	...	...	...	...	...
VII.		Boston	1·36	— ·02	·41	5	7	52·0	26	18·0	14	...	...
,,		Hesley Hall [Tickhill].....	1·69	+ ·28	·47	7	15	55·0	26	14·0	15	13	...
,,		Derby (Midland Railway).....	2·00	+ ·40	·35	4	20	53·0	6, 26	22·0	14*g*	12	...
VIII.		Bolton (The Park).....	3·20	+ ·15	·47	5	19	51·4	25	24·1	14	11	17
IX.		Wetherby (Ribston Hall) ...	2·21	+ ·55	·45	5	20	...	...	...	...	...	...
,,		Skipton (Arncliffe)	9·81	+ 3·43	2·38	26	20	...	...	...	...	...	...
,,		Hull (Pearson Park).	1·78	+ ·11	·35	5	19	55·0	26	19·0	13	9	18
X.		Newcastle (Town Moor)	2·63	+ ·82	·58	5	15	...	...	...	...	...	...
,,		Borrowdale (Seathwaite).....	18·18	+ 3·33	3·74	26	21	50·5	25	19·4	14	13	...
XI.	WALES.	Cardiff (Ely).....	5·85	+ 2·29	1·70	4	24	...	...	...	...	...	...
,,		Haverfordwest	6·11	+ 1·49	1·20	4	24	52·6	5	20·9	13	7	13
,,		Aberystwith (Gogerddan) ...	5·38	+ 1·13	·91	4	17	52·0	6	10·0	13	11	...
,,		Llandudno.....	4·49	+ 1·96	·72	26	18	56·0	26	23·8	15	7	...
XII.	SCOTLAND.	Cargen [Dumfries]	6·24	+ 1·66	1·32	9	17	51·0	26	18·0	14	13	...
XIII.		Edinburgh (Royal Observatory)	3·96	...	1·15	9	22	53·5	26	21·6	15	13	19
XIV.		Colmonell	7·15	+ 2·31	1·10	1, 10	...	54·0	26*a*	18·0	13	12	...
XV.		Tighnabruaich	7·91	...	1·45	29	20	46·0	25*b*	20·0	12	13	...
,,		Mull (Quinish).....	6·69	+ ·46	·80	9	22	...	...	...	...	...	...
XVI.		Loch Leven Sluices	7·20	+ 3·90	1·46	27	17	...	...	...	...	...	...
,,		Dundee (Eastern Necropolis)	3·85	+ 1·32	·75	6	19	52·3	25	16·7	14	11	...
XVII.		Braemar	4·57	+ 1·79	·65	27	19	47·3	26	1·0	13	17	25
,,		Aberdeen (Cranford)	4·98	+ 2·26	1·62	9	19	53·0	26*c*	14·0	13	13	...
,,		Cawdor (Budgate)	4·42	+ 2·20	·76	9	17	..	...	...	...	...	...
XVIII		Strathconan [Beauly]	8·72	+ 4·18	1·37	30	18	...	...	...	...	...	...
,,		Glencarron Lodge.....	14·01	+ 3·62	3·15	29	20	52·0	26	14·8	13	14	...
XIX.		Dunrobin	3·94	+ 1·32	·76	9	14	53·0	29	20·0	14	15	...
,,		S. Ronaldshay (Roeberry) ...	2·87	— ·42	·27	30	20	50·0	29	26·0	13	11	...
XX.	IRELAND.	Darrynane Abbey.....	6·15	+ ·89	·87	8	27	...	...	33·0	11	0	...
,,		Waterford (Brook Lodge) ...	6·04	+ 2·52	·93	16	22	53·0	25	24·0	12*h*	9	...
,,		Broadford (Hurdlestown) ...	4·67	+ 1·54	1·02	8	25	48·0	25*d*	25·0	11	8	...
XXI.		Carlow (Browne's Hill)	4·85	+ 1·78	·65	8	21	...	...	...	...	...	...
,,		Dublin (Fitz William Square)	3·27	+ 1·13	·58	8	20	55·9	26	25·7	13	7	9
XXII.		Ballinasloe	4·96	+ 1·52	·83	8	23	53·5	25	...	...	...	...
,,		Clifden (Kylemore)	9·26	+ 1·29	1·34	1	21	...	...	...	...	...	...
XXIII		Seaforde.....	5·14	+ 1·73	1·35	8	18	54·0	25*d*	20·0	12	12	13
,,		Londonderry (Creggan Res.).	4·31	+ ·65	·81	9	23	...	...	...	...	...	...
,,		Omagh (Edenfel)	6·19	+ 2·68	·75	5	21	53·0	25	16·0	11	12	19

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

a—and 27. *b*—and 29. *c*—and 29, 30. *d*—and 26. *e*—and 15. *f*—and 14. *g*—and 15, 16. *h*—and 13.

SUPPLEMENTARY RAINFALL, JANUARY, 1903.

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
I.	Uxbridge, Harefield Pk..	2·49	XI.	Llandefaelog-fach.....	4·79
II.	Dorking, Abinger Hall .	2·78	,,	New Radnor, Ednol.....	5·50
,,	Sheppey, Leysdown	2·03	,,	Rhayader, Nantgwillt...	8·77
,,	Hailsham	3·05	,,	Lake Vyrnwy	...
,,	Crowborough.....	3·50	,,	Ruthin, Plâs Draw	3·15
,,	Ryde, Beldornie Tower..	2·09	,,	Criccieth, Talarvor	4·14
,,	Bournemouth, Kempsey	2·44	,,	I. of Anglesey, Lligwy..	5·63
,,	Emsworth, Redlands ...	2·57	,,	Douglas, Woodville.....	5·29
,,	Alton, Ashdell	3·24	XII.	Stoneykirk, Ardwell Ho.	5·00
,,	Newbury, Welford Park	3·51	,,	Dalry, Old Garroch	10·20
III.	Oxford, Magdalen Coll..	2·40	,,	Moniaive, Maxwelton Ho.	8·49
,,	Banbury, Bloxham	2·58	,,	Lilliesleaf, Riddell	5·47
,,	Pitsford, Sedgebrook ...	1·99	XIII.	N. Esk Res. [Penicuick]	5·40
,,	Huntingdon, Brampton.	2·07	XIV.	Dalry, Blair	8·19
,,	Wisbech, Bank House...	1·43	,,	Glasgow, Queen's Park..	7·16
IV.	Southend	1·85	XV.	Inveraray, Newtown ...	10·60
,,	Colchester, Lexden	1·77	,,	Ballachulish, Ardsheal...	11·99
,,	Saffron Waldon, Newport	2·02	,,	Campbeltown, Redknowe	7·53
,,	Rendlesham Hall	2·03	,,	Islay, Eallabus.....	6·70
,,	Swaffham	1·74	XVI.	Dollar.....	5·64
V.	Salisbury, Alderbury ...	2·71	,,	Balquhidder, Stronvar...	...
,,	Bishop's Cannings	3·10	,,	Coupar Angus Station...	3·80
,,	Ashburton, Druid House	6·83	,,	Blair Atholl	5·82
,,	Okehampton, Oaklands.	6·76	,,	Montrose, Sunnyside ...	4·40
,,	Hartland Abbey	5·16	XVII.	Alford, Lynturk Manse..	2·94
,,	Lynmouth, Rock House	6·89	,,	Keith H.R.S.....	3·77
,,	Probus, Lamellyn	4·60	XVIII.	Fearn, Lower Pitkerrie..	2·59
,,	Wellington, The Avenue	4·07	,,	S. Uist, Askernish	5·41
,,	North Cadbury Rectory	3·18	,,	Invergarry.....	12·32
VI.	Clifton, Pembroke Road	4·29	,,	Aviemore, Alvie Manse.	5·63
,,	Ross, The Graig	3·51	,,	Loch Ness, Drumnadrochit	7·86
,,	Shifnal, Hatton Grange	1·82	XIX.	Invershin	3·77
,,	Wem, Clive Vicarage ...	2·05	,,	Bettyhill	4·61
,,	Cheadle, The Heath Ho.	2·34	,,	Watten H.R.S.....	2·81
,,	Coventry, Kingswood ...	2·43	XX.	Cork, Wellesley Terrace	8·07
VII.	Market Overton	1·67	,,	Killarney, District Asyl.	8·30
,,	Grantham, Stainby	1·83	,,	Glenam [Clonmel]	6·75
,,	Horncastle, Bucknall ...	...	,,	Ballingarry, Hazelfort...	4·57
,,	Worksop, Hodsck Priory	2·25	,,	Miltown Malbay	5·88
VIII.	Neston, Hinderton	2·37	XXI.	Gorey, Courtown House	5·16
,,	Southport, Hesketh Park	2·84	,,	Moynalty, Westland ...	5·63
,,	Chatburn, Middlewood.	5·07	,,	Athlone, Twyford	4·91
,,	Duddon Val., Seathwaite Vic.	9·35	,,	Mullingar, Belvedere ...	6·45
IX.	Langsett Moor, Up. Midhope	4·32	XXII.	Woodlawn	5·47
,,	Baldersby	2·48	,,	Westport, Murrisk Abbey	5·77
,,	Scalby, Silverdale	2·04	,,	Crossmolina, Enniscoe ..	6·79
,,	Ingleby Greenhow Vic..	3·08	,,	Collooney, Markree Obs.	5·34
,,	Middleton, Mickleton ...	5·12	XXIII.	Enniskillen, Portora ...	5·13
X.	Beltingham	4·28	,,	Warrenpoint.....	5·79
,,	Bamburgh	2·04	,,	Banbridge, Milltown ...	4·30
,,	Keswick, The Bank	10·70	,,	Belfast, Springfield	5·33
,,	Melmerby Rectory	3·82	,,	Bushmills, Dundarave..	5·79
XI.	Llanfrechfa Grange	6·25	,,	Stewartstown	6·64
,,	Treherbert, Tyn-y-waun	13·88	,,	Killybegs	5·98
,,	Castle Malgwyn	6·03	,,	Horn Head	6·17

METEOROLOGICAL NOTES ON JANUARY, 1903.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

LONDON, CAMDEN SQUARE.—In spite of a week of severe frost, ending on 17th, the month, as a whole, was remarkably mild. Mean temp. 40°·8, or 2°·7 above the average. Unsettled weather prevailed during the first week and, except during the frost, R was fairly frequent. Short TS on 3rd with heavy H. Remarkable silver thaw on the evening of 17th, causing many street accidents. Thick fog with great darkness at times on 18th, 20th and 21st.

ABINGER HALL.—Showery, with a short spell of real winter in the early part. Mild and open afterwards to the end. Fogs from 18th to 21st.

TENTERDEN.—Very windy in the first and last weeks. Three inches of S on 12th, and hard frost till 17th. Duration of sunshine 49 hours.

SHEPPEY, LEYSDOWN.—A very windy month. Frosty from 11th to 19th; the rest of the month mild with occasional night frosts.

CROWBOROUGH.—Wet and sunless except for a spell of frost from 11th to 16th. From 17th to 22nd dense mist, followed by rough unsettled weather till 27th, and a storm on the night of the 31st. Mean temp. 38°·8. W. and S.W. winds prevailed.

COLCHESTER, LEXDEN.—Very mild, dull and damp, except during hard frost from 11th to 17th, with three days' skating. Brief but intense TS on 3rd.

NORWICH, BRUNDALL.—Except for slight frosts and a little S in the middle of the month it was generally very mild. Mean temp. of the last 7 days 46°·2. L on 2nd. T and H on 3rd.

WINTERBOURNE STEEPLETON.—Except for a cold spell between 11th and 17th, the temp. was high, the mean temp. being 1°·8 above the average.

TORQUAY, CARY GREEN.—Mean temp. 44°·8, or 2°·6 above the average. Duration of sunshine 43·3 hours, or 20 hours below the average. Mean amount of ozone 6·8, max. 9·5 on 25th and 26th with S.W. wind: min. 1·0 on 21st with E. wind.

LYNMOUTH, ROCK HOUSE.—The heaviest R yet measured in January, except in 1899, when 8·25 in. fell. Cold from 10th to 18th, otherwise warm, but with no great amount of sunshine. T and L on 3rd.

WELLINGTON, THE AVENUE.—The first 9 days were generally mild and very wet. Sharp TSS on nights of 2nd and 3rd. Very cold from 11th to 17th, and from 18th to the close mild and damp. Violent gale on 31st followed by S.

NORTH CADBURY RECTORY.—Similar in type to November and December, being mild with one spell of bright dry frost. The general average of wind was the highest in 7 years, but few strong gales. Violent H storm with T and L on 3rd.

CLIFTON, PEMBROKE ROAD.—Mild and wet except a short spell of severe frost from 11th to 16th, with N.E. winds, followed by several foggy days. Strong W. and S.W. winds during the first and last weeks. TS between 2 and 3 a.m. on 4th.

ROSS, THE GRAIG.—The first 10 days were very wet, but the only other falls of any consequence were on 22nd and 27th, the total fall being about 25 per cent. above the average. Mean temp. 1°·5 above the average; but it varied greatly, the first ten days being 5° above the average, the next 10° below, and the last ten days 7° above. Bright, clear and enjoyable weather alternated with great winds, gloom, fog and R.

BOLTON, THE PARK.—The first ten days were changeable and mild, with R daily. An anticyclone then set in causing N. and E. winds and decided fall of temp. until 19th. After 20th mild but cloudy. Very little fog or S. Mean temp. 39°·0, or 1°·5 above the average. Duration of sunshine 12·5 hours, or little more than half the average.

HULL, PEARSON PARK.—Variable weather, with scarcely any sunshine. Total darkness on 3rd from 8 to 8.30 a.m., with very high wind, T, L and H. Severe wintry weather from 11th to 18th.

WALES AND THE ISLANDS.

LLANFRECHFA GRANGE.—Mild until 10th, then frost till 17th, very sharp on 14th and 15th. Temp. rising after 17th and very mild towards the end. L from 6.30 to 11 p.m. on 3rd.

HAVERFORDWEST.—Stormy and changeable, with large R and very little sun. Frost on 1st and 2nd, then wet to 10th, then hard frost to 16th; then, without change of wind, the temp. gradually rose and it remained mild and stormy to the end. Duration of sunshine 30·7 hours.

ABERYSTWITH, GOGERDDAN.—The first ten and last ten days had heavy R. A few severe frosts occurred in the middle, but there was no S nor sunshine.

DOUGLAS, WOODVILLE.—Very wet and stormy, with great deficiency of sunshine. Dry and cold, with strong E. gales from 11th to 18th. High winds occurred on 21 days, reaching the force of a gale on 18, and strong S.W. gales blew uninterruptedly with high channel seas from 22nd to the end.

SCOTLAND.

LILLIESLEAF, RIDDELL.—R abnormally heavy, no such fall having occurred since 1864. On 20th and 22nd, when the S melted rapidly, with heavy continuous R, there were heavy floods in the river. In the first half the wind was N.W., with cold and S, and in the latter S.W. with R.

BALLACHULISH ARDSHEAL.—The month opened with much R. From 10th to 17th dry and frosty. Strong gales from 25th to the end. T and L on 25th and 26th.

MULL, QUINISH.—Very strong and almost continuous wind, with high temp. and much R, from S. or S.W. from 20th to 31st. No excessive floods. T and L on 3rd and 27th, and H on 27th.

COUPAR ANGUS.—A continual succession of gales, with heavy falls of S during the first week. A cold snap occurred after the 8th, the mean temp. for the following week being 11° below the average, while the mean of the last week was 5° above the average of 20 years.

DRUMNADROCHIT.—R 4·35 in. above, or more than double, the average of 17 years.

BETTYHILL.—Generally very stormy, but fairly mild. During the first ten days gales, accompanied by heavy showers, prevailed. Then came an equal period of frost, followed by a return of boisterous weather.

WATTEN, H.R.S.—Storms of wind, R and S in the opening and closing portions. Frosty with gales in the middle. T and L on 28th and 29th.

IRELAND.

CORK, WELLESLEY TERRACE.—R more than double the average, the amount unequalled in January since 1879, when 8·32 in fell. A great storm occurred on 16th. Mean temp. 39°, or 2° below the average. Heavy H on 5th.

GLENAM [CLONMEL].—The wettest January for 20 years. Very little sunshine, and only two days free from clouds. From the 6th there was a continuance of heavy gales and strong winds, some very cold from S.E. and S.W.

DUBLIN, FITZWILLIAM SQUARE.—Changeable, stormy and rainy. The weather was generally open, but a cold spell lasted from 10th to 18th. Strong S.W. winds blew almost incessantly from the 22nd to the end, and the temp. rose. Mean temp. 42°·1, or 0°·5 above the average. Duration of sunshine 56·5 hours.

MURRISK ABBEY.—A harsh month with continuous storms, accompanied by S and sleet.

BELFAST, SPRINGFIELD.—Very stormy and inequable, frost and R alternating throughout. The wettest January since 1886.

OMAGH, EDENFEL.—The remarkably heavy R and S of the first ten days were followed by a dry, cold period, with frost of much intensity, the mean temp. of the five days ending 16th being 26°·5. The remainder was mild and wet, with frequent gales.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, AUGUST, 1902.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Average. Dew Point.	Average. Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	Total Rain. Depth.	Total Rain. Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	79·9	29	44·0	11	71·2	53·0	53·9	75	122·8	39·3	3·69	18	7·2
Malta	99·3	10	64·9	15	88·9	71·3	66·1	65	148·3	60·2	·00	0	0·6
Cape Town	69·2	22	38·3	18	61·9	48·8	48·6	79	...	...	3·88	20	5·5
Durban, Natal	79·0	12	48·4	19	73·4	55·9	...	...	131·5	...	3·90	12	4·3
Mauritius	80·3	8	51·9	12	78·5	62·0	60·7	74	145·0	63·5	·58	11	...
Calcutta	94·2	13	74·7	11	89·8	78·6	77·8	83	159·0	73·7	14·01	16	8·1
Bombay	88·2	7	74·4	21	85·8	78·3	76·0	82	139·7	73·5	16·53	24	7·5
Madras	100·3	3	72·9	25	93·8	77·7	74·4	76	153·0	72·4	3·26	14	6·5
Kodaikanal	67·5	11	50·9	29	64·2	53·4	52·9	85	142·7	43·8	4·01	16	7·7
Colombo, Ceylon	89·2	4*a*	75·0	17	87·5	78·1	74·6	81	150·0	72·0	2·76	13	6·9
Hongkong	90·6	30	74·2	10	86·9	77·4	75·8	83	145·5	...	26·51	17	6·1
Melbourne	68·5	29	29·6	14	56·2	39·7	40·8	78	125·0	21·3	·88	9	5·9
Adelaide	70·1	19	39·0	8, 25	61·8	44·3	42·6	71	127·7	31·2	1·13	13	5·6
Coolgardie	77·0	31	34·0	7	66·8	43·2	45·0	70	142·2	27·8	1·71	5	3·4
Sydney	65·1	30	40·3	1	59·4	46·9	45·6	83	101·9	31·8	6·32	20	5·1
Wellington	61·0	18*b*	35·0	31	54·6	42·6	40·7	73	100·0	28·0	2·06	19	5·4
Auckland	62·5	7	39·0	4	56·5	44·7	40·1	67	130·0	37·0	2·33	16	4·6
Jamaica, Negril Point	89·9	1, 9	70·9	6	87·6	73·0	73·6	78	...	...	6·77	14	...
Trinidad	90·0	15*c*	70·0	8	86·9	72·2	77·1	93	168·0	67·0	11·67	19	...
Grenada	86·0	17	70·0	21	83·7	74·6	70·6	76	146·4	...	12·12	26	3·2
Toronto	85·2	3	47·0	16	75·2	55·8	56·8	77	106·0	38·0	2·38	10	4·7
Fredericton, N.B.	83·9	1	39·5	28	73·1	52·7	53·9	63	...	...	3·50	13	5·9
Winnipeg	91·2	5	38·3	21	77·6	50·9	...	...	...	...	·93	7	5·0
Victoria, B.C.	84·4	9	46·2	29	68·8	52·7	...	...	...	...	·43	4	3·2
Dawson	72·4	1, 9	34·5	28	66·3	44·7	...	...	...	...	2·15	12	5·4

a—and 11, 25. *b*—and 21. *c*—and 18.

MALTA.—Mean temp. of air 79°·2, or 1°·3, above average. Mean hourly velocity of wind 6·9 miles or 0·5 below average. Mean temp. of sea 81°·2. J. F. DOBSON.

Mauritius.—Mean temp. of air 1°·2 above, dew point 1°·2 above, and R 1·79 in. below, and mean hourly velocity of wind 2·3 miles below their averages. T. F. CLAXTON.

MADRAS.—Mean temp. of air 0°·7 above, humidity 6 above and R 5·43 in. below average, sunshine 106·0 hours, or 27·4 per cent. of possible amount. A. MOFFAT.

KODAIKANAL.—Bright sunshine 112·3 hours. A very cloudy month. C. MICHIE SMITH.

COLOMBO.—Mean temp. of air 1°·7 above, of dew point 1°·5 above, and R ·92 in. below their averages. Mean hourly velocity of wind 8 miles. H. O. BARNARD.

HONGKONG.—Mean temp. 81°·8. Bright sunshine 231·2 or 34 hours above average. R 11·65 in. above average. Mean hourly velocity of wind 10·2 miles. F. G. FIGG.

Adelaide.—Mean temp. 53°·0 or 0°·9 below, and R 1·13 in. below their averages. Except in the extreme S.E. R was from 40 to 70 per cent. short of the average. Highest mean bar. in August for 45 years (30·30). C. TODD, F.R.S.

Sydney.—Mean temp. 1°·6 below, humidity 9°·3 above, and R 3·10 in. above their averages. H. C. RUSSELL, F.R.S.

Wellington.—Mean temp. 0°·6 above and R 3·14 in. below averages. R. B. GORE.

Auckland.—Mean temp. 2°·1 and R quite 2 in. below averages. T. F. CHEESEMAN.

Trinidad.—R 1·54 in. above the 40 years' average. J. H. HART.