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RESUMPTION OF THE BEN NEVIS METEOROLOGICAL OBSERVATIONS, 1882.

BY CLEMENT L. WRAGGE, F.R.G.S., F.M.S.

Under the auspices of the Scottish Meteorological Society.

MAY 25th.—Arrived at Fort William from Edinburgh.

May 26th.—Engaged making arrangements for workmen, &c. In evening erected Stevenson's thermometer screen, at Achintore, in the same field as last year, by the Loch beach, and about 28 ft. above the sea.

Subsequently hung the low level barometer, a fine Board of Trade by Adie, London, its greatest error being but 0·003 in., and compared with it the mercurial barometer that is to be used at a new fixed and fully equipped station I had arranged with the Scottish Meteorological Society to establish at the Lake (1840 ft.)

May 27th.—Started off four men and a mason betimes for the Lake. I followed, accompanied by Mr. Livingston of Public Schools, Fort William, and Mr. J. B. Simpson of Edinburgh University. Away nine hours, and engaged with the men building a cairn for the barometer near the water's edge, 1,840 ft. above sea. Had great trouble in getting the stone, collected granite from the quagmire adjacent and the water's side, where it lies and "crops up" in some quantity. Had to battle with pitiless hail squalls and heavy weather in the afternoon; men could not make rapid progress, and cairn not completed, by some 4 ft. However, fixed the box to contain the barometer inside.

May 28th.—Sunday's rest—engaged, however, examining instruments, and fixing those at Achintore, Fort William.

May 29th.—A heavy day's work. Men left Fort William at 7 a.m., returning about 9 p.m. Two men and mason engaged at the Lake, I superintending. The barometer cairn there finished, and the Stevenson's thermometer screen fixed. These are situated by the edge of the tarn, at the N.E. end. Twelve men and joiner engaged on summit of Ben Nevis, I superintending there in afternoon.

Snow covered the entire plateau of the summit to a depth of from 3 to 5 ft. Engaged "digging out" the barometer cairn, which was surrounded by snow 3 ft. 6 in. deep, thermometer cage and hut, and in excavating an area, 18 ft. in diameter, where another thermometer screen was fixed (some ten paces E. from the other). This is to contain a self-recording hygrometer, acting by clockwork, to record the temperature of the air, and that of evaporation at 9 p.m. on the Ben. Messrs. Negretti and Zambra are the makers of this invaluable apparatus, and have most kindly placed it at my disposal, for use on Ben Nevis. The snow walls of this area averaged $3\frac{1}{2}$ ft. high, and presented a most singular appearance. It will be remembered that the barometer was securely built-up last October in its cairn. Great labour was expended to-day, before the north side of the cairn was reopened; the stones were so hard frozen that a crowbar had to be used to remove them. To my delight, I found the instrument in excellent order—nothing the worse for its winter's "rest." Snow had deeply accumulated inside thermometer cage. The reading of the minimum thermometer that has been on the Ben all winter was $11^{\circ}0$, and this occurred since January, when Mr. Livingston, of the Public Schools, Fort William, made an ascent.

May 30th.—Engaged at Achintore Observatory on sundry matters—sowing grass-seed around thermometer box, and placing post for new solar radiation thermometer.

May 31st.—A most important day. Fixed all the instruments for the commencement of my work on the morrow. Up at 5 a.m.; examined the thermometers, to ascertain their index errors; then packed up those for the new "Lake" station and Ben Nevis. Set out at 8 a.m., I carrying barometer for the Lake, accompanied by Mr. Mackenzie, of the Inland Revenue, Fort William, and Mr. J. B. Simpson, Edinburgh University, carrying the thermometers. The Lake Observatory, fully equipped by 3 p.m., and barometer safely hanging in its cairn; then set out for the Ben. By 8.15 p.m. all instruments were fixed in position on the summit of Ben Nevis, including Negretti and Zambra's clockwork hygrometer, and a new tarpaulin was placed over the hut. Arrived at Achintore, Fort William, about 11 p.m.; afterwards re-fixed instruments at the sea level station, and being satisfied that all was correct got to bed about 1 a.m., very tired. Up again by 5 a.m., June 1st, and commenced work, taking observations on the outward and homeward journeys, and five sets of readings on Ben Nevis.

The work this year is much heavier than that of last season, and the following is the plan that has hitherto been, is being, and will be, adhered to till the end of the season:—Outward to Ben Nevis (fixed stations), observations at Achintore, Fort William, are taken at 5 a.m.; on the Peat Moss, about 30 ft. above sea, and two miles N.N.E. from Fort William at 5.30; at "The Boulder," about 840 ft. above sea, 6.15 a.m.; at the new fully-equipped observatory at "The Lake," 1,840 ft., at 7 a.m. (Here are barometer, and dry

and wet bulbs, maximum and minimum thermometers in cairn and Stevenson's screen respectively ; rain gauge ; tubes for earth temperature and ozone tests) ; at Brown's Well, about 2,200 ft., at 7.30 ; at the Red Burn Crossing, about 2,700 ft., at 7.55 to 8 a.m. ; and at Buchan's Well, about 3,575 ft., at 8.30. On the summit of Ben Nevis, 4,406 ft., the observations are taken at 9, 9.30, 10, 10.30, and 11 a.m. ; and consist of atmospheric pressure, by mercurial standard and aneroid barometers, temperature and extremes of ditto, hygrometrical conditions, ozone, rainfall, solar and terrestrial radiation, wind, force, cloud, amount of ditto, movements of the various strata, hydrometeors, &c., and temperature of "Wragge's Well," about 25 ft. from summit ; Negretti & Zambra's clockwork hygrometer, registers at 9 p.m.

From June 15th ozone observations are taken half-hourly, and three more rain gauges will be examined at 9 a.m. at different points, from the centre of the plateau to the precipice, to ascertain if, and to what extent, the rainfall varies with different winds. Dr. Angus Smith, F.R.S., of Manchester, has kindly undertaken to supply apparatus for the measurement of the actinism of the sun's rays and of daylight. Browning's Rainband spectroscope is also used.

Homewards from Ben Nevis, the observations are at Buchan's Well, at 11.30, at the Red Burn Crossing at noon, at Brown's Well at 0.30, at "The Lake" at 1, at "The Boulder" at 1.45, on the Peat Moss at 2.30, and at Fort William at 3 p.m.

At all intermediate stations a "travelling" hygrometer is used (dry and wet bulbs), and the observations consist of pressure by aneroid, temperature of air (of Lake), wells, and burns, moisture, wind, force, cloud and amount, &c.

Simultaneous observations are taken in direct connection with the foregoing at the low-level observatory at Achintore, Fort William, about 28 ft. above sea, and the hours of observation there are 5 a.m., 5.30, 6.15, 7, 7.30, 8, 8.30, 9, 9.30, 10, 10.30, 11, 11.30, and noon, also 0.30 p.m., 1, 1.45, 2.30, 3, and at 6 and 9 p.m., and the elements of observation are precisely the same. Lest reading half-hourly at the low-level station should, by the heat of the observer's person, cause vitiation of readings of the self-registering thermometers, these instruments have been placed at 30 ft. distant from the hygrometer and other thermometer screen, in a new special screen. I am fortunate in having an able assistant, whom I have myself trained, and who relieves me when occasion requires in the ascent of Ben Nevis, and who takes the low-level observations. Mr. J. B. Simpson has also assisted, and my best thanks are due to him. I have also other assistants in training, so that any emergency may be met. The work is very heavy, but well under control, and punctuality and method will carry it through. The weather during the last few days on the Ben has been bitterly cold, and much new snow has fallen. The barometer cairn and thermometer cages on the 15th instant, were entirely frozen up, and

great difficulty was experienced in opening them. A supply of fuel is very necessary, for one's hands get so dead with the cold that writing and handling keys, instruments, &c., are difficult matters—hence the necessity for an observatory house. Temperature has been between 23° and 30° , with biting N.E. winds, and maximum below 32° Fah.

One of the greatest difficulties I have to contend with is the getting the horse (on which I ride to and from the Lake) over the ruts and swamps. The latter are so very treacherous and deep, that the poor animal has a trying time of it. By keeping the work well in hand, I can keep time punctually at the intermediate stations, and so secure the simultaneous, or nearly simultaneous, observations, that I trust will be of the greatest value. The hardest climb is from Buchan's Well to the summit in the half-hour. Earth temperature will be added to the observations on July 1st, and systematic observations of the rainband by Browning's spectroscope will be by then an important feature in the work. CLEMENT L. WRAGGE.

Fort William, N.B., June 16th, 1882.

P.S.—The great value of the intermediate observations is, that they enable disturbances in the varied stratum of atmosphere between Ben Nevis and Fort William to be localised and examined in discussion. We hope largely to increase the value of forecasts.

SUBSEQUENT NOTE.

July 1st, 1882.

Stevenson's screens, somewhat smaller than the usual size, are now fixed at all intermediate stations (from July 1st) between Fort William and Ben Nevis (at the Lake the large "Stevenson" is used), and in these are exposed neat and small "sling" thermometers with small bulbs fitted as "dry" and "wet." The labour of swinging is thus done away with, punctuality ensured, and accuracy also. The entire observing system goes like clockwork.

There are now 4 rain gauges, 15 paces apart on the plateau of the summit of Ben Nevis, read daily 9 a.m.—*viz.*, A in centre of plateau, D on edge of great precipice, and B and C intermediate. There is a gauge at the Lake 1840 ft. (also on Peat Moss at base of mountain) read weekly; and gauge at Achintore, Fort William, read 9 a.m. 9 p.m.

CLEMENT L. WRAGGE.

THE METEOROLOGICAL SOCIETY.

THE closing meeting of this society for the present session was held on the 21st inst. at the Institution of Civil Engineers, Mr. J. K. Laughton, F.R.A.S., president, in the chair.

The following papers were read :

I. "A New Metal Screen for Thermometers," by the Rev. F. W. Stow, M.A., F.M.S. This screen differs from the ordinary Stevenson in the following respects:—(1.) It is somewhat larger; (2) it has a single set of double zinc louveres; (3) it is partially closed at

the bottom to cut off radiation from the ground. The advantages claimed for the use of zinc louveres are—(1) The conductivity of metal causes the heat derived from the sun's rays to be distributed over every part of the louveres ; (2) the louveres being much thinner than those of wood, the circulation of air through the screen is not only much greater absolutely, but much greater also in proportion to the bulk of the louveres ; (3) the zinc louveres, therefore, are much more sensitive to changes of temperature than wooden ones. Comparative readings of thermometers in this screen, along with those in an ordinary Stevenson screen, were made during the summer of 1881. From these the author is of opinion that the Stevenson becomes unduly heated when the sun shines, but this may be as much due to its small size as to the material of which the louveres are made. The thermometers in it are only 3 to 5 inches from the louveres at the back of the screen, against 7 to 8 inches in the zinc screen. The roof, too, is single, and the box is open at the bottom. The author also says that there is no need to condemn all wooden screens ; but there does seem to be some reason to think that screens with metal louveres might be better.

In the discussion it was pointed out that the differences were not very large, but that it was important that no change should be made in the pattern or materials of Stevenson's screens until after mature consideration, as strict uniformity was more necessary even than a theoretically perfect stand.

II. "On the effect of different kinds of Thermometer Cribs, and of different exposures in estimating the diurnal range of temperature at the Royal Observatory, Cape of Good Hope." By David Gill, LL.D., F.R.A.S. Meteorological observations were commenced at the Cape Observatory in 1841, when the thermometers were placed in a well-ventilated crib, before a south window, through which they could be read. The buildings were unfortunately burnt in 1852. A small wooden house, with double roof, and affording a free passage of air, was then erected on the site of the old Meteorological Observatory. The instruments were placed in the middle of this building, and observations were recommenced on the same plan as before, and continued until the end of August, 1858. On September 1st the thermometers were transferred to a crib erected in front of the south-west window of the transit circle room. This crib is well ventilated, except on the side next the transit room window, but the great mass of solid masonry in the immediate neighbourhood of the thermometers appears seriously to affect the range of temperature. For many years a Glaisher stand has been in use, and at the end of 1880 the author caused a Stevenson screen to be erected in its immediate neighbourhood. In this paper the author gives results of observations made in the window, Stevenson and Glaisher screens, during the year 1881 ; from which it is evident that the exposure of the thermometers in the window crib gives a distinctly smaller, and

on the Glaisher stand a larger, daily range of temperature than in the Stevenson screen.

III. "Some account of a Cyclone in the Mozambique Channel, January 14th–19th, 1880."—By C. S. Hudson.

IV. "Rainfall of Frere Town, Mombassa, East Coast of Africa, 1875–1881." By R. H. Twigg, M.Inst.C.E., F.M.S.

THE GALE OF APRIL 29TH AND SEA-SPRAY IN LONDON.

To the Editor of the Meteorological Magazine.

SIR,—The gale you mention (*Met. Mag.*, Vol. XVII., p. 65), in which salt was found on the windows at Leeds was, I have no doubt, that of January 6th (Epiphany Sunday night), 1839.

My house near Bowness, Windermere, was stripped of every slate, on the weather side, and very extensive damage was done. No doubt you have some record of it.—Yours faithfully,

T. SABINE PASLEY.

Moorhill, Shedfield, Botley, Hants, June 16, 1882.

REVIEWS.

Results of Meteorological Observations made in New South Wales during 1875, under the direction of H. C. RUSSELL, B.A., F.R.A.S., Government Astronomer of New South Wales. Sydney: Thomas Richards, Government Printer, 8vo, 1880.

THIS is the general summary, not merely of the results from the observatory, but also from all the stations (about 50) in the colony.

The relation of the temperature and rainfall of 1875 to the average is summed up in the following paragraph:—

"The general average temperature for all stations is only $0^{\circ}4$ higher than it was in 1874, and is again, as it was in 1874, 3° below the temperature of Sydney. The general average rainfall for 1875 is less by $4\frac{1}{2}$ in. than that of 1874; but if the stations are divided by the Blue Mountains into two sets, Eastern or coast stations, and Western or inland stations, it appears that the coast stations had 3 in. less rain than they had in 1874, and the inland stations $5\frac{1}{2}$ in. less."

Underground temperature observations are somewhat rare in Australia, and as this report contains a long series, we epitomize the results:—

There are five thermometers, the bulbs being respectively, 1 in., $2\frac{1}{2}$ ft., 5 ft., 10 ft. and 19 ft. below the ground. Each thermometer is enclosed in a wooden tube 3 in. square, and so protected they were all placed vertically in a well 4 ft. in diameter, which had been dug 20 ft. deep through the following strata:—

- 5 ft. red clay, with a few stones.
- 7 ft. bands of red clay and iron sandstone.
- 8 ft. solid sandstone.

Mean Monthly Temperature of the Earth at Sydney, New South Wales

	Shade Temp.	AT DEPTH OF				
		1 in.	2½ ft.	5 ft.	10 ft.	19 ft.
January	72·7	73·8	72·7	69·7	66·7	63·6
February	69·7	69·8	70·6	69·5	67·2	64·5
March	69·6	69·6	70·1	69·1	67·3	65·1
April	65·0	65·5	67·5	67·8	66·6	65·2
May	57·0	57·1	61·1	63·5	64·3	64·6
June	55·6	54·5	57·6	59·8	61·4	63·6
July	52·5	51·3	54·7	57·3	59·0	62·2
August	57·3	54·8	56·4	57·2	58·3	61·0
September	57·4	56·7	58·7	58·7	58·8	60·7
October	64·5	63·7	63·4	61·7	60·6	61·1
November	68·1	67·0	66·8	64·6	62·7	61·7
December	70·7	70·1	70·1	67·5	65·0	62·9
1875... ..	63·4	62·8	64·1	63·9	63·2	63·0
1874... ..	63·0	62·7	63·7	63·3	62·7	62·7
1873... ..	63·0	62·8	63·9	63·7	63·0	63·0
1872... ..	62·6	62·5	64·1	64·0	63·4	63·2
1871... ..	62·4	62·7	63·9	63·4	62·8	62·8
1870... ..	62·8	63·0	64·2	63·9	63·3	63·2
Mean	62·9	62·8	64·0	63·7	63·1	63·0

Max. figures printed thus, 72·7; Min. figures thus, 52·5.

It is curious, if true, that the mean annual temperature should be about 1° higher at depths of 2½ ft. and 5 ft. than it is either at greater or less depths.

It will be seen that the retardation of the epoch of extreme temperatures is much the same as in this country, the max. falling two months late at 10 ft. and three months late at 19 ft. Similarly, the min., which, of course, occurs in the air in July, is one month late at 5 ft. and 10 ft., and two months late at 19 ft.

So, again, with respect to the extreme range between the absolute max. and absolute min., at each depth they are much the same as in England :—

	Shade.	1 in.	2½ ft.	5 ft.	10 ft.	19 ft.	
Extreme range	58°·6	29°·7	20°·7	14°·2	10°·8	5°·0	Sydney, 1875.
in year	73°·5	34°·0	25°·0	17°·5	12°·0	5°·5	Greenwich, 1874
Ratios	100	52	35	24	18	9	Sydney.
	100	47	34	24	16	8	Greenwich.

Which, being interpreted, shows that of the total range, scarcely half penetrates 1 in. deep, only a quarter penetrates 5 ft. deep and at 19 ft. the entire range between winter and summer is only about 5°, or less than one tenth of the range in the air in perfect shade.

Bulletin mensuel de l'Observatoire Météorologique de l'Université d'Upsal.
Vol. xiii. 1881. Par Dr. H. HILDEBRAND-HILDEBRANDSSON.
4-to. Upsal : E. Berling, Imprimeur de l'Université.

IN noticing this volume, we have the pleasure of congratulating Dr. Hildebrandsson on recovery from long illness, and upon the resumption of directorial functions at the Observatory.

We think that it would be well to devote two or three pages in each part to a brief description of the instruments used, and of their position. At present there is not a single word upon the subject. Hourly values of pressure, temperature, humidity, and wind are given, and copious notes of clouds and occasional phenomena. At the end there are two pages of summaries of the results, from which we select a few.

Mean barometric pressure at 32°, 29·782 in.*

„ temperature 37°·6.

„ humidity, 82.

„ amount of cloud, 6·4.

Total depth of rain, 16·79 in.

This portion of the work requires development, *e.g.*, the extremes of temperature, pressure, &c., should be stated, and it would be very desirable to give also the differences between the values for the year in question, and the averages for previous years.

Now that Dr. Hildebrandsson has resumed control, we hope to see these needs supplied.

Meteorologiska Iakttagelser I Sverige, utgifna af Kongl. Svenska Vetenskaps Akademien, Nittonde Bandet, 1877. 4to, Stockholm, Kongl. Boktryckeriet, P. A. Norstedt & Söner, 1881.

OUR readers will remember that while the observations made at the Observatory at Upsala are carried on and published at the cost of the University, the records from all other parts of Sweden, and an abstract of the Upsala values, are collected, discussed, and published at Stockholm, at the Swedish Central Meteorological Institute, which is under the control of Dr. Rubenson.

The volume before us complies very nearly, if not absolutely, with the conditions laid down by the International Congresses, and is by that statement sufficiently described—except as regards extent. The records from 18 second order stations are printed *in extenso*, and abstracts are given from the whole system, viz., 34 stations.

The hours of observation are 8 a.m., 2 p.m., and 9 p.m. The chief instrumental deficiency appears to be that of self-registering maximum and minimum thermometers.

We have compiled the following abstract, converting the observations into Fahrenheit degrees and English measures, believing that,

* There is nothing to show whether this is at sea-level, or, if not, at what altitude the barometer is.

though referring to only one year, they will be of general interest. The stations follow in geographical order from S. to N., the last, Jockmock, being within the Arctic circle.

Abstract of Returns from Sweden, 1877.

	Lat. N.	Lon. E.	Alt.	TEMPERATURE.			Mean Hu- midity.	Mean Cloud.	Total Rain.
				Max.	Min.	Mean.			
	° ' "	° ' "	ft.	°	°	°		0—10.	in.
Wexjö	56 53	14 48	551	83·8	— 4·9	41·0	77	7·0	25·14
Westervik ...	57 46	16 38	43	87·8	— 8·5	41·4	—	6·8	22·11
Jönköping ...	57 47	12 11	321	86·9	— 9·4	41·0	80	7·1	20·23
Skara	58 23	13 27	371	86·7	—16·6	40·5	87	6·0	21·66
Askersund ...	58 53	14 54	315	81·5	—12·1	39·2	84	6·3	33·35
Örebro	59 16	15 13	101	—	—24·7	39·2	81	6·4	26·58
Stockholm ...	59 20	18 4	145	85·8	— 9·9	40·3	80	6·6	19·63
Nora	59 31	15 3	—	85·3	—27·4	38·5	79	6·7	30·20
Westerås	59 37	16 32	59	88·7	—14·8	39·7	80	7·6	21·42
Upsala	59 52	17 38	79	84·4	—15·0	38·6	83	6·7	24·45
Falun	60 36	15 37	380	86·0	—25·6	37·4	80	6·5	25·07
Gefle	60 40	17 9	43	89·6	—13·0	38·2	79	6·0	21·95
Östersund.....	63 11	14 42	1082	82·4	—19·8	32·8	—	6·1	18·93
Haparanda ...	65 51	24 11	30	80·6	—27·4	31·3	84	6·1	21·97
Jockmock.....	66 36	19 50	926	—	—	27·9	—	4·5	11·91

We are sorry not to find in this volume any references to the relation of these values to those for previous years, and we also consider, that although the latitudes and longitudes of the stations are given, yet the addition of a map would be an improvement.

This reminds us of the desirability of mentioning that in the corresponding volume for 1875, a most interesting map was given by Dr. Rubenson in illustration of the exceptional cold on the morning of January 24th, 1875. The temperature at upwards of a dozen stations fell to or below—40°C, which oddly enough is identical with—40°F; and at two stations near Lake Siljan it went down to —45°C, or—49°F. And this excessive temperature was not in the extreme north of the country, but over a tract about 200 miles long by 100 miles wide, near the centre of the country. The observer at Östersund reports “Qvicksilfret gätt ned under skalan” (mercury gone down under the scale) and well it might, for few would prepare for such temperatures in the latitude of the Faroe Isles.

Weather Report for the Month of April, 1882; (From the Jamaica Gazette). Published by Authority. Government Printing Establishment, Kingston. Folio, 1882.

In his paper on “The Climate of the various British Colonies,” the following was Mr. Symons’s epitome of the meteorological data which he was able to collect respecting Jamaica :—

"No regular observations have been established in the colony (except those made by the Army Medical Department) and no papers upon the subject have been published. About 20 rain gauges have been in more or less regular use for three years, and indicate a rainfall, varying from about 37 in. at Kingston, to upwards of 100 in. at the Cinchona plantations in the parish of St. Andrew."

Shortly afterwards, a paper was contributed to the Meteorological Society by Mr. Cox,* in which he summarised the fragmentary rainfall records 1870-76 and therein showed that while the above figures were very nearly correct, the rainfall was greatest at Bath in the parish of St. Thomas, nearly at the eastern extremity of the Island.

We call attention to the monthly report described at the head of this note because it shows the marked advance which has taken place in the attention devoted to the subject since it has passed under the control of Mr. Maxwell Hall.

In the first place, we have a summary of a complete series of Meteorological Observations taken at Kingston, which perhaps we may as well reprint as describe.

METEOROLOGICAL RESULTS FOR APRIL, 1882. KINGSTON.

Mean Pressure	...	...	30.020 in.
„ Temperature	...	...	77°.9
„ Maximum Temp.	...	...	84°.7
„ Minimum Temp.	...	...	70°.1
„ Minimum Temp. on Grass	...	...	64°.5
„ Range of Temp.	...	...	14°.6
„ Direction of the Wind	...	...	S.E. by S.
„ Velocity of the Wind	4.5 Miles per Hour	...	
„ Temp. of the Dew-point	...	...	69°.4
„ Humidity	...	...	76
„ Amount of Cloud	...	...	2.6
Total Rainfall in inches	...	...	0.15

Average Weather :—Fair, with strong sea breezes.

The highest temperature was 89°·6 recorded on the 18th ; the lowest was 66°·8 recorded on the 24th ; the extreme range was, therefore, 22°·8. The lowest temperature on the grass was 60°·2, recorded on the 24th.

This is followed by returns of total rainfall at 168 stations—then is given the mean fall at those stations for which it has been possible to obtain averages, so as to show the relation of the fall to the average for separate districts and for the whole island. Some general remarks follow, and also a comparison of identical elements observed at Kingston (50 ft.) and the Cinchona Plantation, 5,100 ft. above sea level. Temperature observations are also given for several localities ; we add three sets of values :—

Station	Kingston.	Cinchona Plantation.	New Haven Gap.	Worthy Park.	King's House.
Altitude	50	5100	...	...	...
Mean Max.	84.7	67.1	69.6	81.0	91.0
„ Min.	70.1	57.3	50.8	60.0	65.7
„ Daily Range ...	14.6	9.8	18.8	21.0	25.3

It would be unfair to the Island to omit the last two lines of Mr. Maxwell Hall's report:—"Kingston was very healthy during April, the death-rate being only 17·7 per thousand."

Observations upon the Temperature, Pressure, and Rainfall of the past Winter. Privately printed.

IN this paper, which like many previous ones has been printed by Mr. C. L. Prince, F.R.A.S., for private distribution, he gives the details for 1882 and some previous years as recorded at the Observatory, Crowborough, Sussex, and also the values (corrected for elevation), from his long series of observations at Uckfield. The first paragraph is in many respects so truthful that we reprint it verbatim.

"There appears to be a general impression that the temperature of the past winter has been many degrees above the average. It may therefore be interesting to know, from the statistics of temperature, that such has not been the fact. The following table will show that there have been nine instances of warmer winter temperature within the last forty years. It is remarkable how soon our recollection, as regards date, of any particular weather passes away; otherwise, the majority of persons would not have forgotten the warm winters of 1868-69 and 1876-77, both of which far exceeded the past winter in warmth. It is also remarkable that of the ten instances, which I quote, the winter of 1881-82 has been the coldest. In order to render my observations at Crowborough comparable with those previously taken at Uckfield, I have applied an approximate correction for the difference of elevation above sea-level."

THE COMING SUMMER.

To the Editor of the Meteorological Magazine.

SIR,—In the March number of your magazine there appeared a letter from Mr. Brumham, in which he predicted that "a very high maximum temperature for so early in the season" would occur about the end of May, or in the first ten days in June, unless "the very abnormal conditions" then prevailing should interfere with the rule. It is to be regretted that Mr. Brumham did not say what were "the very abnormal conditions" to which he referred. But if a prediction of this kind is worth publishing, it should be worth verifying, and I simply write to point out that no such high maximum temperature as that predicted has occurred. According to the official weekly weather reports, the absolute maximum for the last week of May was 73°, and for the first ten days of June only 71° even in the south of England—a quite exceptionally low maximum for the time of year. In the same letter, Mr. Brumham predicts "a warm summer and a good harvest," the prediction in this particular instance not being qualified by any saving clause. I am not going to follow Mr. Brumham's example by prophesying when I do not know; but as regards the first month of this summer, the prediction has certainly not been fulfilled, as the temperature in June was everywhere below the average, and rainfall nearly everywhere in excess. The total here reached the high figure of 6·27 inches. G. T. RYVES.

Team Vicarage, Stoke-on-Trent, July 3rd, 1882.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, FEB., 1882.

STATIONS. (Those in italics are South of the Equator.)	Absolute.				Average.				Absolute.		Total Rain.		Aver.
	Maximum.		Minimum.		Max.	Min.	Dew Point.	Humidity.	Max. in Sun.	Min. on Grass.	Depth.	Days.	Cloud.
	Temp.	Date.	Temp.	Date.									
	°		°		°	°	°	0-100	°	°	inches		
England, London	56·2	26	24·6	2	48·2	36·3	37·8	84	95·4	19·4	1·30	8	7·7
<i>Cape of Good Hope</i> ...	...	...	...	...	...	...	...	...	...	...	...	...	...
<i>Mauritius</i>	84·6	11	70·0	19	82·3	74·4	70·0	77	...	...	8·28	23	6·6
Calcutta.....	88·5	1	51·6	6,9	81·7	58·9	59·2	69	147·6	40·9	3·42	5	1·8
Bombay.....	94·3	25	63·2	18	83·6	68·5	63·9	66	150·4	52·3	·04	1	·4
Ceylon	90·6	21	69·3	21	87·5	73·4	70·8	72	157·0	62·0	3·58	9	5·9
<i>Melbourne</i>	105·1	26	46·1	24	79·3	55·2	50·9	60	158·0	38·0	·29	2	4·3
<i>Adelaide</i>	103·5	21	50·0	1,28	89·1	61·3	51·1	43	158·5	40·8	·00	0	1·3
<i>Wellington</i>	72·5	16	47·0	23	67·5	54·1	...	...	142·0	42·0	1·60	5	...
<i>Auckland</i>	78·0	8	51·0	9	72·8	57·7	55·5	71	131·5	45·4	1·90	11	6·6
<i>Falkland Isles</i>	62·7	13	36·4	28	56·0	44·3	45·5	82	127·0	30·0	2·38	12	8·5
Jamaica	88·6	17	61·5	6	84·0	66·6	66·0	78	...	57·1	·28	5	2·5
Barbados .....	...	...	...	...	...	...	...	...	...	...	...	...	...
Toronto	50·3	13,15	9·6	18	37·4	23·1	25·3	78	117·0	6·5	1·72	14	6·7
New Brunswick, S. John	41·0	14	—6·0	4	27·5	12·2	20·0	90	...	...	7·47	13	5·5
Cape Breton, Sydney...	44·4	14	—6·1	5	27·4	8·0	18·2	89	...	...	5·22	13	5·6
Newfoundlnd, S. John's	43·0	14	—3·0	2	25·5	14·8	20·0	...	105·0	—0·0	6·50	15	7·3
Manitoba, Winnipeg ..	40·7	28	—31·5	17	19·2	4·8	11·0	93	...	...	1·79	11	4·9

REMARKS, FEBRUARY, 1882.

Mauritius.—Rainfall, 1·29 in. above the average; pressure slightly below it. Mean hourly velocity of wind, 12·4 miles; extremes, 27·7 miles and 1·9 miles; prevailing direction, E.S.E. to E. by N. T and L on seven days.

C. MELDRUM, F.R.S.

CEYLON.—TSS occurred on six days, and L was seen on five other days.

J. STODDART.

Melbourne.—Mean pressure, temp., and humidity all about the average; mean temp. of dew point, amount of cloud, and total rainfall below it. Prevailing winds, S. and S.W.; strong breezes occurring on six days.

R. L. J. ELLERY, F.R.S.

Adelaide.—Mean temp. (75°·2) 1° above the average; the max. reaching 90° on 15 days, five days more than the average. No R fell in this colony up to lat. 30° or along the route of the overland telegraph, S. of lat. 19°, except one slight T shower at the S. end of the Flinders range and one at Charlotte Waters; but about 600 miles E. of the latter place, viz.:—Gooyea, in Queensland, 6·72 in. fell on 11 days. In the tropics the fall was below the average.

C. TODD.

Wellington.—Generally fine pleasant weather throughout the month. Mean pressure, average; temp. 2° below average; rainfall less than half the average. Prevailing wind, N.W.; stormy at times. T on 21st, and L on 11th; earthquakes on 1st, 20th and 21st.

R. B. GORE.

Auckland.—Weather mostly fine; temp. below the average. Mean pressure, 29·837 in. (rather low). Wind mostly W. and S.W. Rainfall small till the last day, then heavy with light N.E. wind; very close and sultry.

E. B. DICKSON.

NEWFOUNDLAND.—The month throughout was very severe. Several wrecks occurred along the coast, attended by loss of life. Depth of 8 64 in. Coast and harbour blocked up with ice during the last 14 days.

J. DELANEY.

SUPPLEMENTARY TABLE OF RAINFALL, JUNE, 1882.

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

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	2.46	XI.	Castle Malgwyn	3.70
"	Margate, Birchington...	2.03	"	Rhayader, Nantgwillt..	5.99
"	Littlehampton	1.97	"	Carno, Tybrite ..	5.99
"	St. Leonards	2.15	"	Corwen, Rhug	3.99
"	Hailsham	2.08	"	Port Madoc	7.04
"	I. of W., St. Lawrence.	2.28	"	I. of Man, Douglas	3.55
"	Alton, Ashdell.....	3.31	XII.	Carsphairn ..	4.31
III.	Great Missenden	3.44	"	Melrose, Abbey Gate...	4.92
"	Winslow, Addington ...	3.12	XIII.	N. Esk Res. [Penicuik]	4.45
"	Oxford, Magdalen Col...	3.08	XIV.	Ayr, Cassillis House ...	4.09
"	Northampton	2.72	"	Glasgow, Queen's Park.	3.32
"	Cambridge, Beech Ho...	1.72	XV.	Islay, Gruinart School..	3.94
IV.	Southend	1.94	XVI.	Cupar, Kemback.....	2.47
"	Harlow, Sheering ...	2.50	"	Aberfeldy H.R.S.	3.01
"	Diss	2.85	"	Dalnaspidal	6.11
"	Swaffham	4.98	XVII.	Tomintoul.....	...
"	Hindringham	3.38	"	Keith H.R.S.	3.98
V.	Salisbury, Alderbury ...	3.74	XVIII.	Forres H.R.S.	2.25
"	Calne, Compton Bassett	4.03	"	Strome Ferry H.R.S....	4.48
"	Beaminster Vicarage ...	4.34	"	Lochbroom	3.93
"	Ashburton, Holne Vic...	5.46	"	Tain, Springfield.....	3.39
"	Torrington, Langtree W.	4.66	"	Loch Shiel, Glenaladale	6.98
"	Lynmouth, Glenthorne.	2.93	XIX.	Lairg H.R.S. ....	...
"	St. Austell, Cosgarne...	...	"	Forsinard H.R.S.	4.91
"	Taunton, Fullands	3.38	"	Watten H.R.S.	4.71
VI.	Bristol, Clifton	3.37	XX.	Fermoy, Glenville	3.46
"	Ross	2.51	"	Tralee, Castlemorris ...	2.88
"	Wem, Sansaw Hall.....	3.38	"	Cahir, Tubrid	2.53
"	Cheadle, The Heath Ho.	5.87	"	Newcastle West	2.90
"	Worcester, Diglis Lock	2.71	"	Kilrush	4.19
"	Coventry, Coundon	4.03	"	Corofin	5.42
VII.	Melton, Coston	3.68	XXI.	Kilkenny, Butler House	...
"	Ketton Hall [Stamford]	3.15	"	Carlow, Browne's Hill..	3.00
"	Horncastle, Bucknall ...	3.72	"	Navan, Balrath	2.82
VIII.	Macclesfield, The Park.	7.24	"	Athlone, Twyford	3.20
"	Walton-on-the-Hill.....	4.30	XXII.	Mullingar, Belvedere ...	3.28
"	Broughton-in-Furness...	6.36	"	Ballinasloe	2.81
IX.	Wakefield, Stanley Vic.	4.58	"	Clifden, Kylemore	5.44
"	Ripon, Mickley	3.45	"	Crossmolina, Enniscoe..	4.31
"	Scarborough	3.36	XXIII.	Carrick-on-Shannon ...	4.34
"	East Layton [Darlington]	...	"	Dowra	5.36
"	Middleton, Mickleton ..	4.56	"	Rockcorry.....	4.70
X.	Haltwhistle, Unthank..	6.71	"	Warrenpoint	4.02
"	Shap, Copy Hill	4.25	"	Newtownards	3.14
XI.	Llanfrechfa Grange	5.32	"	Belfast, New Barnsley .	4.83
"	Llandovery	5.02	"	Bushmills	3.80
"	Solva	2.94	"	Buncrana .....	...

JUNE, 1882.

Div	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which ·01 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Differ- ence from average 1870-9	Greatest Fall in 24 hours.		Deg.	Date.		Deg.	Date.				
				Dpth	Date.									
											Inches	Inches.	in.	
I.	London (Camden Square) ...	2·30	—	·37	·41	9	18	74·3	27 ^a	41·5	13	0	0	
II.	Maidstone (Hunton Court)...	2·50	+	·43	·72	24	20	...	...	...	...	...	...
III.	Strathfield Turgiss	1·99	—	·11	·44	8	15	73·2	27	36·6	17	0	2	
IV.	Hitchin	2·93	+	·80	·66	26	18	70·0	29	40·0	12	0	...	
V.	Banbury	5·42	+	2·98	2·04	22	22	72·5	29	37·0	17	0	...	
VI.	Bury St. Edmunds (Culford)	2·71	+	·44	·52	24	20	75·0	29	39·0	12	0	...	
VII.	Norwich (Cossey)	2·87	+	·65	·58	9	14	72·0	24 ^a	41·0	1	0	0	
VIII.	Bridport	3·94	...	...	·85	5	16	...	...	...	...	...	...
IX.	Barnstaple	3·23	+	·51	·72	5	23	73·5	30	47·0	13	0	...	
X.	Bodmin	5·24	+	2·03	1·07	5	22	69·0	30	42·0	17	0	0	
XI.	Cirencester	3·80	+	1·31	·57	5	18	...	...	...	...	...	...
XII.	Churchstretton (Woolstaston)	4·13	+	1·26	·78	4	20	73·5	30	40·5	13	0	...	
XIII.	Tenbury (Orleton)	4·77	+	2·03	1·08	4	19	76·0	30	37·2	13	0	0	
XIV.	Leicester	4·11	...	...	1·09	22	21	73·2	30	41·0	13	0	0
XV.	Boston	3·01	+	·76	·40	22	19	75·0	25	42·0	13	0	...	
XVI.	Grimsby	3·39	+	1·02	·48	5	22	...	...	...	...	...	...
XVII.	Mansfield .....	...	...	...	...	...	...	...	...	...	...	...	...
XVIII.	Manchester (Ardwick)	6·75	+	3·59	1·08	4	21	69·0	25 ^b	42·0	13	0	...	
XIX.	Wetherby (Ribstone Hall) ...	4·36	+	1·49	1·47	24	11	...	...	...	...	...	...
XX.	Skipton (Arncliffe)	6·64	+	2·82	1·01	4	21	75·0	30	35·0	16	0	...	
XXI.	North Shields	3·88	+	1·85	·90	3	16	71·0	4	36·5	13	0	0	
XXII.	Borrowdale (Seathwaite)	13·66	+	5·85	2·40	17	21	...	...	...	...	...	...
XXIII.	Cardiff (Ely)	4·02	+	·96	·82	5	20	...	...	...	...	...	...
XXIV.	Haverfordwest	5·80	+	2·77	1·00	17	16	73·2	30	37·5	16	0	1	
XXV.	Plinlimmon (Cwmsymlog) ...	6·05	...	...	1·20	4	23	...	...	...	...	...	...
XXVI.	Llandudno	2·98	+	·98	·72	13	20	68·5	28	43·2	10 ^e	0	...	
XXVII.	Cargen [Dumfries]	3·46	+	·29	·64	18	18	74·6	30	39·0	12	0	...	
XXVIII.	Hawick	4·96	+	2·45	·84	21	16	...	...	...	...	...	...
XXIX.	Douglas Castle (Newmains) ...	3·92	+	·91	1·08	29	19	...	...	...	...	...	...
XXX.	Lochgilthead (Kilmory)	4·21	+	·37	·74	8	17	...	...	34·0	16	0	...
XXXI.	Appin (Airds)	4·47	...	...	...	...	...	...	...	...	...	...	...
XXXII.	Mull (Quinish)	4·82	...	...	·91	17	17	...	...	...	...	...	...
XXXIII.	Loch Leven Sluices	2·10	+	·33	·50	18	15	...	...	...	...	...	...
XXXIV.	Arbroath	3·24	+	·63	·57	3	12	67·0	27 ^c	39·0	12 ^f	0	...	
XXXV.	Braemar	4·61	+	1·52	·75	14	25	71·2	30	34·4	17	0	7	
XXXVI.	Aberdeen	3·41	...	...	·85	22	20	68·0	26	37·0	13	0	0
XXXVII.	Skye (Sligachan)	6·50	...	...	1·05	6	17	...	...	...	...	...	...
XXXVIII.	Culloden	2·15	—	·10	·50	5	13	70·0	2	37·3	11	0	2	
XXXIX.	Dunrobin	3·61	...	...	·46	22	21	67·0	2	37·8	11	0	0
XL.	Orkney (Sandwick)	3·43	+	1·63	·42	3	22	62·6	2	40·1	14	0	1	
XLI.	Cork (Blackrock)	3·67	+	·12	·58	2	20	85·0	30	37·0	12	0	...	
XLII.	Dromore Castle	4·92	...	...	·80	20	23	70·0	29	41·0	12 ^g	0	...
XLIII.	Waterford (Brook Lodge) ...	3·11	...	...	·48	17 ^h	19	75·0	30	37·0	15	0	...
XLIV.	Killaloe	4·50	...	...	·64	4	24	82·0	30	37·0	13	0	...
XLV.	Portarlinton	2·68	+	·25	·31	17	24	75·0	29	37·0	15	0	...	
XLVI.	Dublin (Monkstown) .....	...	...	...	...	...	...	...	...	...	...	...	...
XLVII.	Galway (Queen's College) ...	...	...	...	...	...	...	...	...	...	...	...	...
XLVIII.	Waringstown	3·60	+	·94	·57	28	18	79·0	27 ^d	39·0	11	0	0	
XLIX.	Londonderry .....	...	...	...	...	...	...	...	...	...	...	...	...
L.	Omagh (Fdenfel)	4·78	+	1·73	·90	8	24	73·0	30	36·0	15	0	...	

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

And 29.

b And 27.

c And 28.

d And 30.

e And 11.

f And 13.

g And 18, 21.

h And 24.

METEOROLOGICAL NOTES ON JUNE.

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

ENGLAND.

STRATHFIELD TURGISS.—The hay crop promised to be heavy, and cutting became general about the 18th, but the variable weather has caused much anxiety. H on 12th, larkspur and guelder rose in flower on 9th, privet in blossom on 23rd.

HITCHEN.—The coldest June since observations were commenced here.

BANBURY.—High wind on 3 days; T and L on 10th, 12th, and 26th.

CULFORD.—A very unsettled month, frequent T and heavy showers; heavy H storm on 14th; last few days of the month very fine and warm.

COSSEY.—A cold month, temp. rose to 70° on 8 days only; wheat not fully in ear before the 21st.

BODMIN.—A very wet ungenial month; mean temp. 58°·3.

CIRENCESTER.—Large crops of hay, but bad weather for making it until the end of the month, the number of wet days being large.

ORLETON.—The weather till the 25th was generally very cold and cloudy, with much R and little sunshine; on the 4th a sudden storm of L, T and R occurred at 1 p.m., followed by frequent heavy showers of R till the 6th, and after that date by very cold rough winds and showers for two weeks. On the 24th another sudden storm of L, T and heavy R occurred at noon, and was succeeded by warmer weather, and after another TS on the 26th, the last four days were very fine. The mean temp. was 2½° below the average of 20 years, and was lower only in 1862, 71, and 79; wheat generally in blossom about the 27th.

LEICESTER.—Rain fell daily from 3rd to 15th, and during that time the nights were cold, with occasional signs of frost; the second half of the month was milder, and towards the end sometimes very hot. Hay crops good, but dry weather much needed at the close of the month.

BOSTON.—Mean temp. 2°·5 below the average, which, coupled with the wet weather, retarded the crops very much; strawberries ripe on 9th; wheat generally in ear on 20th; hay cutting commenced about the 26th; crop heavy and good.

KILLINGHOLME.—The month with the exception of the last few days was very wet and unsettled; splendid crops of grass and clover; apples and pears a failure.

MANCHESTER.—The month was a very unsatisfactory one, comparatively cold and very wet; there were but a few seasonable days; the rainfall was heavy and all but continuous, except during the last few days of the month, which were warm and bright; hay crop heavy, but fine weather much wanted to secure it.

NORTH SHIELDS.—Thunderstorms on 4th, 7th, and 23rd, and T on 3rd and 24th.

SEATHWAITE.—Wet and cold, with occasional T; S on mountains on 11th, heavy H on 14th; six falls of R exceeding 1 in. in 24 hours.

WALES.

HAVERFORDWEST.—The month was as a whole cold, unsettled, and wet, very trying for the hay harvest; the temp. only once reached anything like summer heat, and on the 16th the grass min. registered 31°, the nights about that date being very cold; followed up to the 27th by very broken weather, with heavy falls of R at night; great electrical disturbance with enormous H during night of 23rd, and L and T on 26th.

LLANDUDNO.—June was very unsettled as to temp. : it began and ended fine, but from the 8th to the 19th an unusually cold wave passed over the British Isles, which I attribute in part to the enormous quantity of ice which was seen about this time floating in mid-Atlantic. The mean temp. of the month was about 2° below the average ; the amount of bright sunshine was low (except in the last 9 days), and the mean degree of humidity was considerably in excess ; altogether the month was cold, wet, and ungenial.

SCOTLAND.

CARGEN.—Mean temp. 1° below the average ; partial TSS frequent ; last four days of the month close and sultry.

HAWICK.—A very warm and genial month, with heavy T showers on 18th, 19th, 24th, and 26th ; scarcely a wasp to be seen.

QUINISH.—From the 3rd to the 22nd the weather was very cold and ungenial, but from the 22nd to the end of the month was warm and beautiful.

ABERDEEN.—On the whole the month was unsettled and rainy, but towards the end it was very fine with bright sunshine ; T, L and H on 6th ; fresh gale from 10th to 12th.

SLIGACHAN.—The first half of the month was cold and unseasonable, the latter half very fine and warm, particularly towards the end, the temp. in shade rising to 87° on the 25th ; severe TS on the 24th. All crops looking well, and stock in good condition. S on hill tops on 12th.

CULLODEN.—The weather during the month was very favourable for growing crops, which are well advanced, and promise abundance ; distant T on several days.

SANDWICK.—June was a wet month the rainfall being greatly in excess of the average. H on 11th, sleet on 12th, fog daily from 26th to 29th.

IRELAND.

DROMORE.—Cold rains in the early part of the month checked vegetation, but the latter part, especially the last week, was warm and genial, hay crop heavy, but green crops greatly injured by slugs. Potato blight appeared in several places on the coast early in the month, but the spots affected were very limited in extent, and the disease did not spread, so that the crop on the whole is promising.

WATERFORD.—Strong wind on 5th, 8th, 13th, 14th, and 25th ; H on 18th, 24th, and 25th ; L on 18th ; potato blight appeared on 19th ; hay making only commenced with the last few days of the month, which were fine and bright.

KILLALOE.—Cold unseasonable weather until the 25th, after which date the temp. rose considerably, the max. temp. in shade being registered on the last day ; some heavy but partial H showers about the 20th.

EDENFEL.—The early promise of an abundant year has been much clouded by the weather of the past month, which, in amount of rainfall and lowness of temp., was almost identical with June, 1879. A violent H shower occurred on the 22nd ; it covered a space not more than a mile in diameter, leaving it white with H stones of irregular shape, many being $\frac{3}{4}$ of an inch long. The shower lasted 40 minutes, and was attended by T and L, the rain gauge yielding .25 in., the greater part of which fell in 15 minutes.