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THE MASTERY OF THE AIR.

The year 1908 will be memorable in history as that which saw the art of aërial navigation or aviation perfected so far as to pass from the advanced experimental to the rudimentary practical stage. It had long been recognised that movement through the air can be effected by two types of machine, one lighter than air, *i.e.*, of the nature of a balloon, in which the problem is one of propulsion and steering only; the other heavier than air, in which the motive power must not only drive the machine forward, but maintain its position against the force of gravity. The latter, or aëroplane type, is essentially a kite, which instead of being lifted by the rush of air acting against the resistance of the surface held by the string, is lifted by the rush of the surface driven by a motor against the resistance of the relatively stationary air. The success of this type depended mainly on the construction of a motor which was sufficiently powerful and sufficiently light, and the provision of such a motor is the direct result of the development of internal combustion engines for road locomotion.

In 1908 Count Zeppelin's great balloon airship achieved the unprecedented feat of performing a whole day's journey in the air—the unhappy wreck of the vessel in no way detracted from the epoch-making nature of the cruise. In 1908 also Mr. Wilbur Wright, in an aëroplane of the heavier than air type and of the simplest possible construction, achieved the more remarkable feat of flying 77 miles in 2 hours 20 minutes without touching the ground, and with perfect control of movement both horizontal and vertical. The rest is merely the development of proved possibilities, and no doubt can be felt that within the next few years aviation will be one of the most pressing of practical problems.

Already questions are being asked as to how the law can be adapted to regulate aërial traffic, and no doubt the military authorities of all countries have been busy devising new methods of attack and defence. One of our German friends, as a gentle satire on the dread of invasion (which some portions of the British press have almost persuaded the less enlightened members of the foreign public to believe is a brooding terror in this country) sent us by way of a Christmas card a copy of

the curious French engraving, dated 1804, which we reproduce as a frontispiece to this volume. It depicts various plans supposed to have been worked out in Napoleon's camp at Boulogne when the invasion of England was nearer than it has been since, and it is curious to notice that the Channel tunnel—itself one of the bogies of the twentieth century—was there, and that the troop-balloon was to be hurled against our country only to be met by a corps of gallant riflemen, each suspended to the tail of a man-lifting kite.

Though there is no new thing under the sun in popular scares or scientific imagination, there will undoubtedly follow a vast impetus to meteorology, leading to the discovery of many new facts, as a result of the opening of the fields of the air to the activity of man, and for many years to come the advancement of our science and the perfecting of the art of aviation will progress by mutually benefiting each other.

THE RAINFALL OF 1908.

A PRELIMINARY study of the records of rainfall from 90 stations distributed fairly uniformly over the British Isles enables us to give a preliminary report on the rainfall of the year, though there has not been time to prepare a map to illustrate it. Our usual Table this month gives in addition to the data for December, the cumulative figures for the year, and in the discussion to which we refer it has been supplemented by something like as many more stations for the year. December was a dry month, in spite of a widespread snowstorm in the last week, the newspaper accounts of which led us to anticipate a much heavier precipitation than actually occurred. Judging from such rainfall data as we have found time to examine, the depth of snow could have exceeded a foot at very few places indeed, and the heavy drifts which isolated Aberdeen by stopping railway communication with the south, and those which blocked trains in both the south-west and the south-east of Scotland, fortunately affected very small areas. The result was that the year as a whole turned out to be dry.

Generalizing the results, we find the following percentages of the average for the general rainfall of 1908 : —

England, S.	Wales.	England, N.	Scotland.	Ireland.	BRITISH ISLES.
86	95	91	98	101	93

This shows a close approximation to the average in Ireland, which had just perceptibly more, and in Scotland which had just perceptibly less, rain than the normal amount. Wales had distinctly less than the normal; and England, especially in the south, was very decidedly dry. England and Wales together had a deficiency of 11 per cent., but in the 28 years since 1881 seven have been drier in those divisions, viz., 1884, 1887, 1893, 1898, 1901, 1902 and 1905.

Taking the year as a whole, Ireland, with the exception of the southern half of the east coast and an area stretching thence into the

RAINFALL OF THAMES VALLEY, DECEMBER, 1908.

The Edinburgh Geographical Institute

J.G.Bartholomew

interior, was wet. The western half of Scotland, and a narrow strip in the north-west of England running into North Wales, as well as the margin of the Moray Firth, were wet also. Part of Argyllshire, and a strip across the middle of the north of Ireland, had an excess of rainfall slightly exceeding 10 per cent. of the average, but no place was very wet. All the rest of the country was dry. From Dublin a dry belt with a deficiency exceeding, though not much exceeding, 10 per cent. ran west as far as the Shannon and south as far as Kilkenny. The extreme east of Scotland, south of Aberdeenshire, had a deficiency exceeding 10 per cent, and this dry belt was continued through most of the east and south of England and the south-east of Wales. A slightly less dry area stretched from the Wash to the middle of the south coast of England.

The driest part of all was a broad strip in Devonshire and the western counties, where a deficiency of more than 20 per cent. of the average prevailed, and the driest part of all seemed to be in the neighbourhood of Torquay, where the rainfall was less than in any year except 1887.

The British Isles as a whole had about 93 per cent. of the average rainfall in 1908, and a deficiency of more than 7 per cent. has occurred only eight times in the last 28 years. These occasions and the deficiency as per cent. of the average were :—1884, 10; 1887, 27; 1889, 10; 1893, 12; 1901, 11; 1902, 17; 1904, 9; and 1905, 14.

THE RAINFALL OF JAVA.*

By CARLE SALTER.

IT is by no means an easy task to write a perfectly unbiassed criticism of such a treatise as Dr. van Bemmelen's work on the rainfall of Java, which, though admittedly incomplete, contains much information of unusual interest, both from a meteorological and a practical point of view. The conditions under which the discussion of the considerable mass of data must be made are so widely different from any with which we are in the habit of coming into contact in the British Isles, that it is obviously unfair to look for such a degree of exactitude as we in this country should consider essential. Labouring, as he undoubtedly was, under enormous difficulties, we cannot help feeling that the author is to be sincerely congratulated on the results he has obtained.

The Island of Java is situated in the region exposed to the full effect of the Indian Ocean rain-bearing monsoon, and having at the same time a land surface broken by masses of lofty mountains, reaching 12,000 feet in height at many points, the resulting rainfall is such as to render its climate almost unique. The industries,

* Over den Regenval op Java (On the Rainfall in Java), by DR. W. VAN BEMMELEN, Acting Director of the R. Magnetical and Meteorological Observatory at Batavia. Batavia, 1908. Size 14½ × 11; pp. 83. Plates and Maps.

which consist almost entirely of plantations, depend in no small degree upon climatic conditions for their prosperity, but the available information on the subject is neither so abundant, nor so trustworthy as could be wished. Dr. van Bemmelen does well in pointing out in some detail the limits beyond which it would not be advisable to strain the data in drawing conclusions.

The first official observations of rainfall were inaugurated by Bergsma in 1879, at 74 stations, and the number was increased subsequently to 124, but only as recently as 1905. The remainder of the 700 stations utilized in the present discussion were made by private individuals, for the most part the managers of plantations, to whom naturally the matter is one of great moment. Only those records extending over a period of at least five years were included. The rain gauges in general use appear to have been of two types. Those at the Observatory stations were of the pattern devised by Bergsma, whilst private observers commonly used a simpler modification introduced by Dr. Figee in 1885, embodying some improvements. It is a matter for regret that it has been the practice to erect gauges at a height of four feet above the ground, a fact which probably accounts for much of the difficulty in making satisfactory comparisons between the results, particularly at high levels, where wind would undoubtedly vitiate many otherwise good observations. Possibly, however, the shelter caused by tropical vegetation might to some extent counteract this defect. No further details of exposure are given. The measurements were uniformly entered to the day of observation.

The author points out that, owing to the enormous difference between the fall at stations even fairly close together, any attempt to reduce the averages to their values for the same period proved utterly impossible, either by the method of comparison of short records with long ones, or by interpolating missing figures. This fact alone constitutes a serious defect in the results, since in a country subject to conditions so variable as those governing tropical rainfall, little reliance can be placed in the averages as representing the normal amounts. This being the case, Dr. van Bemmelen was obliged to abandon the attempt to express the average distribution by means of isohyetal lines; a decision which, after some detailed study of the maps on which the mean values are plotted, we can see to have been necessary.

For purposes of comparison, it was found advisable to divide the island into 16 rainfall districts; but, unfortunately, in the appended maps the limits of these districts have not been laid down, and in the absence of place names, it is only possible to distinguish them by means of tedious reference to the tabulated lists of stations. Conclusions as to the geographical and seasonal distribution are based on the monthly averages of all the stations in each district. The method is open to criticism, but as isohyetal lines could not be drawn, it was the only one applicable. The groups are arranged in

such a manner as to bring together the localities exposed to similar conditions, the various plains and shores being separated from the mountains, which are again grouped with regard to the direction of their slopes. By this means the primary fact is established that the variation in total amount of annual rainfall on the mountains is distinctly related to altitude ; whilst that on the plains is, as a rule, dependent on the position of the stations with reference to the higher land. The wettest districts stand out prominently as the high land in the centre of the island, on which the average works out at 164 inches per annum for the southern, and 168 inches for the northern slopes. On the latter, at an elevation of 2837 ft., is Tombo, the wettest ascertained spot, with a mean fall of 283 inches. At this station 386·75 inches fell in 1893, curiously enough a year of exceptionally prolonged drought in this country. The eastern portion of the northern plain is driest at all seasons, the mean value for that group amounting to about 59 inches. One or two stations give averages somewhat below 40 inches, but they are rare. The grouping of the stations is more particularly utilized in studying the seasonal incidence and its connection with the orographical features ; and a series of curves representing the averages of rainfall, rain days and maximum daily falls in each month, forms a valuable appendix.

Over the whole island the rainy season occurs during the West monsoon, in the (Southern Hemisphere) summer half-year ; but the winter season is nowhere absolutely rainless, and in every district a slight, but perfectly distinct, secondary maximum occurs about June. The average values for the groups are moderate, considering the high annual amounts ; the highest being slightly less than 30 in. in February in the mountains of Pekalongan, and the mean for the whole island 14·50 in. in that month. It falls to less than 3 inches in August, and in the drier districts to less than an inch. In the northern coastal plains the monsoon rains are both earlier and heavier in the western than the eastern part, whilst on the south coast the rains commence earlier in the middle than in the eastern part, whilst the drought of the east monsoon is more pronounced. In the mountainous regions of the west two distinct maxima are developed, one in December and a second in April, this feature being most strongly marked in the southern mountains, Comparing the northern slopes of the mountains with the southern, it appears that the north receives more rain in general in the early part of the year, and the south more in the latter, owing to the seasonal development of the monsoon winds. In dealing with the monthly values, it should be borne in mind that the averages are in no case for periods of any great length, the longest being for 27 years. From an instructive table giving the percentage which the maximum fall in 24 hours is of the monthly amounts, we gather that this is, on the average of all statons, 29 per cent., and reaches 50 or even 60 per cent. for some of the low-level groups during the east monsoon, showing that the monthly values are liable to be influenced enormously by the fall of a single day.

Although it does not appear that during the dry season any part of the island is always rainless, considerable periods of drought are common everywhere. The method adopted for bringing out the normal prevalence of dry spells is ingenious: it consists in counting, for selected stations, the number of days in each month which formed part of rainless periods of six days or more, and averaging the values thus obtained. No wide differences are apparent between the various groups; but the seasonal variation is naturally strongly marked, the curve rising from practically zero in January and February to a maximum of about 20 days between July and September. In three instances droughts extending over more than 200 days are recorded.

Appended to the volume are comprehensive lists giving the names and, where available, the altitudes of all the stations used, together with the period of observation. The monthly and annual averages of rainfall, rain days (·02 in. or more) and maximum daily fall are set out in full. The rainfall averages for the months of February (wettest) and August (driest), and for the whole year, are also plotted on maps on the scale of 1 : 1,000,000, or about 16 miles to the inch, with hill shading and the principal rivers, but with a deplorable absence of place names which detracts somewhat from their value for locating positions.

ROYAL METEOROLOGICAL SOCIETY.

THE monthly meeting of this Society was held on Wednesday evening, December 16th, at the Institution of Civil Engineers, Westminster, Dr. H. R. Mill, President, in the chair.

Mr. Eric Stuart Bruce read a paper on "Some Forms of Scientific Kites," in which he brought to the notice of the Society some forms of kites lighter and less fragile than the well-known box-kite invented by Mr. Hargrave. The latter possesses the indisputable advantages over the lighter forms of stability, ascending steeply, and exerting great force, and when there is wind enough to fly it, it would appear to be unsurpassed. Mr. Bruce considers that the lighter forms of kites, which are specially adapted for use in very light winds, would be of great service in securing the continuity of meteorological records in weather when the box-kite would not rise. He described the Brogden six-winged bird-kite, the Salmon eighteen-winged kite, the Barclay honeycombed-kite, the Cody bat-winged box-kite, the Balston butterfly-kite, and the Burgoyne aluminium-kite. Mr. Bruce thought that the work which has already been done with scientific kites in this country by Mr. Dines, Mr. Cave, and others, justified the hope that before very long a permanent national aërial observatory may be established, where will be gathered together every useful form of kite, and, in fact, every contrivance that is fitted to further the investigation of the upper air.

Mr. C. J. P. Cave read a paper on "The Registering Balloon Ascents in the British Isles, July 27th to August 1st, 1908." These ascents were made in connection with the extended series of ascents of kites and balloons organized by the International Meteorological Commission on Scientific Aëronautics. Twelve balloons were sent up for the Meteorological Office, under the direction of Mr. W. H. Dines, six ascents being from Crinan, on the west coast of Scotland, and six from Pyrton Hill, Oxfordshire; six were sent up by the Meteorological Department of the Manchester University, under the direction of Mr. J. E. Petavel; six by Capt. C. H. Ley, from Birdhill, Co. Limerick, for the Kite Committee; and four by Mr. C. J. P. Cave, from Ditcham Park, Petersfield. Of those sent up, four from Crinan, five from Manchester, three from Pyrton Hill, and two each from Birdhill and Ditcham, have been recovered. The meteorographs used were of the type designed by Mr. Dines, in which the traces are made on copper-plates, electro-plated with silver. (See this Magazine, **41**, p. 101). Some of the records show considerable differences of temperature between the up and down traces, which seems to indicate that fairly rapid fluctuations of temperature may occur in the upper air. The average height reached was 10·2 miles, the greatest height being 14·3 miles. All the balloons, except one, reached the "isothermal layer," showing that the diminution of temperature with height ceases after a certain point, or that there is a rise of temperature; the rise of temperature is quite marked, even in the case of balloons which have attained their highest point after sunset, and cannot therefore be the effect of solar radiation.

Mr. C. J. P. Cave also read a paper on "Balloon Observations at Ditcham Park, near Petersfield, July 27th to August 2nd, 1908." He described how the registering balloons which were sent up were followed by means of theodolites, for the determination of wind direction and velocity at different heights. The balloons were observed until after they had entered the "isothermal layer," and in each case there was a well-marked diminution of wind velocity at its lower limit.

An interesting discussion followed the reading of the papers, in which Mr. Balston, Mr. Brogden, Mr. Dines, Dr. Shaw, and the President, took part, and Mr. Bruce and Mr. Cave replied.

The following gentlemen were elected Fellows of the Society:—Mr. P. A. Cobbold, M.A., Mr. T. Curley, Mr. J. S. Dines, B.A., Mr. J. A. Greenwood, F.R.A.S., Mr. H. H. Haines, F.L.S., Mr. N. Holden, F.R.A.S., Mr. F. W. Nash, Sardar Nawrojee Pudumjee, Mr. T. Robinson, and Prof. R. Wallace, F.L.S.

THE WEATHER OF DECEMBER, 1908.

By FRED. J. BRODIE.

UNTIL very nearly the close of the month the weather of December was characterised by few features of striking interest. The thermometer was usually above its average level, but the absolute maxima were by no means remarkable; the frosts which occurred from time to time were such as we get in almost any ordinary December; rains were frequent but seldom heavy; and the gales experienced were of moderate severity for a month which has often been characterised by some of the worst storms of the whole year. In the opening week, when the distribution of pressure was anticyclonic, some rather sharp frosts were recorded in various parts of the country, but there were few places in which the sheltered thermometer fell as many as 10° below the freezing point; and on the surface of the grass readings of 17° or less (fifteen degrees of frost) appear to have been observed only at a few widely scattered stations in North Britain. Throughout the entire middle portion of the month the wind was almost always from some point between South and West, and the weather consequently mild, but in the rear of a deep cyclonic disturbance which moved eastwards across the country on the 10th and 11th, a cold air swept down from the northward, and on the mornings of the 12th and 13th a rather sharp frost was again experienced in many northern districts.

The striking spell of weather which set in at Christmas time was due to the formation of an anticyclone over northern Europe, and a consequent backing of the wind in these islands to South-East, and afterwards to East. A period of cold had previously set in over the Continent, and on the 26th the wintry air began to drift across England, where the weather gradually increased in severity. On the 29th or 30th, minimum temperatures of 10° or less were recorded at nearly all stations in the midlands and also at most inland places situated in our eastern and southern counties, the thermometer even at some of the south coast stations falling below 20°. The indications of the thermometer in the screen included readings of − 1° at Liphook, + 3° at Garforth, Raunds and Swarraton, 4° at Buxton, Marlborough and Epsom, and 5° at Bawtry and Kingston-on-Soar. In many places the terrestrial radiation thermometers were buried in deep snow which fell about this time, and thus rendered ineffective, but at Tunbridge Wells the ground temperature fell 2° below zero, at Raunds 7° below it, and at Epsom as many as 8° below zero. Over by far the greater part of England the weather on these two days was more severe than at any time since the great frost of February, 1895, when readings below zero were registered very commonly even by the sheltered thermometer. In its greatest strength the cold air failed to reach Scotland, where very few of the thermometric minima were below 20°. In Ireland the frost was of the lightest possible description, while in West Cornwall and the Scilly Islands there was prac-

tically none at all, the lowest readings observed at Falmouth and St. Mary's being respectively 35° and 40°. For the week ending with January 2nd the mean temperature at Falmouth was nearly 14° higher than at Greenwich, and nearly 16° higher than at some places in the more central parts of England.

In the latter part of the 30th, when the anticyclone over northern Europe began to move southwards, a mild air from south-west set in over the south-western parts of the United Kingdom, and by the end of the month a rapid thaw was in progress in all districts. The period of cold, though sharp, was therefore very short, and at all but a few places in northern and central England was insufficient to counteract the effect of the previous long run of mild weather, the mean temperature for December being slightly in excess of the average, even in some of the coldest parts of the country.

Correspondence.

To the Editor of Symons's Meteorological Magazine.

NOTES ON THE EXTRAORDINARY WEATHER OF THE LAST DAYS OF 1908.

TILL the 27th December the weather had been dry and not cold for some days; on that day (Sunday) slight snow fell all day, with light air from N. to E., with temperature just below freezing; towards evening it got finer, and during the night the thermometer fell to 19°. The 28th was fine and bright, though cold, and the little coating (about half an inch=·04 in. rain) of snow on the grass disappeared by evening; that night temperature fell to 20°, and on the morning of the 29th, at 7 a.m., snow set in from E. to E.S.E., with moderate wind, and fell all day till 4 p.m., the temperature varying little from 23°, the total depth being 5½ inches=·46 in. of rain. The sky cleared after 4 p.m., and wind shifted to N.E. for a time, after which it fell calm, and a most severe frost set in, the minimum recorded being 7½°, the lowest ever seen here by me. The 30th was a brilliant cloudless day, but very cold, with little wind; as the temperature could not, from my records, have risen much above 19°, and sunk to 11°, during the early evening, this day must have been decidedly colder than the previous one. About 8 p.m., however, the thermometer began to rise, and during the early hours of the 31st thaw set in, with light rain from S.E., which continued all day. By evening rain stopped, and fog came on, the temperature being about 34°, at which figure it kept all night, the barometer rising steadily. On the morning of 1st January the fog was very thick, there was no wind, temperature rose to over 40° by noon, and the barometer attained the unusual height of 30·52 in.

A. C. BIGG-WITHER.

Tilthams, Godalming, 1st January, 1909.

THE COLD OF DECEMBER 29th, 1908.

THE spell of cold weather with which 1908 came to a close seems to have been unusually severe in parts of the country, so I trouble you with a few notes concerning low maxima in December. Here the highest temperature on Tuesday, December 29th, was 21°·2, by Negretti's verified maximum, and during the meteorological day (9 p.m to 9 p.m.) 23°·6. This latter reading occurred about 10 p.m. on Monday, the 28th. Heavy snow fell continuously all Tuesday after 8 a.m., the depth on the ground at 9 p.m. being 5 inches. It fell with a strong N.E. wind, and was much drifted. The 9 a.m. reading was 19°·5, and at 2 p.m. 18°·3. Subsequently the temperature rose to 19°·6 at 6 p.m. and to 21°·0 at 9 p.m. The snow then ceased and the sky cleared, temperature falling rapidiy. It was 18°·0 at 10 p.m., and during the night the minimum in the Stevenson screen was 14°·2. On a chair in the garden, however, it fell to 10°, and on the surface of the snow to 5°·6. At 9 a.m. the snow when melted yielded ·38 in. in the Snowdon gauge and ·30 in. in the Glaisher gauge (the funnel of which was full).

An examination of past December records in the *Quarterly Journal* of the Royal Meteorological Society shows no lower December maxima than these in the London district. The great frost of 1890-91, in fact, gave as its lowest maximum 21°·2 at Reading. Round London the lowest was 23°·7 at Greenwich. These are, I believe, the lowest official maxima. In *British Rainfall, 1890*, under date December 22nd, we find it stated that at West Kensington the maximum during the day was 19°·5, with dense fog. The recent frost has certainly been remarkable as regards day temperature.

E. L. HAWKE.
2, Akenside Road, Fitzjohn's Avenue, Hampstead, N.W.

[At Camden Square the maximum for the 29th was 23°·7, the lowest maximum recorded in December since the record began in 1858; and the lowest in any month, with one exception, January 4th, 1867, when it was 16°·9. The minimum temperature for the 30th was 14°·4, which was once equalled in December on the 17th, in 1859, and passed by lower minima twice, 6°·7 on the 25th, in 1860, and 14°·0 on the 25th, in 1870. In January and February the minimum has been lower than 14°·4 on 14 occasions, of which 4 were in January, 1881, and 5 in February, 1895].

THE MILD WINTER IN CORNWALL.

THE abnormally mild weather which has been experienced this winter, and has continued in Cornwall notwithstanding the severe snowstorms and hard frost which have visited other parts of England and Scotland, affords some justification for its adopted name of "the

Riviera of England." The contrast is remarkable between our maximum and minimum temperatures and those of less favoured districts. The following are the particulars for the last week of 1908 taken from the climatological station at the Falmouth Observatory:—

	Max.	Min.		Max.	Min.
	°	°		°	°
Dec. 25.....	46·9	40·8	Dec. 29.....	50·8	35·3
,, 26.....	46·6	43·9	,, 30.....	51·9	40·2
,, 27.....	44·8	39·7	,, 31.....	53·7	42·0
,, 28.....	45·7	33·9			

It will be seen that we have escaped any frost, and we have had no snow whatever. There was, however, a heavy rainfall during the 24 hours ending the 29th inst. at 10.30 a.m. amounting to 1·63 in., of which 1 inch fell between 4 and 7.20 a.m.

A list of 144 shrubs and plants in bloom in a garden in this neighbourhood, viz., at "Enys," appeared in the *Western Morning News* of the 5th inst. Doubtless the list might have been very much increased, if not more than doubled, by the addition of the names of other shrubs and plants flowering in other gardens in the district.

WILSON L. FOX.

Falmouth, 31st December, 1908.

SNOWDONIA'S TRADITIONAL AUGUST FLOODS.

The Cwm Dyli valley, situated to the E. of Snowdon, bounded on the N. by the "Cribs," the S. by Lliwedd and Wenalt, and extending from Snowdon to Llyn Gwynant, is traditionally supposed to be visited by three floods during the month of August, and this year was no exception to the rule.

The first occurred on the 20th, when 1·11 in. of rain fell from noon onwards; a very heavy fall about 9.30 p.m. causing the streams to rise rapidly and flood the low-lying land above Gwynant.

On the 26th the weather was fine and bright at sunrise. At 7 a.m. a mist filled the valley, afterwards turning into a very fine rain. The afternoon was gloomy with an occasional shower, but very little rain was recorded until about 7 p.m., when a very heavy fall lasting two hours took place. The Afon Glaslyn, which takes the overflow from Glaslyn, Llydaw and Teyrn Lakes, and drains the lower western slopes of Moel Siabod, rose about 6 feet. This rise, considering the gradient of the river bed, and also that the river was only a few inches above normal 35 minutes after the downpour ended, is a large amount. The total rain for the day was 1·79 in.

The barometric readings for the day were:—9 a.m., 29·41 in.; noon, 29·39 in.; 11 p.m., 29·10 in.

The third flood occurred on the last day of the month. The morning on this date was cloudy, with showers at intervals all morning. The afternoon was cloudy, rain falling at 3 p.m., and continuing gently till 6 p.m., when it became fine. About 9 p.m.

some lightning was noticed, but no rain fell till about 2 a.m., when a very heavy fall occurred, lasting about 80 minutes. During that time an inch of rain fell. The total rainfall for the day was 1·32 in.

At Llyn Llydaw, for the corresponding times, the rainfall was:—On the 20th, 1·33 in.; 26th, 3·16 in.; and 31st, 2 53 in.

The country-side immediately after one of these floods looks extremely beautiful, and it is well worth a soaking to see the magnificent waterfalls which are formed.

A. LOCKWOOD.

Cwm Dyli, Beddgelert

THE PRESENTATION OF RAINFALL STATISTICS.

MR. ELLISON calls attention to the effect of the rainfall in Ireland in 1907. Although the conditions seem to have been much the same as in England, the results were very different. The official returns of the Board of Agriculture show that so far as agriculture was concerned, 1907 in England was one of the most prolific years on record. The Registrar-General's returns show that it was one of the healthiest, and the death-rate for the summer quarter was the lowest that has been published since registration commenced. The year was, therefore, in England the reverse of disastrous for the chief interests that depend on the weather. The popular newspaper belief is that an absence of rain and a high temperature are the most favourable conditions possible; but, like many other popular beliefs, this is a false one, as was strikingly shown in the year in question. The connection between the crops and the weather is certainly far more complex than is commonly supposed.

W. H. DINES.

Pyrton Hill, Oxon, 1st January, 1909.

METEOROLOGICAL NEWS AND NOTES.

THE PRESENT NUMBER is probably the largest issue of this little Magazine hitherto published (there is not time to verify the fact), and we take advantage of the opportunity of exceeding the halfpenny postage to make an effort to overtake arrears in our reviews of current meteorological literature. We wish we could do more in this direction, for it is difficult to over-rate the importance of placing on record an epitome of the world's work in meteorology.

DR. H. R. MILL has arranged to lecture for the Gilchrist Trust on "Climate—a Bond of Union," at Abergavenny on February 8th, Glyn Neath on the 9th, Maerdy on the 10th, Penygraig on the 11th, and Aberaman on the 12th. He hopes to be able to inspect a number of rainfall stations during his visit to South Wales.

WIRELESS TELEGRAPHY FROM ATLANTIC LINERS is, we learn from the daily press, which no doubt has received authentic information, about to be employed to supplement the daily reports of weather sent in to the Meteorological Office.

REVIEWS.

Handbuch der Klimatologie von Dr. Julius Hann, *ordentlicher Professor der Geographie in der Universität in Wien. Band I.—Allgemeine Klimalehre. Mit 22 Abbildungen im Text. Dritte, wesentliche umgearbeitete und vermehrte Auflage* [Handbook of Climatology by Dr. Julius Hann, Professor of Geography in the University of Vienna. Vol. I.—General Study of Climate. With 22 illustrations in the text. Third edition, greatly revised and enlarged]. Stuttgart, J. Engelhorn, 1908. Size 9 × 6½. Pp. xiv. + 394. Price 13 marks.

There is, we believe, only one man who attempts to keep his head above water in the rising flood of meteorological literature, and if that man did not happen to be Dr. Hann we fear he would be overwhelmed; but Dr. Hann is superhuman in his power of combining the passion for classifying innumerable details with an instinctive grasp of general principles. How fully he has assimilated the recent literature of climatology is shown by the natural way in which the results of the latest writers fall into line with the classics of the science. The copious references to authorities make the original work indispensible to English as to Continental students.

The new edition appears in the larger form now given to the "Library of Geographical Handbooks," edited by Professor Penck, and the numerous tables are presented in a much more satisfactory manner than before. It is difficult to say of such a work that the new edition is better than the old, but retaining the quality which could not well be improved it has increased in amount and been kept up to the latest results. It is no small satisfaction to English readers to see how frequently the pages of British meteorological journals are cited by the Author.

This first volume is really a text-book of general climatology dealing with the broad principles and the facts of world wide application; the succeeding volumes will fill up to date the storehouse of facts regarding the different climates of the globe.

The Rainfall of Kent. By Hugh Robert Mill. From the "Water Supply of Kent." Memoir of the Geological Survey, 1908, pp. 20 to 27, Size 10 × 6. Pp. 10. Map.

The rainfall of Kent is mapped here on a small scale, but as a reduction from a map on the scale of two miles to the inch, it may be treated as of a higher degree of accuracy than its scale suggests. The rainfall corresponds very closely with the configuration. Less than 22·5 inches occurs along the Thames estuary, and the gradual slope from the Thames southward has less than 25 inches up to the contour line of 250 or 300 feet. The low rainfall follows the Medway

gap for a short distance into the Weald. The low ground of Romney Marsh has less than 25 inches. In all parts of the county more than 500 feet above the sea the rainfall exceeds 30 inches, and the isohyetal of 30 outlines the North Downs, the Greensand ridge, south of Sevenoaks, and the eastern extremity of the Forest Ridges. In continuation of the summaries for Lincolnshire, Suffolk and the East Riding of Yorkshire, given in this Magazine for October, 1906 (Vol. **41**, pp. 173, 174), we quote :—

KENT.—*Average General Rainfall*, 26·75 *in.*

ZONE.	Sq. miles.	Per cent. of total area.	General Rainfall of Zone.
Below 20·0 in.....	12·4	0·8	19·8 in.
20·0 to 22·5 ,, ...	143·2	9·4	21·6 ,,
22·5 to 25·0 ,, ...	302·2	19·7	23·8 ,,
25·0 to 27·5 ,, ...	394·6	25·8	26·4 ,,
27·5 to 30·0 ,, ...	488·1	31·8	28·7 ,,
30·0 to 32·5 ,, ...	142·6	9·3	31·1 ,,
32·5 to 35·0 ,, ...	39·6	2·6	33·1 ,,
Above 35·0 ,, ...	9·5	0·6	37·0 ,,
Total	1532·2	100·0	...

Meteorological Atlas of the Indian Seas and the North Indian Ocean, prepared chiefly by W. L. DALLAS, under the direction of GILBERT T. WALKER, M.A., Sc.D., F.R.S., Director General of Observatories, Simla, 1908. Size 12 × 15½. Thirty-six charts and letterpress. Price 17s. 6d.

THE charts in this atlas are reproduced with the clearness and finish usual in the work of Mr. Bartholomew, who is responsible for the cartographic part of the work. The atlas is designed for the use of captains navigating the Indian Ocean north of 10° S., and the subjects dealt with are as follows : Charts I.–XII.—The normal pressure at 8 a.m., wind-direction and force, and sea currents for each month. Charts XIII.–XXI.—Monthly storm tracks in the Arabian Sea and Bay of Bengal between 1893 and 1903. Charts XXII.–XXXI.—Typical storms at different seasons of the year in the Arabian Sea. Charts XXXII.–XXXVI.—Typical storms at different seasons of the year in the Bay of Bengal.

In the first set of monthly maps the data have been compiled as 11-year averages for squares of 4°, and the figures are entered on each square, while the isobars of each ·05 in. are drawn in red over the sea-surface. The second series of monthly charts shows the tracks of a selection of typical cyclones, showing the position of the centre for each day during which they were apparent, and the remaining charts show the isobars and wind-directions and force for each day of a selection of typical cyclones. The accompanying letterpress describes clearly how the maps may be used to assist navigators.

Solar Physics Committee. Monthly Mean Values of Barometric Pressure for 73 selected stations over the Earth's surface. Compiled at the Solar Physics' Observatory, South Kensington, under the direction of SIR NORMAN LOCKYER. London. Printed for H.M. Stationery Office, 1908. Size 12 × 10. Pp. vi. + 98 + vi. + 32 plates. Price 6s.

THIS volume is singular for a Government publication in being printed with leaded type and a generous allowance of blank spaces on a highly surfaced "art" paper, giving an appearance of luxury rare in scientific works. It is a fact perhaps not fully appreciated by the general public that an institution is maintained at the public expense for the investigation of the phenomena of the sun, and of the influence which solar activity exerts on the Earth and in its atmosphere. Sir Norman Lockyer points out that there is a curious "see-saw" in the variations of barometric pressure in different parts of the world, *e.g.* :— in the years when the pressure in Bombay is abnormally high it is abnormally low in Cordoba, and *vice-versâ*, and that a large number of stations agree in variation of pressure with one or the other type. Records of monthly mean barometric pressure for 73 stations in different countries are here reproduced in figures, and the annual means in curves; but the tables lose some of their value by being given in inches, or millimetres, as observed, instead of being reduced to the same units, and the curves are drawn on different scales for height, the object being to call attention to the date of the maxima and minima, not to compare the ranges. A few blank charts are added ruled for the years from 1905 to 1950, so that the diagrams can be carried on by the student for some years to come. No data regarding solar activity are given for comparison with the pressure curves.

A Discussion of Types of Weather in Madras. By R. LL. JONES, M.A., Meteorologist, Madras. Memoirs of the Indian Meteorological Department. Vol. **20**, Part **4**. Simla, 1908. Size 12½ × 10. Price 1 rupee.

WE must demur to the pagination of this memoir, if indeed we can use such a word with reference to a work in which the pages are not numbered. Each leaf is numbered consecutively on one side which bears letterpress, the other side bears two lithographed maps, each numbered as a separate "plate," except the last one which has only one map, "Plate 35"—altogether a bibliographical irritant. Each "plate" represents the 8 a.m. weather chart of southern India and the Bay of Bengal for a day on which a particular weather type was apparent. The four chief types of Madras climate are (1) the cold-weather type from the end of December to the end of February, (2) the hot-weather type from the beginning of March to the end of May, (3) the south-west monsoon type from the beginning of June to

the first week in October, and (4) the north-east monsoon type from the second week in October to the third week in December. The charts show pressure by isobars, wind by arrows, and rain by a figure within a circle at certain stations.

Commonwealth Bureau of Meteorology, Melbourne. A new form of Pressure Anemometer. By H. A. HUNT, Commonwealth Meteorologist. By Authority, Melbourne. (Not dated.) Size 10 × 6. Pp. 10. Plates.

THE instrument consists of an aluminium cube one foot in the side mounted on a vane and capable of moving under the pressure of the wind, towards which one face is always directed. The movement is checked and the pressure measured by a spiral spring, and the record of direction and force is written by means of a novel form of pen (a toothed wheel, the side opposite the paper revolving on an ink pad) on a roll of paper driven by a clock, the whole of the mechanism being inside the cube.

Skizze des Klimas der Heard-Insel (Sketch of the Climate of Heard Island). Von W. MEINARDUS. Reprinted from the Reports of the German Antarctic Expedition of 1901-03. Berlin. (Not dated.) Size 13 × 10. Pp. 26.

PROFESSOR MEINARDUS essays the somewhat remarkable task of describing the climate of an island on which no series of meteorological observations has ever been taken. Heard Island lies on the line which joins Kerguelen Island with the winter quarters of the Gauss on the Antarctic circle. Simultaneous observations were made at Kerguelen and the winter quarters, and the temperature at Heard Island is calculated on the assumption of a uniform fall of temperature from north to south, and also by reference to the mean temperature of the air over the South Indian Ocean deduced from charts compiled from ships' observations.

An Analysis of the Meteorological Elements of Rochdale. By J. R. ASHWORTH, D.Sc. (From the *Transactions* of the Rochdale Literary and Scientific Society.) Rochdale, 1908. Size 8½ × 5½. Pp. 18. Plates.

DR. ASHWORTH has subjected the monthly means of the 30 years' records of meteorological data at Rochdale to mathematical study, and determined, in the first place, the simple sine curve which most nearly corresponds to the actual figures as plotted. The peculiarity of the sine curve is that for a given period of recurrence it has one maximum and one minimum, with a regular fall and rise. It is rarely that a curve of any meteorological element is regular, but a mathematical expression, taking account of its irregularities, may be

approximated to by compounding with the simple curve similar curves of shorter period. The outcome of Dr. Ashworth's work is to show that the normal temperature maximum at Rochdale occurs on or about July 23rd, and the minimum on or about January 22nd; the maximum humidity about December 20th, and the minimum about June 20th. The barometric curve is treated as compounded of a dry-air pressure curve and a vapour pressure curve, the latter having a simple and well-defined annual period; but the former retains many of the irregularities of the actual pressure curve. The rainfall curve is also irregular and corresponds ill with the nearest simple sine curve. While the annual period with maximum in October and minimum in April is the most distinct, a period of 73 days, or one-fifth of a year, is also important. This sub-period has its maximum on December 29th and every successive 73rd day. It remains, of course, to find the physical explanation.

Der tägliche Gang der Temperatur in der äusseren Tropenzone [Daily March of Temperature in the Outer Tropical Zone.] *B Das Indische und Australische Tropengebiet* von JULIUS HANN. Wien, 1907.

DR. HANN concludes in this third treatise his discussion of the daily march of temperature within the tropics. The first part dealt with the conditions of daily temperature in the equatorial part of the tropical zone, the second with the American and African portion of the outer tropical zone, and this with the Indian and Australian portion of the same.

A very valuable and comprehensive series of tables discusses the diverse aspects of the subject, among which may be mentioned that dealing with the corrections required for the values of the daily mean temperature as derived from observations made at the hours 7, 2, 9; 7, 2, 9, 9; 6, 2, noon; 6, 2, 8; and the daily maximum and minimum. A close examination of these five different methods by which the daily mean temperature may be arrived at shows that the mean $\frac{7+2+9+9}{4}$ gives the best results whilst the mean $\frac{\max+\min}{2}$ yields the worst. In the tropical zones the mean of the daily extremes is as much as possible to be avoided, although in higher latitudes more reliance may be placed upon it. The figures showing the yearly variation from month to month of the periodic daily amplitude of temperature at numerous places in India are interesting as showing the influence upon them of the monsoon changes with their attendant wet and dry seasons. Thus at Calcutta in January and February the amplitude is 9·8, whilst in July and August during the wet season it is 3·2 and 3·1 respectively. The daily maximum temperature in general falls considerably earlier in the wet than in the dry season, and the minimum is slightly earlier in the dry season. The greatest periodic daily amplitudes of temperature occur at the following

mentioned places: Poona, 16°·7 in February and March; Deesa, 17°·5 in December and 17°·1 in February; Allahabad, 16°·5 in April; Lucknow and Jeypore, 16°·5 in November; Roorkee and Lahore, 16°·6 and 16°·7 in November; and Alice Springs, in the heart of Australia, 15°·9 in August.

Dr. Hann discusses the diurnal, semi-diurnal, tri-diurnal and quadri-diurnal waves of temperature in relation to the sine-constants as determined by Eliot and Blanford. In all portions of the tropical zone the amplitude of both the mono- and the di- or semi-diurnal range of temperature is greater in the dry than in the wet seasons as might have been expected. L.C.W.B.

Bihang till Meteorologiska Iakttagelser i Sverige, 49 Bandet. Medeltal och extremer af Lufttemperaturen i Sverige, 1856-1907, af H. E. HAMBERG. [Appendix to Swedish Meteorological Observations. Vol. 49. Means and extremes of Air Temperature in Sweden, 1856-1907. By H. E. HAMBERG.] Uppsala, 1908. Size 12 × 10. Pp. iv. + 82 + 20 plates.

THE text is given in parallel columns, Swedish and French. The plates include maps of the Scandinavian peninsula, showing mean temperature for about 40 years (1859-1900 for Sweden, 1841-1890 for Norway) for every month and for the year, isotherms being shown for intervals of 1° C., the temperatures being reduced to sea level. A set of maps on a smaller scale shows for Sweden only the monthly and annual mean temperatures as actually observed at the stations without correction for sea-level. Tables are given of the mean and extreme values for the stations individually. The most interesting fact regarding the temperature of Sweden, is that in summer there is a centre of high temperature, and in winter of low temperature, both in South Sweden and in North Sweden, separated by a region of less extreme temperature in Jämtland. At all seasons the main isotherms run appreciably parallel to the coast.

Report on the Administration of the Meteorological Department of the Government of India in 1907-8. [Simla, 1908.] Size 13 × 8½. Pp. 24.

THE service in India is carried on by "observatories" of four classes, the "fourth class observatory" taking account only of rain and temperature; but in addition there were in March, 1908, no less than 2,677 rainfall stations, of which 730 were inspected in the year. The Report shows steady progress in improving and simplifying the meteorological service, increasing the utility of the records to agriculture and engineering, and accelerating the publication of reports.

Comparaisons graphiques des valeurs mensuelles saisonnières et annuelles des principaux éléments météorologiques dans diverses stations françaises pour l'année, 1906. [Graphic comparisons of the monthly, seasonal and annual values of the principal meteorological elements at various French meteorological stations for 1906] Par G. EIFFEL. [Paris, 1908.] Size $12\frac{1}{2} \times 9\frac{1}{2}$. Pp. 4 + 13 plates.

Atlas météorologique pour l'année 1907 d'après vingt-quatre stations françaises. [Meteorological Atlas for 1907, based on 24 French stations.] Par G. EIFFEL. Paris, 1908. Size 13 x 10,

THE former publication consists of a series of map-diagrams to be added to the Atlas for 1906. The latter takes the form of an elegantly designed portfolio containing (1) a pamphlet of 52 pages of letterpress of a general character, (2) a cover containing 50 folded sheets giving monthly means in figures and daily values in curves of all the elements at the 24 stations dealt with, (3) a cover containing a set of the curves for each station, printed on tracing-paper so that they can be laid over the sheets of any of the stations in cover 2 and allow of exact comparisons being made, and (4) a pamphlet containing twelve "synoptic maps," showing the conditions for each element graphically.

The synoptic maps are not maps of distributions, but merely maps on which 24 diagrams of the nature familiar to us as wind-roses are placed on the various stations. Thus, the rainfall map shows 24 rosettes, each of twelve rays, each representing by its length the rainfall of a month. The result makes an appeal to the eye, and some of the diagrams are extremely ingenious; but considering the elaborate nature of the whole publication, we are of opinion that really valuable maps of each element could be constructed with but little more expense, such maps as would bring out the relation of the various conditions to the physical features of the country.

Practical Exercises in Physical Geography, by WILLIAM MORRIS DAVIS. Boston, R. Ginn & Co. [1908]. Size $7\frac{1}{2} \times 5\frac{1}{2}$. Pp. xii. + 148. Atlas for above, size $8\frac{1}{2} \times 10$. Plates 45.

THESE publications by the leading American exponent of geographical education, devote a fair amount of space to isothermal and isobaric maps, and their interpretation. The system of exposition is by means of a series of questions, such as no doubt experience has shown to be congenial to the youthful mind, for it is widely adopted in books by practical teachers. To us, however, this system is so uncongenial that we have read many pages in order to test our power of resisting the temptation to give way to irritation. Apart from the style, enforced, as we believe, by the demand on the part of the teachers, the matter is beyond praise, and the clever drawings in the atlas are a pleasure to study.

The Relation of Anti-cyclonic Weather to the prevalence of La Grippe and Pneumonia on the Northern Himisphere. By C. M. RICHTER, M.D., San Francisco. Reprinted from the *Journal of the American Medical Association.* August 22nd, 1908, pp. 660-663. Chicago, 1908. Size 8½ × 6. Pp. 12.

DR. RICHTER'S conclusions, drawn mainly from statistics of San Francisco and Chicago, are :—

Pneumonia is not merely a concomitant of the cold weather season.

Its prevalence depends on anticyclonic weather, summer and winter, on the northern hemisphere, and not on low temperature.

There is sufficient reason to assume that the quality of the air of an anti-cyclone changes in conformity with changes in the activity of the sun, and that the prevalence of grip and pneumonia is subject to a specific quality of such air.

Report of the International Meteorological Conference at Innsbruck, September, 1905. Published by Authority of the Meteorological Committee. London. Printed for H.M. Stationery Office, 1908. Size 10 × 6. Pp. iv. + 156. Price 2s.

THIS is translated by Mr. Lempfert from the German original, dated 1906. The most valuable part of the publication is the series of appendices containing the text of the various proposals submitted to the Conference, some of which are of great interest.

Rainfall Map of the Commonwealth of Australia. Bulletin No. 2 of the Commonweatth Bureau of Meteorology, Melbourne. Published under the authority of the Minister of Home Affairs, by H. A. HUNT. Melbourne, 1908. Size 10 × 6. Pp. 10. Map.

MR. HUNT has prepared a map of the rainfall of Australia on the scale of about 125 miles to an inch, showing the average precipitation for the ten years, 1897-1906, and plotted from the observations at 700 stations. The objects of the publication are to give authentic information and to dispel many of the erroneous impressions that are current respecting the rainfall of Australia and Tasmania. The period was selected in order to ensure a fair distribution of stations and it is pointed out that the period was an unusually dry one. A table is given comparing the ten years average with the average of all the years of observation for the longer records; but the time has hardly come yet for attempting to draw a map showing the normal rainfall with precision. It is pointed out that one-third of the area of Australia receives less than 10 inches of rain per annum, one-third receives between 10 and 20 inches, and the remaining third has from 20 to 130 inches, the greatest falls occurring on the east coast of Queensland and the west coast of Tasmania. It is justly pointed out that compared with other continents Australia is by no means so arid as is often supposed.

Hourly Readings obtained from the Self-recording Instruments at Four Observatories in connection with the Meteorological Office, 1907. Thirty-ninth year. New Series. Vol. 8. Published by the authority of the Meteorological Committee. London. Printed for H.M. Stationery Office, 1908. Size 12 × 10. Pp. xviii. + 198. Price 25s.

THIS volume marks an epoch. It brings the records of the four First Order stations up to date, and henceforth the publications of the Meteorological Office will have the additional utility of being placed in the hands of the public at the following intervals. *Daily Weather Report*, daily at 2.30 p.m., giving the 7 a.m. observations of the same day at 29 telegraphic reporting stations. *Weekly Weather Report*, giving records at 109 stations, every Thursday. *Monthly Weather Report*, giving summaries for all stations of the first, second and third orders [and also, though this is not mentioned in the preface from which we quote, a rainfall map based on about 900 records compiled at the *British Rainfall* office] on the 28th of the following month. *Daily Observations at 20 second order stations* six weeks after the close of the month to which they refer, and the *Hourly Readings*, under the title at the head of this notice, in separate sections for each observatory, about three months after the month to which they refer.

The British public are entitled to look with satisfaction on the prompt service they now receive for the money voted by Parliament for meteorological purposes; but we may point out that for forty-seven years the voluntary observations of rainfall, published by private enterprise, have out-stripped the official records by months and even years. The voluntary work, burdened as it is by growing volume and stationary resources, has not dropped behind though it has very properly been overtaken at last by the Government Office.

Bericht über die Tätigkeit des Königlich Preussischen Meteorologischen Instituts im Jahre, 1907. Erstattet vom Direktor. [Report of the work of the Royal Prussian Meteorological Institute in the year 1907. By authority of the Director.] Berlin, Behrend & Co., 1908. Size 10½ × 7½. Pp, 76. Price 3 marks.

IN this brief, but comprehensive Report, Dr. Hellman not only summarises the work of the great Institute over which he presides, but gives also a biographical notice of his predecessor, Dr. von Bezold illustrated by an admirable portrait.

Ceylon. Administration Reports, 1907. Meteorology. Report of the Surveyor-General. [Colombo, 1908.] Size 13½ × 8½. Pp. 58. *Plates.*

IN addition to the usual data and rainfall maps of Ceylon, this report contains an account, with illustrations, of a cyclone at Batticaloa on on March 9th; and a description of remarkable surges of the sea and great waves on the south and west coasts on January 4th, apparently the result of earthquakes near Sumatra.

Report of Rainfall Registration in Mysore for 1907, by N. VENKATESA IYENGAR, B.A. Bangalore, 1908. Size 12 × 10. Pp. 48. Plates.

Nedboriagttagelser i Norge udgivet af det Norske Meteorologiske Institut, 1907. [Rainfall Observations in Norway, issued by the Norwegian Meteorological Institute.] Christiania, 1908. Size 14½ × 11. Pp. 218. Plates. Price 5 kronor.

WE have only to repeat our annual tribute of praise to Professor Mohn, for his annual lesson in the prompt and full presentation of rainfall statistics, not untouched by harmless envy of the magnificent *format* of his publication, which of itself is an incitement to good work.

Die tägliche Variation der Windstärke auf den Berggipfeln in Südindien in ihrer Beziehung zu der täglichen Luftdruckschwankung, [The diurnal variation of wind-force on the mountain summits of Southern India in relation to the diurnal pressure changes.] Von J. HANN. From *Sitzungsbericht.* K. Akad. Wiss. in Wien. Math.-Naturwiss, Klasse. Bd. **117**. Abt II. a. Mai, 1908. Size 9½ × 6½. Pp. 64.

PROFESSOR Hann has worked up the hourly values of wind velocity for Kodaikanal, and the earlier results for Dodabetta. He deduces as a conclusion that there is chiefly a whole-day period of wind-force on mountain summits, with its maximum at night and its minimum about noon ; the cause of which is the warming of the lower layers of air by day and the cooling at night. A secondary half-daily period shows a close relation to the diurnal pressure changes.

Zur Meteorologie der Adria. [On the Meteorology of the Adriatic.] Von J. HANN. From *Sitzungsbericht.* K. Akad, Wiss. in Wien. Math.-Naturwiss. Klasse. Bd. **117**. Abt. II. a. Juni, 1908. Size 9½ × 6½. Pp. 36.

LORD Kelvin used to delight in concealing a pun in the heart of the severest physical discussion, and we almost suspect Professor Hann of following in his footsteps, when he points out that the small size of the little rocky islet *Pelagosa* makes its meteorology of a *pelagic* character! Thus he discusses the meteorology of Pelagosa as representative of that of the Adriatic Sea.

Peruvian Meteorology, by SOLON J. BAILEY. Observations made at the Arequipa Station, 1892-1895, pp. 104. Observations made at the auxiliary stations, 1892-1895, pp. [126]. From Annals of the Astronomical Observatory of Harvard College, vol. **49**. Cambridge, Mass, 1907, 1908. Size 12 × 9½.

THESE are tables of data, with a brief letterpress introduction to each volume.

Nautical Meteorological Annual, 1907. Published by the Danish Meteorological Institute. Copenhagen, 1908. Size 12 × 9½. Pp. lii. + 150.

THE most interesting part of this valuable annual report, which is printed in Danish and English in parallel columns, is the discussion of the state of the ice in the Polar seas, with maps.

Results of the Meteorological Observations made in Japan for each period of five years since 1876, *and for the* 10, 15, 20, 25, 30 *years ending* 1905. Published by the Central Meteorological Observatory. Tokio, 1906. Size 13 × 8. Pp. 160.

ALTHOUGH dated 1906, this important collection of data has only recently been received.

Mysore Meteorological Memoirs, No. II., containing for the period of the twelve years, 1895 to 1906, the means of the hourly records of the weather elements obtained with the self-recording instruments at the Bangalore Observatory; together with the twelve-year monthly means of various weather elements and miscellaneous observations. Published by authority of the Government of Mysore, by JOHN COOK, M.A., F.R.S.E. Bangalore, 1908. Size 14½ × 11. Pp. iv. + 34.

Recherches sur les courants les plus bas de l'Atmosphère au-dessus de Paris. [Researches on the lowest atmospheric currents over Paris.] Par F. ÅKERBLOM. Upsala, 1908. Size 11 × 8½. Pp. iv.+46.

THIS is a reprint of a paper from the *Nova Acta* of the Royal Society of Sciences of Upsala. It deals with the conditions of movement in the layer of air which lies between the level of the Parc St. Maur and of the Central Meteorological Bureau in Paris and that of the summit of the Eiffel Tower, a vertical distance of 286 metres or 949 feet. The factors discussed are the barometric gradient, and the angle which the resulting winds make with the gradient at the surface and at the top of the tower.

The Science Year Book. Diary, Directory, Biography and Scientific Summary for 1909. By Major B. BADEN-POWELL. London: Office of *Knowledge.* Size 9 × 5. Price 5s. net.

WE have pleasure in calling attention once more to this most useful and ingeniously arranged diary and book of scientific reference.

RAINFALL TABLE FOR DECEMBER, 1908.

STATION.	COUNTY.	Lat. N.	Long. W. [*E.]	Height above Sea. ft.	RAINFALL OF MONTH.	
					Aver. 1870-99.	1908.
		° ′	° ′		in.	in.
Camden Square	*London*	51 32	0 8	111	2·12	1·89
Tenterden	*Kent*	51 4	*0 41	190	2·74	3·58
West Dean	*Hampshire*	51 3	1 38	137	2·74	2·93
Hartley Wintney	,,	51 18	0 53	222	2·55	2·36
Hitchin	*Hertfordshire*	51 57	0 17	238	2·05	1·71
Winslow (Addington)	*Buckinghamshr.*	51 58	0 53	309	2·27	1·97
Bury St. Edmunds (Westley)	*Suffolk*	52 15	*0 40	226	2·11	1·83
Brundall	*Norfolk*	52 37	*1 26	66	2·13	1·28
Winterbourne Steepleton	*Dorset*	50 42	2 31	316	4·13	5·21
Torquay (Cary Green)	*Devon*	50 28	3 32	12	3·46	3·82
Polapit Tamar [Launceston]	,,	50 40	4 22	315	4·39	3 98
Bath	*Somerset*	51 23	2 21	67	2·76	2·73
Stroud (Upfield)	*Gloucestershire*	51 44	2 13	226	2·48	2·35
Church Stretton (Wolstaston)	*Shropshire*	52 35	2 48	800	2·92	3·01
Coventry (Kingswood)	*Warwickshire*	52 24	1 30	340	2·44	2·36
Boston	*Lincolnshire*	52 58	0 1	25	1·79	1·16
Worksop (Hodsock Priory)	*Nottinghamshire*	53 22	1 5	56	2·02	1·36
Derby (Midland Railway)	*Derbyshire*	52 55	1 28	156	2·28	1·50
Bolton (Queen's Park)	*Lancashire*	53 35	2 28	390	4·19	3·41
Wetherby (Ribston Hall)	*Yorkshire, W.R.*	53 59	1 24	130	2·19	1·41
Arncliffe Vicarage	,, ,,	54 8	2 6	732	6·41	5·38
Hull (Pearson Park)	,, *E.R.*	53 45	0 20	6	2·36	1·59
Newcastle (Town Moor)	*Northumberland*	54 59	1 38	201	2·64	1·12
Borrowdale (Seathwaite)	*Cumberland*	54 30	3 10	423	14·70	12·15
Cardiff (Ely)	*Glamorgan*	51 29	3 13	53	4·43	4·26
Haverfordwest (High Street)	*Pembroke*	51 48	4 58	95	5·22	7·63
Aberystwyth (Gogerddan)	*Cardigan*	52 26	4 1	83	4·49	4·92
Llandudno	*Carnarvon*	53 20	3 50	72	2·95	2·28
Cargen [Dumfries]	*Kirkcudbright*	55 2	3 37	80	4·68	4·19
Hawick (Branxholm)	*Roxburgh*	55 24	2 51	457	3·54	1·38
Edinburgh (Royal Observy.)	*Midlothian*	55 55	3 11	442	...	·23
Girvan (Pinmore)	*Ayr*	55 10	4 49	207	5·24	5·46
Glasgow (Queen's Park)	*Renfrew*	55 53	4 18	144	3·53	3·18
Tighnabruaich	*Argyll*	55 55	5 14	50	6·33	7·17
Mull (Quinish)	,,	56 36	6 13	35	6·48	7·22
Dundee (Eastern Necropolis)	*Forfar*	56 28	2 57	199	2·73	1·61
Braemar	*Aberdeen*	57 0	3 24	1114	3·15	1·59
Aberdeen (Cranford)	,,	57 8	2 7	120	3·39	4·95
Cawdor	*Nairn*	57 31	3 57	250	2·53	1·27
Fort Augustus (S. Benedict's)	*E. Inverness*	57 9	4 41	68	5·13	4·56
Loch Torridon (Bendamph)	*W. Ross*	57 32	5 32	20	9·04	13·08
Dunrobin Castle	*Sutherland*	57 59	3 56	14	3·39	1·82
Castletown	*Caithness*	58 35	3 23	100	...	3·28
Killarney (District Asylum)	*Kerry*	52 4	9 31	178	6·64	5·36
Waterford (Brook Lodge)	*Waterford*	52 15	7 7	104	4·31	6·27
Broadford (Hurdlestown)	*Clare*	52 48	8 38	167	3·37	5·62
Abbey Leix (Blandsfort)	*Queen's County*	52 56	7 17	532	3·48	3·89
Dublin (Fitz William Square)	*Dublin*	53 21	6 14	54	2·39	1·74
Ballinasloe	*Galway*	53 20	8 15	160	3·63	4·81
Clifden (Kylemore House)	,,	53 32	9 52	105	8·99	...
Crossmolina (Enniscoe)	*Mayo*	54 4	9 18	74	5·81	6·70
Collooney (Markree Obsy.)	*Sligo*	54 11	8 27	127	4·19	4·98
Seaforde	*Down*	54 19	5 50	180	3·64	5·70
Londonderry (Creggan Res.)	*Londonderry*	54 59	7 19	320	4·31	3·90
Omagh (Edenfel)	*Tyrone*	54 36	7 18	280	3·77	3·51

METEOROLOGICAL NOTES ON DECEMBER, 1908.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Temp. for Temperature; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; TS for Thunderstorm; R for Rain; H for Hail; S for Snow; F for number of days Frost in Screen; f on Grass.

LONDON, CAMDEN SQUARE.—Dull, sunless and mild weather prevailed until 27th, when S fell with a falling temp. Cold conditions predominated on 28th and 29th, and on the latter day a heavy and almost continuous fall of S occurred, measuring over 3 inches in undrifted places. Duration of sunshine 14·0* hours, and of R 64·6 hours. Mean temp. 40°·5, or 1°·3 above the average. Shade max. 52°·9 on 13th; min. 14°·4 on 30th. The shade max. on 29th was 23°·7, the lowest in December during 51 years. F 5, f 13.

TENTERDEN.—Duration of sunshine 28·5† hours. Shade max. 53°·0 on 13th; min. 14°·0 on 30th. F 6, f 13.

TOTLAND BAY.—Duration of sunshine 57·6* hours. Shade max. 53°·8 on 13th; min. 16°·1 on 30th. F 5, f 8.

PITSFORD.—Mean temp. 37°·1. Shade max. 50°·5 on 21st: min. 6°·2 on 30th. F 10.

TORQUAY.—Duration of sunshine 47·8* hours, or 5·6 hours below the average. Mean temp. 46°·2, or 2°·5 above the average. Shade max. 58°·2 on 19th; min. 27°·8 on 30th. F 2, f 7.

NORTH CADBURY.—Mild till 22nd, followed by a steady fall in temp. till 29th, which was a most wintry day. A sudden rapid thaw occurred on 31st. Shade max. 56°·2 on 13th; min. 12°·5 on 30th. F 5, f 13.

ROSS.—Shade max. 53°·6 on 23rd; min. 17°·6 on 30th. F 7, f 12.

HODSOCK PRIORY.—Shade max. 52°·9 on 20th; min. 6°·5 on 30th; the latter was the lowest temp. recorded since February, 1902. F 14, f 21.

SOUTHPORT.—Mild until 23rd, then severely cold and wintry, with a 12 hours' blizzard on 29th. Duration of sunshine 25·4* hours, or 4·0 hours below the average. Duration of R 66·6 hours. Mean temp. 39°·9, or 0°·6 above the average. Shade max. 51°·3 on 21st; min. 15°·9 on 30th. F 8, f 12.

HULL.—Exceptionally dull, with fogs and often stormy. Duration of sunshine 2·9* hours. Shade max. 50°·0 on 8th and 21st; min. 12°·0 on 30th. F 7, f 15.

CARMARTHEN.—Dark, gloomy, and wet, with heavy T shower on 14th. About 3½ inches of S fell on 26th, and again more on 28th.

HAVERFORDWEST.—Unusually mild to 24th, after which colder weather set in, with a considerable fall of S. Duration of sunshine 43·3* hours. Shade max. 53°·8 on 20th; min. 26°·9 on 30th. F 5, f 7.

LLANDUDNO.—Shade max. 54°·0 on 21st; min. 23°·7 on 29th. F 5.

DOUGLAS.—Wet and mild generally, with a violent E.S.E. gale and heavy S from 27th to 29th.

DUMFRIES.—Duration of sunshine 48·0* hours. Mean temp. 38°·5 Shade max. 52°·0 on 5th; min. 22°·0 on 29th. F 11.

EDINBURGH.—Shade max. 52°·3 on 20th; min. 18°·7 on 29th. F 8, f 19.

DUNDEE.—Shade max. 49°·7 on 8th and 20th; min. 19°·9 on 28th. F 12.

FORT AUGUSTUS.—Shade max. 53°·0 on 22nd; min. 21°·0 on 26th. F 11.

WATERFORD.—Shade max. 55°·0 on 20th; min. 28°·0 on 28th. F 8.

DUBLIN.—Mild, damp and foggy, with almost constant S. to W. winds. A blizzard of S and sleet from S.E. occurred on 28th. Mean temp. 44°·2. Shade max. 56°·7 on 21st; min. 27°·9 on 16th. F 2, f 10.

MARKREE.—Shade max. 54°·4 on 22nd; min. 24°·0 on 27th. F 8, f 22.

WARRENPOINT.—Shade max. 55°·0 on 1st; min. 21°·0 on 27th. F 6, f 9.

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* Campbell-Stokes. † Jordan.

Climatological Table for the British Empire, July, 1908.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Date.	Minimum. Temp.	Date.	Average. Max.	Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Min. on Grass.	Total Rain. Depth.	Days.	Aver. Cloud.
	°		°		°	°	°	0-100	°	°	inches		
London, Camden Square	87·3	3	47·2	20	73·7	54·5	55·5	78	130·2	44·0	3·36	12	6·0
Malta	...	...	...	...	...	...	...	...	...	...	...	...	...
Lagos	87·2	5	72·0	16	83·2	73·8	73·1	81	158·2	67·5	5·70	12	8·5
Cape Town	78·1	24	38·6	30	62·7	47·2	47·8	77	...	...	2·68	10	5·1
Durban, Natal ...	77·9	4	45·0	22	73·3	53·8	...	...	129·2	...	·40	6	2·1
Johannesburg	68·0	30	31·8	21	58·4	41·0	38·3	72	124·8	27·1	·84	3	2·4
Mauritius	76·6	10	53·8	14	74·4	61·7	59·2	75	133·6	46·8	2·55	19	5·2
Calcutta...	91·9	4	76·0	21	88·1	78·9	77·6	87	139·0	75·0	24·64	24	8·5
Bombay...	86·1	3	75·4	1	83·7	77·6	76·4	86	127·7	72·8	21·13	29	9·7
Madras	101·1	3	73·3	11	96·6	79·7	72·7	70	144·6	72·0	1·62	18	7·6
Kodaikanal	65·7	2	49·9	30	61·8	52·2	50·7	85	132·1	40·9	4·89	24	8·3
Colombo, Ceylon ...	88·2	15	73·3	20	86·1	76·8	73·4	77	150·9	73·0	1·41	13	6·9
Hongkong	92·6	16	74·2	28	87·0	78·7	76·2	82	144·7	...	22·27	17	6·5
Melbourne	60·9	19	33·3	28	53·6	41·0	41·5	81	97·5	26·6	1·65	17	5·9
Adelaide	66·3	19	32·0	24	57·5	42·2	43·0	80	122·0	26·0	1·21	15	6·1
Coolgardie	68·9	17	35·4	9	59·8	40·6	36·1	54	143·6	30·6	·52	6	5·1
Perth	73·5	16	38·0	30	63·5	46·3	44·7	70	120·2	32·0	5·68	10	4·1
Sydney	73·0	20	37·8	2	58·2	44·4	42·4	85	106·7	31·0	11·59	22	4·[illegible]
Wellington ...	58·0	23	33·0	4, 12	50·2	40·9	39·4	79	96·0	23·0	6·29	21	7·0
Auckland	60·0	23	37·0	30	54·6	44·9	43·8	79	114·0	33·0	5·63	24	6·6
Jamaica, Kingston ...	92·9	6	69·9	10	90·0	73·2	70·6	75	...	...	·95	7	4·1
Trinidad	...	...	...	...	...	...	...	...	...	...	...	...	..
Grenada	87·4	21	69·8	4	83·4	74·7	72·0	79	145·6	...	7·37	21	4·[illegible]
Toronto	92·2	12	51·7	9	81·6	59·8	...	...	127·1	49·4	2·93	9	3·[illegible]
Fredericton	90·5	7	45·0	17	80·8	56·0	...	69	...	...	2·43	6	4·[illegible]
St. John's, N.B. ...	84·5	6	49·8	16	70·4	56·5	...	...	...	...	2·93	8	5·[illegible]
Victoria, B.C.	83·2	12	44·2	26*	62·7	52·2	...	66	...	...	·15	4	3·[illegible]

* and 29.

Johannesburg.—Bright sunshine, 246 hours.

Mauritius.—Mean temp. of air 0°·1 above, of dew point 0°·2 below, and R ·30 in above averages. Mean hourly velocity of wind 12·4 miles, or 0·4 above average.

KODAIKANAL.—Bright sunshine 75 hours.

COLOMBO.—Mean temp. of air 79°·3 or 1°·3 below, of dew point 0°·1 above, and R 3·13 in. below, averages. Mean hourly velocity of wind, 6 miles.

HONGKONG.—Mean temp. of air 82°·3, bright sunshine 227 hours or 25 hour above, and R 9·50 in. above, averages. Mean hourly velocity of wind 9·1 miles.

Melbourne.—Mean temp. of air 1°·2 below, and R ·20 in. below, averages.

Adelaide.—Mean temp. 1°·7 below, and R 1·36 in. below, averages.

Sydney.—Mean temp. of air 1°·0 below, and R 6·98 in. above, averages.

Wellington.—Mean temp. of air 2°·0 below, and R ·37 in. above, averages.