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Introductory Note.

WITH the first issue of *The Meteorological Magazine* as the official organ of the Meteorological Office, a few words of introduction may be desirable. Since 1916 the Office has issued each month a Circular, which has been found of value for the publication of official information and for the exchange of opinions on current meteorological topics. On the absorption of the British Rainfall Organization, the Office became responsible for the continuance of *Symons's Meteorological Magazine*, which had been closely associated with that Organization throughout its long history. The continued existence of two separate publications was obviously undesirable, and the *Meteorological Magazine* is to be issued instead. For convenience in reference the serial numbers of *Symons's Meteorological Magazine* are being carried on.

With regard to the *Meteorological Office Circular* it may be noted that a classified index has been prepared. Typed copies of convenient size for binding will be supplied on application to the Office.

Contributions to the *Meteorological Magazine* from Observers and others who take an interest in the weather will be welcomed by the Editors, to whom they should be sent not later than the 5th of the month.

Shackleton's Last Expedition.

A Review by R. C. MOSSMAN, F.R.S.E.

IN this book Sir Ernest Shackleton gives a vivid and soul-stirring account of the adventures on two sides of Antarctica of the British Expedition of 1914-17. The main object of Shackleton's venture, it may be recalled, was the crossing of the Antarctic Continent from the head of Weddell Sea to McMurdo Sound taking the South Pole on the way. As Vaksel Bay, the contemplated point of departure, on the Weddell Sea side, was in lat. 78° S., the same latitude as McMurdo Sound, in the Ross Sea area, a distance of at least 1,440 miles had to be crossed, without allowing for relays and unavoidable detours which might easily add an extra 400 miles to the journey. A line of depôts over the Ross Barrier as far as the Beardmore Glacier in lat. 83° S. was necessary, so that the trans-antarctic party might be assured of adequate food supplies towards the end of their long march.

To accomplish this task a subsidiary expedition under Captain Mackintosh, went down to McMurdo Sound in the *Aurora*, which, however, broke adrift from her ice moorings close to the shore, and, after a perilous voyage (if such a term can be applied to a ship, frozen up and a plaything of winds and currents), reached New Zealand, thanks to the fine seamanship of Captain Stenhouse, after a besetment of ten months. The stranded party, deprived of much essential gear, carried out successfully the laying of the depôts, although under conditions of unprecedented difficulty and hardship. Scurvy developed, and one member, Spencer Smith, broke down and died, after having been dragged for forty days on a sledge. Later on, the leader of the party, Captain Mackintosh, and his companion, Hayward, lost their lives through an error of judgment, being overtaken by a blizzard while on sea ice between Hut Point and Cape Evans.

Meanwhile the main expedition on the *Endurance* was having a series of misadventures in Weddell Sea of an even more varied and perilous description, although fortunately unattended by any casualty. The main pack was met with on 11th December, 1914, before the 60th parallel was reached, and for five weeks the vessel made slow progress south. In the middle of January, 1915, a long continued north-east gale packed the ice in the southern bight of Weddell Sea, the temperature fell, and on January 19th, the ship was closely beset in lat. $76^{\circ} 34'$ S., about 80 miles off the desired haven. There was no open water in sight, and no later improvement in the conditions took place owing to the severe cold throughout February, whose mean

temperature of 7° F. was 4° lower than the previous Antarctic record for this month at sea level. The *Endurance* continued to drift first to the south-west and then in a zig-zag northerly direction until overwhelmed by ice pressure on October 27th, 1915, nearly 600 miles (as the skua flies) from the point where she was imprisoned. The subsequent adventures of the party and their miraculous deliverance after a drift of five and a half months on floating ice, followed by a miserable existence on a desolate ice-swept island for four months, are graphically described by Sir Ernest Shackleton and Frank Wild to whose almost superhuman courage and resource the party as a whole owe their lives. Shackleton's great 800 mile journey through the sub-antarctic ocean in a 22 foot boat at a season of the year when its mood was at the worst, was a remarkable feat of endurance and skilful navigation, to the success of which Captain Worsley's faculty of snapping positions under almost impossible conditions largely contributed. The first crossing of the South Georgia glaciers in a thirty-six hours' march is also worthy of mention. The account of the four midwinter voyages, in small unprotected vessels, through Cape Horn seas encumbered with ice, to relieve the men on Elephant Island, is modestly told. Only those who have had practical experience of the fearful conditions that prevail when a heavy sea rolls down on the pack edge, with its chaos of jostling ice blocks, can adequately appreciate the frequent desperate situations, so successfully overcome. There is little of a scientific nature in the book, but readers of this magazine will find in the appendices preliminary reports dealing with various aspects of the physical conditions in Weddell Sea, along with an admirable account of South Atlantic whaling, now of such economic importance.

The climatic features of Weddell Sea are described in general terms by Mr. Hussey. Summer was the cloudiest and winter the clearest time. The weather experienced on Elephant Island is described as "appalling," and is evidently much the same as at the South Orkneys. The autographic meteorological records, including traces from a Dines anemometer, went down with the *Endurance*, but the logs containing four-hourly observations of the principal climatic elements have been brought home intact. During the drift on the floe and at Elephant Island, less complete information is available, but the wonder is that so much was effected under such trying circumstances. The meteorological work seems to have been maintained throughout with much care and zeal, and it is fortunate that it will be possible to co-ordinate the data with those for sub-antarctic stations, such as Laurie Island, South Georgia, New Year Island, the Falklands, and for stations on the mainland of the south of South America. The lowest temperature observed was

—35° F., but the outstanding feature seems to have been the remarkable coldness of the summer and early autumn. Towards the end of February, a minimum of —16° F. was recorded, and on March 6th the thermometer fell to —21° F., so that, as in the Ross Sea area, the cold snaps that occur in the “fall” are much more striking than those of winter. It is of interest to note that for the first time in the Weddell Sea area several faint auroras were observed.

No reference is made in the book to any systematic scientific work having been effected by the McMurdo Sound party.

South.—The Story of Shackleton's Last Expedition, 1914-17. By Sir Ernest Shackleton, C.V.O. London: William Heinemann, pp. xxix 376. 82 Illustrations and Map. Price 25s.

Royal Meteorological Society.

THE Annual General Meeting was held on January 21st, in the rooms of the Royal Astronomical Society, Burlington House, W.. Sir Napier Shaw, F.R.S., President, in the chair. The report of the Council for 1919 was read and adopted. The increased interest in meteorology is reflected in a continued growth of the Fellowship. During the year, 97 new Fellows were elected and the total number of Fellows now stands at 820. The inadequate accommodation of the present premises has long been recognized, and the transfer of the library and staff to more suitable and commodious premises in Grosvenor Gardens is foreshadowed. The Council for 1920 were duly elected as follows:—*President*: R. H. Hooker.; *Vice-Presidents*: Joseph Baxendell, Francis Druce, Sir Napier Shaw, D.Sc., LL.D., F.R.S.; F. J. W. Whipple. *Treasurer*: W. Vaux Graham; *Secretaries*: W. W. Bryant, J. S. Dines; *Foreign Secretary*: R. G. K. Lempfert, C.B.E.; *Councillors*: C. E. P. Brooks, John Brownlee, M.D., D.Sc., Capt. C. J. P. Cave, R.E., J. E. Clark, Richard Corless, O.B.E., Capt. G. M. B. Dobson, James Fairgrieve, Lieut. H. D. Grant, R.N.V.R., Henry Mellish, C.B., D.L., J. E. Petavel, D.Sc., F.R.S., M. de Carle S. Salter, G. I. Taylor, F.R.S. The Symons Gold Medal, awarded to Prof. H. H. Hildebrandsson, of the University, Upsala, was presented to the Swedish Minister, on his behalf, the President taking the opportunity to pay a warm tribute to the attainments and to the personal charm of the Professor.

Sir Napier Shaw delivered an address on “Pioneers in the Science of the Weather,” which was preceded by a sketch of the history of the Meteorological Office, in which the year 1919

marked such an important epoch. The address will be printed in the *Quarterly Journal* of the Society.

The following candidates were balloted for and elected Fellows of the Society:—Mr. H. W. Baker, Mr. W. R. Ballinger, Lieut. F. O. Bassett, Mr. J. H. Bassett, Mr. J. E. Belasco, B.Sc., Mr. L. H. G. Dines, M.A., Mr. O. Henrichsen, Mr. J. Leahy, Mr. G. F. Morton and Mr. J. S. Samson.

Obituary.

Mr. Thomas W. Baker, late Chief Assistant at Kew Observatory, died at Sheen on January 28th. Mr. Baker, who retired in 1912, after fifty-three years' service, joined the staff of the Observatory as a boy in 1860. He occupied the position of Chief Assistant for a period of thirty-seven years, during which time he was responsible for most of the magnetic observations as well as for the testing of sextants and other optical instruments.

WE hear, with deep regret, of the sudden death, on January 24th, of *Mr. R. F. Wallace*, whose retirement from the staff of the Meteorological Office, after thirty-seven years' service, was reported last month. He was taken ill at South Kensington Station, and passed away without recovering consciousness, within a hundred yards of the Instruments Division in Cromwell Road, where he had worked as Principal Assistant during the latter years of his life. His genial and kindly manner had endeared him to a large circle of friends.

Climatological Stations.

Hereford.—Observations at Belmont Priory, which were interrupted in October, 1918, were recommenced in June, 1919. From the beginning of 1920, the publication of temperature and rainfall for Hereford in the *Weekly Weather Report* has been resumed, and the station takes its place again as a District Value station. For the year 1919, the Ross-on-Wye station served for this purpose.

Mallaranny.—The number of reporting stations in the North of Ireland has recently been increased by the addition of Mallaranny in County Mayo. This station now appears in the *Weekly Weather Report*.

Official Publications.

British Meteorological and Magnetic Year Book, 1917, Part III., Sec. 2., Geophysical Journal, 1917.—The annual supplement, which completes this volume has now been issued. This supplement contains the first chronological summary of upper air temperatures observed on aeroplanes to be published in this country. This summary refers to Martlesham, a testing station of the Royal Air Force near Ipswich. Details are given for about 270 ascents.

To the usual diagram showing the variation of water level in the "well" at Kew Observatory has been added a graph of "integrated rainfall." This is of special interest as the year includes the thunderstorm of June 16th (when 120 mm., the "record" for London, was measured at Kensington, and 43 mm. fell at the Observatory) as well as the heavy cyclonic rains of July 29th to August 1st. The water level was hardly affected by the former storm, but the general rain in the latter case produced a rise of 550 mm.

The British Meteorological and Magnetic Year Book, 1916 Part IV.—Hourly Values from Autographic Records.—This volume follows the line of its predecessors. It contains monthly means of hourly values for the usual meteorological elements as recorded at Kew, Valencia and Eskdalemuir Observatories with corresponding data for electrical potential gradient. In the case of Terrestrial Magnetism hourly readings themselves are given for Eskdalemuir and the harmonic analysis of diurnal variation for days of different types is carried out. A special feature of the volume is a discussion by Dr. Chree of the electrical potential gradient at Kew and Eskdalemuir Observatories in the years 1914 to 1916. There was a change of site of the Kew electrograph in 1915, but Dr. Chree finds that if it exerted any influence on the diurnal inequality, that influence was certainly small. A very substantial difference in type is found to exist between the diurnal inequalities at Kew and Eskdalemuir.

Professional Notes No. 9.—An Analysis of Cloud Distribution at Aberdeen during the years 1916-1918. by G. A. Clarke. Price 4d. net. Mr. G. A. Clarke holds a unique position as an observer of clouds. His sketches and photographs are well known for their artistic merit as well as for their scientific value. Nephoscope observations at Aberdeen for which he has been principally responsible, have been published in the *Geophysical*

Journal for some years, and an analysis of this series was published in the supplement to the *Journal* for the year 1916. In the Professional Note which has recently been issued the frequency of different cloud types is discussed. The question is approached from the point of view of aviation and stress is laid on the selection of the characteristic cloud present each day, the rule adopted being that if four tenths of the sky was covered with a lower cloud, that cloud should be taken as characteristic. For example, when a complete layer of strato-cumulus has below it four-tenths of cumulus, the characteristic of cumulus is given. Amongst other results it is found that on 31 per cent. of days there is considerable cloud below 3,000 ft. and on only 15 per cent. is there no "characteristic" cloud below 15,000 ft.

NOTES AND QUERIES.

The Highest Gust on Record.

THE severe gale which was experienced on the west of Ireland during the morning of January 27th last, was remarkable on account of the unprecedented gust of wind, which was recorded by the Dines' anemometer at Quilty, Co. Clare.

During the early hours of the morning a moderate breeze was blowing. After 3 h. the wind increased steadily in force until at 8 h. the mean velocity for the hour was 23 m/s. There were several gusts of 31 m/s. and over, between 7 h. and 8 h., and one of 36 m/s., at 7 h. 45 m. After this the pen did not rise above 31 m/s. until 8 h. 20 m. when it rushed up to the very of the chart. It seems to have caught on the edge of the sheet and spluttered as it came down. The indicated speed of the wind was at least 50 m/s. (over 110 mi/hr.). The duration of the squall cannot have been much more than a minute, and the average strength of the wind afterwards was about the same as before—22 m/s. The highest subsequent gust was one of 31 m/s., at 8h. 25m. The general direction of the wind during the morning was between S. and S.W., but as the anemometer is not provided with a direction-recorder there is no evidence as to the direction of the squall. No report on the incident has yet been received from the Observer.

The strongest gust hitherto recorded in this country was 44.6 m/s. (100 mi/hr.), at Pendennis, on March 14th, 1905 ;

the highest at Quilty, 41 m/s. (92 mi/hr.), on December 4th, 1914. No doubt greater wind speeds are reached occasionally in the small tornadoes which occur from time to time.

Geostrophic Wind in March for London.

It is now an accepted principle in meteorology that the wind at about 1,000 ft. is in fairly close agreement with the "geostrophic wind," which is thought of as blowing along the isobars and with such strength that the pressure-gradient just balances the tendency of the air-current to bear to the right owing to the rotation of the earth. The best series of actual observations of the wind aloft are comparatively short, and broken by many gaps: it is, therefore, of interest to ascertain the frequency of geostrophic winds from different quarters and of different strengths. The estimation of geostrophic wind each day at London, from 1881 onwards, has been undertaken by Miss D. Figgins. The following table gives a summary of the results for March; the speed is given to the nearest multiple of 5 metres per second.

Geostrophic Wind at London; March 1881—1915.

FREQUENCY OF STRENGTH AND DIRECTION.

Estimates base on the D.W.R. chart (8h., 1881-1908; 7h., 1909-1915).

Direction.	5 m/s. 11 mi/hr.	10 m/s. 22 mi/hr.	15 m/s. 33 mi/hr.	20 m/s. 44 mi/hr.	Over 23 m/s. Over 50 m/hr.	Total Frequency of Direction.
N.	19	26	27	6	9	87
NE.	7	22	30	18	7	84
E.	10	22	28	11	4	75
SE.	11	16	4	4	...	35
S.	10	21	14	13	8	66
SW.	19	42	57	32	23	173
W.	11	46	71	58	39	225
NW.	16	32	46	23	8	125
Total Frequency of Strength	103	227	277	165	98	870

Indeterminate — 215.

The majority, but by no means all of the days in the "indeterminate" class, corresponds with light winds. It will be noticed that geostrophic winds from western quarters preponderate. The low proportion from south-east and the entire absence of gales from that quarter is worth comment.

Rainfall at Havana and in South-west England.

THE rainfall figures from Havana during the rainy season May to October, 1919, have now been received. During this period only 75 per cent. of the average seasonal fall was registered, which suggests that the rainfall in England, south-west, during January to March, 1920, will probably be above the average. For seven successive years, 1913-1919, the rainy seasons at Havana have yielded a fall below the average, and in four out of the six succeeding seasons in this country the rainfall has been in excess of the average. Full particulars of the two seasons, from 1905 to 1918, will be found in *Symons's Meteorological Magazine*, April, 1919, p. 30.

A. HAMPTON BROWN.

70, Victoria Street, S.W. 1, 10th January, 1920.

[Cf.—“The Rainfall in Cuba and England S.W.” (*Symons's Met. Mag.*, February, 1915), in which communication Mr. Hampton Brown found a correlation coefficient of —.54 between the rainfall at Havana in England S.W. in the seasons mentioned.]

Line Squall of December 4th, 1919.

It would be interesting to trace the movement of this squall, which was attended by thunder and lightning in many places. Apparently it traversed the southern half of England, reaching this district at about 4.50 p.m. My brother was in Arras on that night, and reports a sharp thunderstorm accompanied by heavy hail passing over from the west at 8 p.m. This seems to have been the same squall which swept over London some three hours earlier.

H. HARRISON.

36, Rosemont Road, Richmond Hill, Surrey, 10th December, 1919.

A Correction.

THE kindly and sympathetic notice of my retirement from the Meteorological Office which appeared in the January issue of *Symons's Meteorological Magazine* contained one slight error. I cannot claim the distinction of having served under the administration of Admiral Fitzroy. The Admiral died in April, 1865. It was four years later that I entered the service of the Meteorological Office, which was then, and for many subsequent years, under the control of Mr. Robert H. Scott.

FREDK. J. BRODIE.

30, Loxley Road, Wandsworth Common, 29th January, 1920.

Reviews.

The Book of Normals of Meteorological Elements for the British Isles. Section I. Monthly Normals, 1881-1915 for Temperature, Rainfall and Sunshine. Published by the Authority of the Meteorological Committee. London, 1919. Pp. 94. Size, $9\frac{1}{2} \times 6$. Price, 2s.

METEOROLOGISTS will note with satisfaction the collection into a single compact volume of the climatological normal values for stations reporting to the Meteorological Office (Statistical Division). Such data have for the most part been hitherto available only by reference to Appendix IV. of the *Weekly Weather Report*, 1913. The present work covers the period 1881-1915. The values for shade temperature (mean maximum, mean minimum and mean temperature) are given separately in degrees Fahrenheit and in the Absolute scale, and those for rainfall in inches and millimetres, an extremely useful precaution during the period of gradual transition from the older units to the newer. There are one or two instances in which the choice of records for weighting incomplete rainfall records might have been more felicitous. Thus Aspatria in Cumberland is referred to Cally, in Kirkcudbrightshire, Shrewsbury to Birmingham, and Grayshott (near Hindhead) to Portsmouth. In all these cases numerous more applicable records are available, and in or two instances the monthly régime at the two stations compared is so different that an appreciable error may result. C.S.

News in Brief.

Summer Time in France. In the *Meteorological Office Circular*, No. 44, it was stated that Summer Time was being adopted in France from February 1st, 1920. The notice announcing this date was subsequently cancelled and the change to Summer Time is being made on the night February 14th—15th.

ON SATURDAY, JANUARY 31ST, the staff of the Meteorological Office met together at an unofficial soirée at the Merrick Rooms, Kensington, W. About 160, members of the staff and friends, were present. An attractive programme of music had been arranged, and revealed considerable musical talent. This was followed by a dance which proved very enjoyable. Sir Napier and Lady Shaw, with a majority of the senior officials of the Office, were present.

Weather in the British Isles: January, 1920.

Except for a brief cold spell about the 6th and 7th, weather of an oceanic or south-westerly type prevailed during the greater part of the month. Depressions, which were often of great size and intensity, followed one another in rapid succession and very commonly travelled on a north-easterly course, so that winds from westerly or south-westerly points predominated, with the result that there were many mild days and the mean maximum temperature for the month in some parts of England exceeded the normal for January by about 4° F. Gales were frequent and widespread, and at times the speed of the wind was very great. Snow was infrequent during the month, but there were considerable falls on the 10th and also during the night of the 28th-29th, the fall on the latter date in Derbyshire being the heaviest during the present winter. Between the 14th and 17th, there was much coastal fog and mist, but generally fogs during the month were remarkably rare.

The mean temperature was above the normal in each week of the month; the departures were most striking in the week which ended on the 17th, when the normal was exceeded by 11° F. at Wilton, 10° F. at Raunds (Northants), and at Oxford. Notable high individual readings were 61° F. at Cullompton (Devon), and 60° F. at Dublin on the 17th, 58° F. at Bath, and 57° F. at Fulbeck (Lincoln), on the 18th. The maximum recorded at Cahirciveen on the 12th was 56° F., the highest January value since the Valencia Observatory was moved there in 1892. The minimum at Cahirciveen on the 18th was as high as 52° F., though 34° F. was reported from Eskdalemuir the same morning.

The first serious gale of the month visited Scotland and north-east England on the 8th, much damage was done and there was very heavy rain in Scotland. Gales were general on the 11th and 13th.

At 7 h. on the 27th, the weather map showed a very large and deep depression off the west of Ireland, which during the day travelled rapidly north-eastwards and caused a very severe gale in all parts of the British Isles. This gale was especially severe over Scotland, Ireland and the west of England. At Quilty (Co. Clare), the strength of the wind was quite abnormal, and at 8 h. the anemometer at this station recorded a gust of 110 m.p.h. This gale was also of great violence at Queenstown Harbour, where much damage was done to the quays and wharves, and a gust of 80 m.p.h. was recorded at 8 h. by the anemometer at Weaver Point. On the 30th another depression appeared off the west of Ireland and winds of gale force were again experienced in many parts of the British Isles, and in some of the northern districts the gale was accompanied by a heavy fall of snow.

The rainfall of the month was practically everywhere in excess of the average, reaching twice the average over isolated areas. Amounts less than 2 inches were confined to the extreme east of England and Scotland. Practically the whole of Devon, Cornwall and Wales, and the greater part of the west of Scotland recorded over 5 inches. More than 10 inches occurred over wide areas of the uplands, while over 15 inches was recorded on Dartmoor, the Lake District and over isolated areas in Argyll and Inverness-shire. At Loch Quioch, Loan, over 25 inches fell. Very heavy rain fell locally on the 16th, when 4.22 in. was recorded at Glenelg Manse. In Ireland the fall was less than 4 inches over a small area in the north-east. More than 10 inches was recorded in elevated areas in the west and north, reaching 15 inches in the mountains of Connemara. The general

Continued on p. 16.

Rainfall Table for January, 1920.

STATION.	COUNTY.	Aver. 1875— 1909. in.	1920		Per cent. of Av.	Max. in 24 hours		No. of Days
			in.	mm.		in.	Date	
Camden Square	London	1.83	2.58	66	141	.61	10	21
Tenterden	Kent	2.14	3.19	81	149	.55	10	21
Arundel (Patching)	Sussex	2.59	4.06	103	157	.92	10	20
Fordingbridge (Oaklands) ..	Hampshire ..	2.67	4.22	107	158	.55	10	27
Oxford (Magdalen College) ..	Oxfordshire ..	1.78	2.02	51	113	.35	10	20
Wellingborough	Northampton ..	1.90	2.26	57	119	.45	28	16
March	Cambridge	1.48	1.94	49	131	.37	9	15
Geldeston [Beccles]	Norfolk	1.53	1.81	46	118	.56	28	14
Polapit Tamar [Launceston].	Devon	3.59	7.82	199	218	1.32	10	26
Rousdon [Lyme Regis]	„	2.94	4.60	118	156	.95	9	22
Ross (Birchlea)	Herefordshire	2.33	4.25	108	182	1.02	28	19
Church Stretton (Wolstaston)	Shropshire ..	2.51	4.64	118	185	1.17	28	20
Boston	Lincoln	1.54	1.52	39	99	.40	28	16
Worksop (Hodsock Priory) ..	Nottingham ..	1.70	2.49	63	146	1.01	28	20
Mickleover Manor	Derbyshire ..	1.95	3.07	78	157	.72	28	22
Southport (Hesketh Park) ..	Lancashire ..	2.55	3.46	88	136	.50	10	22
Wetherby (Ribston Hall) ..	York, W.R. ..	1.89	3.38	86	179	.85	10	14
Hull (Pearson Park)	„ E.R.	1.70	2.27	58	133	.62	28	21
Newcastle (Town Moor)	Northland ..	1.90	3.08	78	162	1.03	10	20
Borrowdale (Seathwaite) ..	Cumberland ..	13.44	19.20	488	143	..	..	..
Cardiff (Ely)	Glamorgan ..	3.65	6.17	175	169	1.15	10	26
Haverfordwest	Pembroke ..	4.69	6.60	168	141	1.03	10	26
Birmingham w.w. Tyrmynydd	Rudnor	6.24	8.01	204	128	1.16	10	24
Llandudno	Carnarvon ..	2.51	3.68	94	147	.51	18	19
Gargen [Dumfries]	Kirkcubrt. ..	4.10	7.23	184	176	1.03	23	26
Marchmont House	Berwick	2.40	2.57	65	107	.55	10	19
Girvan (Pinmore)	Ayr	4.78	7.10	180	148	.71	18	29
Glasgow (Queen's Park)	Renfrew	3.53	5.12	130	145	.48	7	25
Islay (Eallabus)	Argyll	4.78	6.64	169	139	.63	29	29
Mull (Quinish)	„	5.55	7.33	186	132	.82	7	29
Loch Dhu	Perth	9.20	11.10	282	121	2.20	7	28
Dundee (Eastern Necropolis)	Forfar	2.01	2.64	67	131	.46	24	19
Bracmar	Aberdeen	2.92	4.38	111	150	.63	25	17
Aberdeen (Cranford)	„	2.36	1.73	44	73	.52	29	17
Gordon Castle	Moray	1.99	1.55	39	78	..	..	..
Drumnadrochit	Inverness ..	3.63	5.07	129	140	.98	7	26
Fort William	„	9.20	15.86	403	172	3.71	16	30
Loch Torridon (Bendamph)	Ross	9.28	14.81	376	160	2.81	16	28
Stornoway	„	5.10	8.77	223	172	..	..	..
Dunrobin Castle	Sutherland ..	2.75	2.81	71	102	.54	6	12
Wick	Caithness ..	2.48	3.34	85	135	..	..	..
Glanmire (Lota Lodge)	Cork	4.70	6.05	154	129	.97	2	26
Killarney (District Asylum)	Kerry	5.94	8.49	216	143	1.17	25	29
Waterford (Brook Lodge) ..	Waterford ..	3.78	4.83	123	128	.84	2	25
Nenagh (Castle Lough)	Tipperary ..	3.88	5.79	147	149	.72	10	27
Ennistymon House	Clare	4.30	6.88	175	160	.75	18	27
Gorey (Courtown House)	Wexford	3.19	4.71	120	148	.67	10	24
Abbey Leix (Blandsfort)	Queen's Co. ..	3.15	5.49	139	174	.75	2	25
Dublin (FitzWilliam Square)	Dublin	2.14	4.29	109	200	.70	9	22
Mullingar (Belvedere)	Westmeath ..	3.10	5.64	143	182	.71	10	25
Woodlawn	Galway	3.83	5.60	142	146	.58	9	27
Crossmolina (Enniscooe)	Mayo	5.35	7.93	201	148	.90	25	29
Collooney (Markree Obsy.) ..	Sligo	3.87	6.30	160	163	.95	8	29
Seaforde	Down	3.41	4.59	117	135	.59	10	23
Ballymena (Harryville)	Antrim	3.73	5.09	129	136	.93	10	27
Omagh (Edenfel)	Tyrone	3.46	5.53	140	160	.74	9	28

Supplementary Rainfall, January, 1920.

Div.	STATION.	RAIN.		Div.	STATION.	RAIN.	
		in.	mm.			in.	mm.
II.	Ramsgate	2.16	55	XII.	Langholm, Drove Rd.	7.07	180
"	Sevenoaks, Speldhurst	3.40	86	XIII.	Selkirk, Hangingshaw	3.60	91
"	Hailsham	4.40	112	"	North Berwick Res. . .	1.78	45
"	Totland B. Aston Ho.	4.09	104	"	Edinburgh, Royal Ob.	2.45	62
"	Ashley, Old Manor Ho.	3.84	98	XIV.	Biggar	4.94	126
"	Grayshott	4.24	108	"	Leadhills	13.90	353
"	Ufton Nervet	3.13	80	"	Maybole, Knockdon F	5.56	141
III.	Harrow Weald, Hill Ho.	3.37	86	XV.	Rothesay	6.64	169
"	Pitsford, Sedgbrook . .	2.52	64	"	Oban	8.14	207
"	Chatteris, The Priory . .	1.69	43	"	Inveraray Castle	15.42	392
IV.	Elsenham, Gaunts End	2.48	63	"	Holy Loch, Ardnadam	10.37	263
"	Lexden, Hill House . . .	2.00	51	XVI.	Loch Venachar	7.50	190
"	Aylsham, Rippon Hall	2.14	54	"	Glenquy	7.20	183
"	Swaffham	1.95	50	"	Loch Rannoch, Dall. . .	8.84	224
V.	Devizes, Highclere . . .	3.82	97	"	Coupar Angus	2.74	70
"	Weymouth	4.48	114	"	Montrose Asylum	1.79	46
"	Ashburton, Druid Ho.	11.74	297	XVII.	Balmoral Castle	3.69	94
"	Cullompton	5.33	135	"	Fyvie Castle	2.21	56
"	Lynmouth, Rock Ho. . . .	7.81	198	"	Peterhead, Forehill . . .	1.82	46
"	Hartland Abbey	4.62	117	"	Grantoun-on-Spey	2.47	63
"	St. Austell, Trevarna . . .	7.25	184	XVIII.	Cluny Castle	6.65	169
"	North Cadbury Rec.	4.48	114	"	Loch Quoich, Loan	25.50	648
VI.	Clifton, Stoke Bishop . .	4.72	120	"	Skye, Dunvegan	10.70	272
"	Ledbury, Underdown	3.45	88	"	Fortrose	2.35	60
"	Shifnal, Hatton Grange . . .	3.76	96	"	Ardross Castle	5.81	148
"	Mayfield, [Ashbourne]. . .	4.12	105	"	Glencarron Lodge	12.27	312
"	Barnt Green	2.44	62	XIX.	Tongue Manse	3.66	93
"	Blockley, Upton Wold	3.55	90	"	Melvich	4.80	122
VII.	Grantham, Saltersford	1.98	50	"	Loch More, Achfary	11.57	294
"	Louth, Westgate	2.19	56	XX.	Dunmanway Rectory	10.40	264
"	Mansfield, West Bank	3.04	77	"	Mitchelstown Castle	6.42	163
VIII.	Nantwich, Dorfold Hall	3.59	91	"	Gearhameen	16.50	419
"	Bolton, Queen's Park	4.55	116	"	Darrynane Abbey	7.18	182
"	Lancaster, Strathspey	3.90	99	"	Clonmel, Bruce Villa	6.75	171
IX.	Wath-upon-Deerne	2.79	71	"	Ballinamona	5.14	131
"	Bradford, Lister Park	4.62	117	"	Roscrea, Timoney Pk.	4.36	111
"	West Witton	4.85	123	"	Foynes	6.19	157
"	Scarborough, Scalby	4.17	106	"	Broadford, Hurdlesto'n	5.80	147
"	Ingleby Greenhow	4.15	105	XXI.	Kilkenny Castle	5.14	130
"	Mickleton	4.50	114	"	Rathnew, Clonmannon	4.61	117
X.	Bellingham	3.83	97	"	Hacketstown Rectory	5.62	143
"	Ilderton, Lilburn Co.	2.38	60	"	Ballycumber, Moorock	4.65	118
"	Orton	9.55	243	"	Balbriggan, Ardgillan	4.49	114
XI.	Llanfrechfa Grange	5.87	149	"	Drogheda	3.76	96
"	Treherbert, Tyn-y-waun	16.97	431	"	Athlone, Twyford	5.10	130
"	Carmarthen Friary	6.46	164	"	Castle Forbes Gdns.	4.90	124
"	Fishguard	5.54	141	XXII.	Aasleagh House	13.86	352
"	Lampeter, Falcondale	6.67	169	"	Westport House	7.99	203
"	Abergwngy	9.20	234	XXIII.	Enniskillen, Portora	5.82	148
"	Crickhowell, Talymaes	5.00	127	"	Dartrey [Cootehill]	5.07	129
"	Sennybridge	6.90	175	"	Armagh Observatory	4.12	105
"	Garthbibio	13.40	340	"	Warrenpoint, Manor H	3.84	98
"	Llangynhafal, Plas D'w.	3.41	87	"	Belfast, Cave Hill Rd.	5.60	142
"	Dolgelly, Bryntirion	6.64	169	"	Glenarm Castle	5.68	144
"	Lligwy	3.91	99	"	Londonderry, Creggan	4.57	116
XII.	Stoneykirk, Ardwell Ho.	5.02	128	"	Sion Mills	6.24	158
"	Gatehouse, Cally	7.17	182	"	Milford Manse	5.23	133
"	Carsphairn, Shiel	11.52	293	"	Killybegs	8.14	207

Old Style type denotes converted units.

Climatological Table for the

STATIONS Those in italics are South of the Equator	Pressure		TEMPERATURE							
	Mean M.S.L. mb.	Diff. from Normal mb.	Absolute				Mean Values			
			Max. ° F.	Date	Min. ° F.	Date	Max. ° F.	Min. ° F.	$\frac{1}{2}$ max. and min. ° F.	Diff. from Normal ° F.
London, Kew Obsy. . .	1016.5	+2.6	84.	9	45.	28	72.7	54.7	63.7	+2.1
Gibraltar	1018.7	+3.3	97.	6,30	64.	3	85.2	69.1	77.1	+0.8
Malta	1016.0	-0.7	90.5	31	68.5	8	83.4	72.1	77.7	-1.1
Sierra Leone	1015.1	+2.0	100.	31	61.	12, 20	83.3	64.9	74.1	-4.0
Lagos . . . . .	..	..	87.3	7	69.0	9	81.1	72.5	76.8	-0.4
Kaduna, N. Nigeria ..	*946.0	..	87.	29	61.	29	81.8	67.4	74.6	..
Cape Town . . . . .	..	..	77.0	13	39.8	4	63.9	49.1	56.5	+1.3
Johannesburg . . . . .	..	..	75.2	24	28.2	4	65.4	42.4	53.9	-4.9
Mauritius	1013.8	-6.8	79.2	28	55.4	22	75.4	61.3	68.3	-0.2
Bloemfontein . . . . .	..	..	80.0	27	22.9	5	67.1	37.9	52.5	+0.9
Calcutta, Alipore Obs.	..	..	91.6	5	76.3	20	87.9	78.9	83.4	+0.8
Bombay . . . . .	..	..	85.6	10	75.8	30	84.1	77.7	80.9	+0.3
Madras . . . . .	..	..	101.1	14	74.0	22	96.5	79.0	87.7	+2.2
Colombo, Ceylon ....	..	..	85.9	31	73.2	19	84.3	76.1	80.2	-1.7
Hong Kong	1001.9	-3.4	92.2	1	74.0	31	87.1	78.5	82.8	+0.7
Sydney . . . . .	..	..	78.5	12	38.8	6	65.6	46.8	56.2	+1.3
Melbourne . . . . .	..	..	74.1	31	29.9	4	59.7	42.9	51.3	+0.2
Adelaide . . . . .	..	..	76.2	5	35.6	21	64.7	47.2	55.9	+2.0
Perth . . . . .	..	..	73.2	25	39.1	14, 15	63.6	47.4	55.5	-0.5
Coolgardie . . . . .	..	..	79.5	9	32.2	12	64.0	43.2	53.6	+0.4
Brisbane . . . . .	..	..	79.1	21	38.4	5	70.9	48.3	59.6	-0.9
Hobart, Tasmania ....	..	..	63.8	10	32.8	5	55.0	41.9	48.5	+0.6
Wellington, New Zealand	1014.3	+0.3	64.5	31	33.0	9, 11	54.9	44.7	49.8	+1.2
Suva, Fiji	1014.0	-1.8	84.8	4	65.8	31	76.3	68.8	72.5	-1.3
Kingston, Jamaica ...	..	..	97.5	9	71.3	30	91.8	74.5	83.1	+1.6
Grenada	1013.2	+0.5	89.	2, 7	68.	23, 24	85.1	74.1	79.6	+0.3
Toronto . . . . .	..	..	92.2	7	47.6	29	77.8	57.9	67.9	+0.8
Fredericton . . . . .	..	..	83.0	13	40.0	10	72.8	51.1	61.9	-1.
St. John, N.B. . . . .	..	..	77.5	16	47.0	5	66.2	52.3	59.3	-1.9
Victoria, B.C. . . . .	..	..	80.4	18	47.7	9	66.7	51.0	58.9	-1.4

* At Station Level, height of 2088 feet.

SIERRA LEONE.—5.75 in. (146 mm.) rain on 23rd.

Mauritius.—Prevailing wind E.S.E. ; mean speed, 2.7 m./s.

Bloemfontein.—Severe drought.

HONG KONG.—Prevailing wind E.S.E. ; mean speed, 5.1 m./s.

British Empire, August, 1919.

TEMPERATURE				PRECIPITATION			Days	Mean Cloud Am't.	Bright Sun-shine Hours per day	STATIONS Those in italics are South of the Equator
Mean Values				Amount		Diff. from Normal				
Dew Point ° F.	R'tive. Humidity %	Max. in Sun ° F.	Min. on Grass ° F.	in.	mm.		mm.			
53.4	67	144.0	33.8	2.20	56	—1	11	5.2	7.32	London, Kew Observatory.
63.4	65	153.	60.0	.00	0	—4	0	1.8	..	Gibraltar.
..	76	144.	..	.00	0	—4	0	2.3	..	Malta.
72.1	83	..	..	22.78	579	—369	26	5.7	..	Sierra Leone.
70.2	78	156.	57.	.20	5	—50	5	8.1	..	Lagos.
68.5	89	..	..	6.30	160	—136	19	2.5	..	Kaduna, N. Nigeria.
49.4	77	..	..	2.19	56	—31	14	6.0	..	<i>Cape Town.</i>
32.4	55	..	25.2	.00	0	—5	0	1.7	9.42	<i>Johannesburg.</i>
59.7	75	..	49.5	3.05	77	+13	18	5.7	..	<i>Mauritius.</i>
31.4	53	..	..	.11	3	—9	3	1.9	..	<i>Bloemfontein.</i>
..	89	..	75.2	23.32	592	+283	23	8.6	..	Calcutta, Alipore Obsy.
75.7	86	125.8	72.1	10.63	270	—90	30	9.0	..	Bombay.
71.7	66	162.0	73.2	3.12	79	—46	8	6.6	..	Madras.
73.6	84	153.9	68.0	4.47	114	+24	18	8.3	..	Colombo, Ceylon.
76.5	82	..	..	19.67	500	+143	24	7.2	5.73	Hong Kong.
43.5	63	122.2	30.1	.75	19	—60	9	3.2	..	<i>Sydney.</i>
40.8	64	127.7	21.8	.57	14	—32	11	5.3	..	<i>Melbourne.</i>
45.5	67	135.2	26.6	3.07	78	+14	13	5.0	..	<i>Adelaide.</i>
47.4	73	137.7	28.2	6.03	153	+10	17	5.4	..	<i>Perth.</i>
42.1	62	134.2	28.8	3.56	90	+65	10	4.8	..	<i>Coolgardie.</i>
45.9	58	136.8	31.4	.69	18	—39	4	2.0	..	<i>Brisbane.</i>
39.5	68	123.4	28.1	.00	0	—46	0	6.5	..	<i>Hobart, Tasmania.</i>
43.9	79	127.0	22.0	3.42	87	—29	17	6.6	3.79	<i>Wellington, New Zealand.</i>
68.0	88	..	..	4.12	105	—83	16	8.5	..	<i>Suva, Fiji.</i>
70.2	74	..	..	.89	23	—70	5	3.8	..	Kingston, Jamaica.
72.9	78	140.	..	15.10	384	+139	28	5.0	..	Grenada.
56.1	75	123.0	42.9	2.17	55	—13	8	4.5	..	Toronto.
55.2	76	..	..	1.95	50	—51	11	5.8	..	Fredericton.
54.1	85	140.4	37.5	3.54	90	—8	14	6.7	..	St. John, N.B.
32.0	78	136.0	38.0	.34	9	—7	4	2.5	..	Victoria, B.C.

Sydney.—Rainfall very deficient.

Wellington.—6 sunless days, 9 days frost.

KINGSTON, JAMAICA.—Drought through the island. Highest temperature ever recorded.

GRENADA.—10 thunderstorms; 3.20 in. (81 m.m.); rain on 22nd.

rainfall expressed as a percentage of the average was as follows :— England and Wales, 150 ; Scotland, 142 ; Ireland, 151, and British Isles, 147. This is, therefore, the second consecutive month of rainfall over 40 per cent. in excess of the average over the British Isles as a whole.

In London (Camden Square), the month was dull and mild. The shade temperature reached 56°·2, on the 12th, and the mean temperature was 42°·1, or 3°·6 above the average. Duration of rainfall, 60·6 hours. Evaporation, ·20 in.

Weather Abroad : January, 1920.

THE chief feature of January, 1920, has been its storminess and the exceptionally heavy rainfall in western and central Europe. For the first four days of the month pressure was high in the neighbourhood of Iceland and relatively low over the land area of western Europe. Under these conditions heavy rain fell on the Continent ; 35 mm. fell at Marseilles in the 24 hours ending at 7 h. on the 2nd, and as much as 47 mm. was reported at Perpignan on the morning of the 5th. At Lugano 68 mm. were measured on the 7th. These heavy falls following those of the end of December, 1919, caused serious floods in many regions. The Rhine rose to a higher level than had been recorded for 40 years. Paris suffered considerable damage, the Seine at Pont Royal reaching a level of 24 feet 3 inches above the normal—the highest ever recorded. River traffic was impossible, the bridges being blocked. The Seine began to fall on January 5th, but a state of flood was maintained more or less through the month.

Later in the month (11th to 17th) the Arno, at Florence, was in flood, and at the same time heavy rain and mild weather in the Alps, following on a heavy snow fall, caused destructive avalanches, while on the 17th and 18th the Danube inundated the lower streets of Budapest. Heavy floods were experienced on the rivers of Bohemia and Moravia, and probably also over Germany.

During the greater part of the month there was a strong south-west current of air over the North Sea, and comparatively high temperatures extended as far as the Arctic Circle, the thermometer at Spitzbergen standing at about 36° F. for a few days.

On the opposite side of the Atlantic severe conditions prevailed. The river St. Lawrence " was never so solidly blocked with ice in the history of its navigation," and in New York severe weather was experienced, the minimum temperature having fallen below 10° F. on several occasions, and to 4° F. on the 5th*. The low temperatures were due to a series of depressions appearing over or off the north-east coast of the United States, causing northerly winds.

A curious coincidence, if such it is, is that on December 30th, at the same time as the heavy rains of Europe, a drought which had prevailed in Australia was broken, and useful rains fell throughout the month of January.

* The mean daily maximum temperature for the month at New York was 29° F., the mean daily minimum was 19° F., and the mean of the two 24° F. This is six degrees below the normal January temperature of 30° F. These figures are based on 27 days figures, four days being absent.