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THE HEAT IN JULY IN THE BRITISH ISLES, AND IN EUROPE GENERALLY.

THE occurrence of a temperature which at Greenwich has not been equalled for at least 40 years, and of a temperature at Brussels which has not been equalled for at least 48 years, naturally claims notice at our hands.

We have made special efforts to place the actual facts before our readers, and we desire in the first place to thank the Directors of nearly all the chief observatories of Europe for the promptitude with which they have supplied the information which we applied for.

We think that it will be convenient to separate the information relating to our own country from that furnished by our Continental friends, and we will therefore dismiss the records from our own little country first.

THE BRITISH ISLES.

We might almost dismiss all parts of the British Isles except the South of England, for the exceptional temperatures were very local—a line from Barnstaple in Devonshire, to Peterborough in Northamptonshire would on its S.E. side have all the temperatures which could be regarded as exceptional. July 5th was a hot summer day, temperatures slightly exceeding 90° were recorded at several stations, and over the greater part of England it was the hottest day of the month, but we are not aware that any of the temperatures observed on that day were unprecedented. The remarkable feature of the month was the temperature reached on July 15th, in a belt of country extending from Wiltshire, through the north of Hampshire, north Surrey, west Kent, Middlesex, Essex, Suffolk and Norfolk.

The following tables contain the principal data upon which the foregoing remarks are based. These tables are mainly compiled from letters and returns sent by our own staff, but have been checked and completed by reference to those sent in to the Meteorological Society.

Space is so valuable that we have been obliged to condense much of the information furnished into a very small space; but we print

two letters in extenso, one because it shows the evidence upon which we print the excessively high value of $101^{\circ}0$; the other is inserted in support of the general statement as to the limitation of the phenomenal heat to the southern counties. As regards this, a curious illustration will be found in the Remarks, on page 132, where our correspondent at Portree, in the Isle of Skye, on the N.W. of Scotland, says July was "The coldest July on record." These letters will be found at the end of the article.

MAXIMUM TEMPERATURES ON JULY 15TH, 1881.

Verified Thermometers in Stevenson's Stands.

(Large type indicates that the max. was the absolute max. of the month.)

95·0	Camden Square, Middlesex.	85·3	Kenilworth, Warwick.
94·9	Eltham Green, Kent.	85·0	Cheltenham, Gloucester.
94·1	South Norwood, Surrey.	84·9	Bitton, Teignmouth, Devon.
93·9	Strathfield Turgiss, Hants.	84·8	Mansfield, Notts.
93·8	Walton-on-Thames, Surrey.	84·6	Loughboro', Leicester.
93·5	Regent's Park, Middlesex.	84·4	Strelley Hall, Nottingham.
93·2	Beddington, Croydon, Surrey.	83·7	Druid, Ashburton, Devon.
92·9	Isleworth, Middlesex.	83·3	Ramsgate, Kent.
92·4	Addiscombe, Croydon, Surrey.	82·8	Babbacombe, Devon.
92·0	Cranleigh, Surrey.	81·0	Brampford Speke, Devon.
91·0	Watford, Herts.	80·8	Belper, Derby.
90·9	Southend, Essex.	80·5	Guernsey.
90·3	Tunbridge Wells, Kent.	80·3	Scarborough, York.
90·2	Throcking, Buntingford, Herts.	79·7	Oakamoor, Stafford.
89·4	Swarraton, Alresford, Hants.	79·7	Cardiff, Glamorgan.
89·3	Harestock, Winchester, Hants.	78·5	Wakefield, Yorks.
88·5	Somerleyton, Lowestoft, Nrfk.	78·4	Lowestoft.
87·7	Eastbourne, Sussex.	78·2	Heath Ho., Cheadle, Stafford.
86·8	The Graig, Ross, Hereford.	77·5	Macclesfield, Cheshire.
86·0	Woodway, Teignmouth, Devon	77·5	Sidmouth, Devon.
85·8	Portsmouth, Hants.	71·9	Llandudno, Carnarvon.
85·7	Burghill, Hereford.	71·8	St. Michael's-on-Wyre, Lncsh.
85·5	Cullompton, Devon.	65·9	S. Shore, Blackpool, Lncsh.
85·4	Hodsock Priory, Wrksop, Nots.		

Records from Stands of other or unknown patterns.

(D.W.R.—Daily Weather Report of the Meteorological Council.)

101·0	Alton, Hants.	91·0	Bromley Common, Kent.
100·0	Alderbury, Salisbury.	91·0	D.W.R., Cambridge Obsvrtty.
97·1	Royal Obs., Greenwich, Kent.	90·0	D.W.R., Nottingham.
96·7	Foxgrove, Beckenham, Kent.	89·0	Ellough, Beccles, Suffolk.
95·6	Enfield, Middlesex.	87·0	D.W.R., Oxford Observatory.
95·0	D.W.R., London.	85·6	St. Leonards, Sussex.
94·6	Camden Square, Middlesex.	85·0	Compton Bassett, Calne, Wilts.
94·2	Hornsey, Middlesex.	85·0	D.W.R., Jersey.
94·0	Hindringham, Norfolk.	83·0	D.W.R., Spurn Head, Yorks.
93·8	Addiscombe, Croydon, Surrey.	83·0	Langton Herring, Weymouth.
93·3	Walton-on-Thames, Surrey.	82·5	Hythe, Kent.
92·0	Merton Villa, Cambridge.	81·0	D.W.R., Hurst Castle, Hants.
92·0	Ipswich, Suffolk.	80·0	D.W.R., Dover.
92·0	Diss, Norfolk.	80·0	Northampton.
92·0	Cossey, Norwich, Norfolk.		

CAMDEN SQUARE.—It was found that the temperature in different parts of the Stevenson stand varied more than a degree—a thermometer near the top recorded $95^{\circ}6$, or one degree higher than on a Glaisher stand close by. The maximum on the Glaisher stand, $94^{\circ}6$, is higher than has been recorded since observations commenced in 1858; the highest previously was that on July 21st, 1868, viz., $93^{\circ}3$.—*G. J. Symons.*

ADDISCOMBE.—Observations have been made here with a Glaisher stand since 1872, hitherto the max. was 13th August, 1876 = $93^{\circ}6$, but on the 15th July, 1881, it rose to $93^{\circ}8$ on that stand, and to $92^{\circ}4$ in the Stevenson.—*E. Mawley.*

GREENWICH.—The maximum temperature ($97^{\circ}1$) on July 15th is higher than any previously recorded in the period 1841-81. On July 22nd, 1868, the maximum temperature was $96^{\circ}6$.—*G. B. Airy.*

FOXGROVE, BECKENHAM.—The following are all the readings of $90^{\circ}0$ or upwards on Glaisher stand since 1867:—1868, July 21st, $91^{\circ}9$; 22nd, $93^{\circ}8$; September 7th, $90^{\circ}0$. 1869, June 12th, $90^{\circ}4$; 18th, $90^{\circ}6$; 22nd, $90^{\circ}0$. 1870, June 22nd, $90^{\circ}8$. 1871, August 12th, $90^{\circ}8$; 13th, $90^{\circ}0$. 1872, July 25th, $90^{\circ}0$. 1873, July 22nd, $90^{\circ}6$. 1874, July 9th, $92^{\circ}6$; 19th, $91^{\circ}7$. 1876, July 14th, $91^{\circ}3$; 15th, $94^{\circ}1$; 16th, $92^{\circ}1$; 17th, $91^{\circ}3$; August 13th, $93^{\circ}8$; 14th, $90^{\circ}4$; 15th, $90^{\circ}1$. 1878, June 26th, $90^{\circ}1$; 27th, $90^{\circ}1$. 1881, July 5th, $92^{\circ}7$; 15th, $96^{\circ}7$ —*P. Bicknell.*

WALTON-ON-THAMES.—It is remarkable that the max. in the Stevenson stand is half-a-degree higher than on the Glaisher. The max. in the louvre screen on the tower, 50 ft. above ground, was only $91^{\circ}0$. against $93^{\circ}8$ at 4 ft. above ground.—*G. Dines.*

To the Editor of the Meteorological Magazine.

SIR,—As it was the hottest day I ever knew here yesterday, I thought you would like to be informed that my thermometer in the shade stood at 101° . The thermometers were made by Burrows, of Malvern, are about 4 feet from ground, on a stand made by them, painted white, facing North, with double back to the South; they were compared at Kew and found correct.—I am, yours truly,

FREDERICK CROWLEY.

Ashdell, Alton, Hants, July 16th, 1881.

To the Editor of the Meteorological Magazine.

SIR,—So much has been said and written about the almost tropical heat of July in the South, that it may interest you to contrast it with the cool moist weather we have experienced here in the North-west of England during the same month.

The mean temperature of July at this station was $57^{\circ}7$, which is $1^{\circ}8$ below the average for the month during the previous nineteen years.

The maximum thermometer in the shade reached 70° on only one day during the month, viz., on the 5th, when the reading was $78^{\circ}\cdot 2$ (this was just before a thunderstorm). The next highest shade temperature was $68^{\circ}\cdot 4$, on the 13th.

Rain fell on 20 days during the month; the total amount being $4\cdot 633$ inches, and the heaviest fall in 24 hours, $1\cdot 680$ inches, on the 24th.—I am, Sir, yours truly,

H. DODGSON, M.D., F.R.A.S., &c.

Cockermouth, Cumberland, August 3rd, 1881.

EUROPE GENERALLY.

We believe that the tables given on pages 118 to 121 are unique in several respects. Although printed within a fortnight of the close of the month, they give complete records from Portugal, Spain, Italy (2 stations), France (4 stations), Switzerland, Austria, Belgium, Germany (2 stations), England, Russia (2 stations), Denmark, and Norway.

For the convenience of the Continental readers of this Magazine, we have printed the values in the Centigrade scale as well as in that of Fahrenheit.

We do not think it necessary to add many remarks, for the notes with which we have been favoured by several of the directors of the observatories on the Continent relieve us of that necessity.

It will be remembered that in the South of England the hottest day was the 15th. On that day the temperature reached or exceeded 100° F. at the following French stations—Paris, 100° ($37\cdot 8$ C.); Nancy, $101^{\circ}\cdot 1$ ($38^{\circ}\cdot 4$ C.); Nantes, $101^{\circ}\cdot 5$ ($38^{\circ}\cdot 6$ C.); and Biarritz, $100^{\circ}\cdot 4$ ($38^{\circ}\cdot 0$ C.).

On July 19th, the hottest day for many years (perhaps ever) at Paris and at Brussels, the following are additional data to those given in the table :—in France, Charleville, $100^{\circ}\cdot 4$ ($38^{\circ}\cdot 0$ C.); and Le Mans, $101^{\circ}\cdot 7$ ($38^{\circ}\cdot 7$ C.); and in Belgium: Arlon, $96^{\circ}\cdot 8$ ($36^{\circ}\cdot 0$ C.); and Maeseyck, $99^{\circ}\cdot 1$ ($37^{\circ}\cdot 3$ C.).

REMARKS.

MADRID.—The maxima are below those usually reached, which are 104° to 106° .—*A. Aguilar.*

PARIS, MONTSOURIS.—The maximum of the 19th ($99^{\circ}\cdot 0$), although exceptionally high, is not without precedent even during the short period since 1872, for on July 9th, 1874, the maximum was $101^{\circ}\cdot 1$.—*H. Marie-Ducy.*

[At the *Observatoire National*, about a mile nearer the centre of Paris than Montsouris, the temperature is reported to have exceeded 99° on the following occasions, viz. :—

1705.	Aug. 5th & 6th	= 102·2	1765.	Aug. 26th	= 104·0
1720.		= 104·0	1766.	July 10th	= 100·0
1757.	July 14th	..... = 99·9	1773.	Aug. 14th	= 102·9
1760.	„ 18th	..... = 99·9	1782.	July 16th	= 101·7
1763.	Aug. 19th	..... = 102·2	1793.	„ 8th	= 101·1

We have not heard that the temperature is still recorded at the National Observatory, but it is hardly likely to differ much from that at Montsouris. But in the last number of the *Comptes rendus*, M. Renou gives his reasons for believing that several of these readings are too high, and for believing the recent temperature to be without precedent.—*Ed. M.M.*]

PARIS, ST. MAWR.—The recent extraordinary temperature was most accurately determined. The ordinary shade maximum thermometer, the *thermomètre fronde*, which I observed repeatedly, and the shade maximum thermometer at my old station, all gave 101°·1 (38°·4 C.). I sent my assistant to observe with the *thermomètre fronde*, on a plateau half a mile E. of Chenevières, and he there found the temperature reached 100°·2 (37°·9 C.). At a station rather lower than that of St. Mawr, the temperature in shade rose to 103°·1 (39°·5 C.).—E. RENOU.

GENEVA.—The mean maximum (83°·9) is the highest observed, 1826-81; the highest previously being 83°·3 in 1827. The absolute maximum (96°·6) has been exceeded both in 1827 (97°·2) and in 1870 (97°·5). The mean temperature (71°·4) is rather below that of July, 1859 (72°·1), but is above that of every other July since 1826.—*E. Plantamour.*

VIENNA.—The maximum temperatures given are those observed at the Central Institute, on the Hohe Warte, 664 ft. above sea level. The temperature in the city of Vienna would rise nearly 2° higher. The maximum in the city was in 1832, July 14th = 101°·7; the maximum at the Central Institute, Hohe Warte, was 95°·9 in July, 1857. The recent maxima are therefore far from unprecedented.—*J. Hann.*

BRUSSELS.—The maximum of July 19th (95°·4) is higher than had previously been reached since the foundation of the observatory in 1833. The absolute maximum previous to 1881 was on June 15th, 1858, when the temperature reached 94°·5.—*J. C. Houzeau.*

BERLIN.—The absolute maximum of the 34 years, 1848-81, was 98°·6 on July 20th, 1865, or 4°·1 higher than in 1881.—*G. Hellmann.*

HAMBURGH.—The absolute maximum for July for the last 33 years has averaged 83°·8, the absolute max. this year is therefore only 3°·5 above the average.—*G. Neumayer.*

COPENHAGEN.—The absolute and mean maximum temperatures are very near the average of the previous twenty years. In Denmark generally, they have been rather lower than the average.—*V. W. Tantzén for F. Hoffmeyer.*

CHRISTIANIA.—The maximum temperatures in July have been 2°·2 below the average; and the absolute max. is only 81°·0, while 90°·0 has been recorded at this observatory.—*A. S. Stern for H. Mohn.*

MAXIMUM TEMPERATURE IN SHADE

AT SOME OF THE PRINCIPAL CAPITALS

FAHRENHEIT

DATE.	PORTUGAL. Lisbon Observatory, <i>J. de B. Capello.</i>	SPAIN. Madrid Observatory, <i>A. Aguilar.</i>	ITALY. Rome Observatory, <i>P. Tachini.</i>	ITALY. Modena Observatory, <i>D. Ragana.</i>	FRANCE. Avignon-Ecole Normale <i>Grand.</i>	FRANCE. Bordeaux Observatory, <i>J. Rayet.</i>	FRANCE. Paris—Montsouris Obs., <i>H. Marie-Davy.</i>	FRANCE. Paris—Père St. Mawr <i>E. Renou.</i>	SWITZERLAND. Geneva, <i>E. Plantamour.</i>
1	80.1	97.9	81.7	77.7	91.8	94.5	81.1	83.7	73.8
2	66.4	69.3	85.1	82.0	88.3	88.5	81.5	85.5	80.2
3	75.9	86.7	88.2	85.6	94.3	93.6	84.4	85.6	84.0
4	69.8	95.0	89.6	88.9	98.6	100.4	90.7	90.5	87.8
5	69.8	93.9	93.2	93.0	97.2	96.8	94.5	96.1	94.8
6	76.3	86.0	94.8	93.7	92.5	75.7	78.4	78.8	90.3
7	79.5	93.2	94.1	91.9	90.0	77.5	67.1	72.7	81.5
8	74.3	92.8	86.5	87.6	86.4	81.0	72.9	73.8	82.9
9	82.0	95.7	87.1	88.3	88.2	77.0	72.5	74.7	75.2
10	88.5	90.5	88.2	82.4	88.2	79.0	72.0	73.8	78.8
11	91.8	94.3	89.2	80.4	91.2	91.9	80.8	83.1	75.2
12	81.1	97.7	86.9	82.0	95.7	86.9	90.1	92.3	79.7
13	81.1	96.1	86.5	86.4	98.2	89.6	80.8	83.1	84.9
14	80.2	95.2	90.1	88.9	97.9	98.8	88.5	91.0	84.9
15	87.1	95.7	91.8	90.0	96.8	102.2	97.7	100.0	90.9
16	73.0	100.2	91.9	90.5	97.9	100.2	93.2	95.2	94.3
17	78.8	101.1	93.6	93.7	101.1	97.0	86.5	89.2	91.8
18	79.3	100.8	93.6	92.7	97.0	102.4	92.7	94.1	86.9
19	75.2	98.1	94.5	91.6	97.2	98.6	99.0	101.1	96.6
20	75.2	80.8	91.2	93.2	97.2	92.5	78.3	82.2	94.3
21	73.2	85.8	92.8	94.1	92.8	71.6	71.2	72.1	91.6
22	80.4	90.3	90.9	93.4	86.5	81.0	74.1	76.1	76.3
23	92.8	95.7	92.5	86.5	87.1	82.0	77.5	78.3	76.8
24	93.9	100.6	90.0	85.5	92.8	87.1	80.1	80.4	85.5
25	89.2	102.6	91.8	88.2	94.1	82.2	65.7	65.8	84.6
26	78.8	96.6	91.6	85.5	87.8	73.0	66.2	67.5	80.6
27	82.8	92.5	90.1	85.3	79.3	75.2	66.7	67.6	69.3
28	87.4	94.1	87.4	77.7	83.7	80.8	71.8	73.2	71.4
29	90.1	80.1	86.4	79.7	89.1	92.7	80.6	81.7	82.8
30	83.1	90.7	86.5	81.7	87.4	84.6	84.9	83.8	84.6
31	82.4	95.0	88.5	87.6	88.2	88.3	75.7	75.7	89.4
Mean..	80.6	93.0	89.9	87.3	92.1	87.8	80.6	82.2	83.8
Max...	93.9	102.6	94.8	94.1	101.1	102.4	99.0	101.1	96.6
Min...	66.4	69.3	81.7	77.7	79.3	71.6	65.7	65.8	69.3
Range.	27.5	33.3	13.1	16.4	21.8	30.8	33.3	35.3	27.3

ON EACH DAY IN JULY, 1881,
AND OTHER CITIES OF EUROPE.

SCALE.

DATE	AUSTRIA. Vienna. <i>J. Hann.</i>	BELGIUM. Brussels. <i>J. C. Houzeau.</i>	GERMANY. Berlin. <i>G. Hellmann.</i>	GERMANY. Hamburg. <i>G. Neumayer.</i>	ENGLAND. London—Greenwich <i>G. B. Airy.</i>	RUSSIA. Moscow. <i>A. Fadcew.</i>	RUSSIA. St. Petersburg. <i>F. Willd.</i>	DENMARK. Copenhagen. <i>F. Hoffmeyer.</i>	NORWAY. Christiania. <i>H. Mohn.</i>
1	69.3	80.6	76.6	75.0	82.6	74.8	81.1	76.3	59.2
2	77.4	81.0	80.2	79.5	77.1	75.0	77.4	80.4	74.3
3	72.9	78.6	86.0	70.9	84.7	78.3	76.6	73.4	68.5
4	81.1	84.7	79.0	68.9	90.1	80.8	80.2	67.1	78.4
5	88.9	89.6	84.2	73.6	92.8	82.2	67.3	68.4	70.7
6	92.1	80.1	85.1	80.8	68.1	73.0	66.0	71.8	76.3
7	79.7	64.9	74.7	65.8	66.1	63.0	65.3	65.5	75.7
8	79.3	67.1	69.1	65.1	65.8	62.8	56.3	63.9	64.4
9	69.8	68.2	71.4	65.7	72.7	71.8	65.7	66.2	69.8
10	69.8	67.1	60.8	67.5	74.1	73.6	72.0	68.2	72.5
11	64.6	78.4	66.2	69.8	79.6	79.3	76.3	70.5	75.7
12	73.8	88.2	79.9	79.2	86.2	77.0	77.4	80.6	81.0
13	81.3	77.5	89.1	77.2	81.4	69.8	74.8	82.4	77.0
14	80.6	82.9	81.7	76.5	89.1	75.2	70.0	78.4	76.3
15	84.0	93.2	90.5	83.8	97.1	68.9	64.6	86.5	78.8
16	92.3	85.1	87.8	74.8	84.3	70.0	72.0	72.3	73.4
17	84.2	78.8	70.9	68.2	85.2	72.7	64.4	68.2	72.0
18	78.8	88.3	84.6	80.2	90.2	59.9	59.4	75.2	64.9
19	86.0	95.4	92.1	86.9	88.0	63.7	61.9	79.9	76.6
20	88.3	80.6	94.5	87.3	76.0	68.5	65.8	79.3	72.1
21	89.1	70.3	71.4	68.7	73.4	75.2	64.4	69.8	74.8
22	74.7	70.2	71.6	66.7	63.1	79.3	72.1	65.3	72.9
23	73.8	71.6	75.2	67.1	73.6	76.5	72.0	71.2	64.4
24	79.3	75.6	78.6	71.4	73.1	81.0	66.4	70.3	65.8
25	84.4	68.0	73.6	69.8	71.3	82.2	70.7	67.1	59.2
26	85.8	56.8	72.1	64.2	73.1	88.7	78.6	67.1	64.2
27	78.8	62.8	63.7	60.3	65.1	90.5	82.9	61.5	59.5
28	65.8	70.3	66.7	64.9	75.9	92.5	71.2	61.3	68.0
29	73.6	73.4	72.9	65.3	74.5	66.2	68.7	60.8	68.9
30	80.2	80.8	75.7	72.0	68.1	70.0	71.6	67.5	69.4
31	84.7	71.2	82.0	73.2	67.7	69.4	71.8	71.2	62.8
Mean..	79.5	76.8	77.7	72.3	77.7	74.6	70.5	71.2	70.6
Max...	92.3	95.4	94.5	87.3	97.1	92.5	82.9	86.5	81.0
Min ...	64.6	56.8	60.8	60.3	63.1	59.9	56.3	60.8	59.2
Range.	27.7	38.6	33.7	27.3	34.0	32.6	26.6	25.7	21.8

MAXIMUM TEMPERATURES IN SHADE

AT SOME OF THE PRINCIPAL CAPITALS

CENTIGRADE

DATE.	PORTUGAL. Lisbon Observatory. <i>J. de B. Capello.</i>	SPAIN. Madrid Observatory. <i>A. Aguilar.</i>	ITALY. Rome Observatory. <i>P. Tacchini.</i>	ITALY. Modena Observatory. <i>D. Ragona.</i>	FRANCE. Avignon-Ecole Normale <i>Giraud.</i>	FRANCE. Bordeaux Observatory. <i>J. Rayet.</i>	FRANCE. Paris—Montsouris Obs. <i>H. Marie-Davy.</i>	FRANCE. Paris—Parc St. Mawr <i>E. Renou.</i>	SWITZERLAND. Geneva. <i>E. Plantamour.</i>
1	26·7	36·6	27·6	25·4	33·2	34·7	27·3	28·7	23·2
2	19·1	20·7	29·5	27·8	31·3	31·4	27·5	29·7	26·8
3	24·4	30·4	31·2	29·8	34·6	34·2	29·1	29·8	28·9
4	21·0	35·0	32·0	31·6	37·0	38·0	32·6	32·5	31·0
5	21·0	34·4	34·0	33·9	36·2	36·0	34·7	35·6	34·9
6	24·6	30·0	34·9	34·3	33·6	24·3	25·8	26·0	32·4
7	26·4	34·0	34·5	33·3	32·2	25·3	19·5	22·6	27·5
8	23·5	33·8	30·3	30·9	30·2	27·2	22·7	23·2	28·3
9	27·8	35·4	30·6	31·3	31·2	25·0	22·5	23·7	24·0
10	31·4	32·5	31·2	28·0	31·2	26·1	22·2	23·2	26·0
11	33·2	34·6	31·8	26·9	32·9	33·3	27·1	28·4	24·0
12	27·3	36·5	30·5	27·8	35·4	30·5	32·3	33·5	26·5
13	27·3	35·6	30·3	30·2	36·8	32·0	27·1	28·4	29·4
14	26·8	35·1	32·3	31·6	36·6	37·1	31·4	32·8	29·4
15	30·6	35·4	33·2	32·2	36·0	39·0	36·5	37·8	32·7
16	22·8	37·9	33·3	32·5	36·6	37·9	34·0	35·1	34·6
17	26·0	38·4	34·2	34·3	38·4	36·1	30·3	31·8	33·2
18	26·3	38·2	34·2	33·7	36·1	39·1	33·7	34·5	30·5
19	24·0	36·7	34·7	33·1	36·2	37·0	37·2	38·4	35·9
20	24·0	27·1	32·9	34·0	36·2	33·6	25·7	27·9	34·6
21	22·9	29·9	33·8	34·5	33·8	22·0	21·8	22·3	33·1
22	26·9	32·4	32·7	34·1	30·3	27·2	23·4	24·5	24·6
23	33·8	35·4	33·6	30·3	30·6	27·8	25·3	25·7	24·9
24	34·4	38·1	32·2	29·7	33·8	30·6	26·7	26·9	29·7
25	31·8	39·2	33·2	31·2	34·5	27·9	18·7	18·8	29·2
26	26·0	35·9	33·1	29·7	31·0	22·8	19·0	19·7	27·0
27	28·2	33·6	32·3	2·6	26·3	24·0	19·3	19·8	20·7
28	30·8	34·5	30·8	25·4	28·7	27·1	22·1	22·9	21·9
29	32·3	26·7	30·2	26·5	31·7	33·7	27·0	27·6	28·2
30	28·4	32·6	30·3	27·6	30·8	29·2	29·4	28·8	29·2
31	28·0	35·0	31·4	30·9	31·2	31·3	24·3	24·3	31·9
Mean..	27·0	33·9	32·2	30·7	33·4	31·0	27·0	27·9	28·8
Max...	34·4	39·2	34·9	34·5	38·4	39·1	37·2	38·4	35·9
Min. ..	19·1	20·7	27·6	25·4	26·3	22·0	18·7	18·8	20·7
Range.	15·3	8·5	7·3	9·1	12·1	17·1	18·5	19·6	15·2

ON EACH DAY IN JULY, 1881,

AND OTHER CITIES OF EUROPE.

SCALE.

DATE.	AUSTRIA. Vienna. <i>J. Hann.</i>	BELGIUM. Brussels. <i>J. C. Houzeau.</i>	GERMANY. Berlin. <i>G. Hellmann.</i>	GERMANY. Hamburg. <i>G. Neumayer.</i>	ENGLAND. London—Greenwich <i>G. B. Airy.</i>	RUSSIA. Moscow. <i>A. Fadeev.</i>	RUSSIA. St. Petersburg. <i>F. Wild.</i>	DENMARK. Copenhagen. <i>F. Hoffmeyer.</i>	NORWAY. Christiania. <i>H. Mohn.</i>
1	20·7	27·0	24·8	23·9	28·1	23·8	27·3	24·6	15·1
2	25·2	27·2	26·8	26·4	25·1	23·9	25·2	26·9	23·5
3	22·7	25·9	30·0	21·6	29·3	25·7	24·8	23·0	20·3
4	27·3	29·3	26·1	20·5	32·3	27·1	26·8	19·5	25·8
5	31·6	32·0	29·0	23·1	33·8	27·9	19·6	20·2	21·5
6	33·4	26·7	29·5	27·1	20·1	22·8	18·9	22·1	24·6
7	26·5	18·3	23·7	18·8	18·9	17·2	18·5	18·6	24·3
8	26·3	19·5	20·6	18·4	18·8	17·1	13·5	17·7	18·0
9	21·0	20·1	21·9	18·7	22·6	22·1	18·7	19·0	21·0
10	21·0	19·5	16·0	19·7	23·4	23·1	22·2	20·1	22·5
11	18·1	25·8	19·0	21·0	26·4	26·3	24·6	21·4	24·3
12	23·2	31·2	26·6	26·2	30·1	25·0	25·2	27·0	27·2
13	27·4	25·3	31·7	25·1	27·4	21·0	23·8	28·0	25·0
14	27·0	28·3	27·6	24·7	31·7	24·0	21·1	25·8	24·6
15	28·9	34·0	32·5	28·8	36·2	20·5	18·1	30·3	26·0
16	33·5	29·5	31·0	23·8	29·1	21·1	22·2	22·4	23·0
17	29·0	26·0	21·6	20·1	29·6	22·6	18·0	20·1	22·2
18	26·0	31·3	29·2	26·8	32·3	15·5	15·2	24·0	18·3
19	30·0	35·2	33·4	30·5	31·1	17·6	16·6	26·6	24·8
20	31·3	27·0	34·7	30·7	24·4	20·3	18·8	26·3	22·3
21	31·7	21·3	21·9	20·4	23·0	24·0	18·0	21·0	23·8
22	23·7	21·2	22·0	19·3	17·3	26·3	22·3	18·5	22·7
23	23·2	22·0	24·0	19·5	23·1	24·7	22·2	21·8	18·0
24	26·3	24·2	25·9	21·9	22·8	27·2	19·1	21·3	18·8
25	29·1	20·0	23·1	21·0	21·8	27·9	21·5	19·5	15·1
26	29·9	13·8	22·3	17·9	22·8	31·5	25·9	19·5	17·9
27	26·0	17·1	17·6	15·7	18·4	32·5	28·3	16·4	15·3
28	18·8	21·3	19·3	18·3	24·4	33·6	21·8	16·3	20·0
29	23·1	23·0	22·7	18·5	23·6	19·0	20·4	16·0	20·5
30	26·8	27·1	24·3	22·2	20·1	21·1	22·0	19·7	20·8
31	29·3	21·8	27·8	22·9	19·8	20·8	22·1	21·8	17·1
Mean..	26·4	24·9	25·4	22·4	25·4	23·7	21·4	21·8	21·4
Max...	33·5	35·2	34·7	30·7	36·2	33·6	28·3	30·3	27·2
Min. ...	18·1	13·8	16·0	15·7	17·3	15·5	13·5	16·0	15·1
Range.	15·4	21·4	18·7	15·0	18·9	18·1	14·8	14·3	12·1

THE
ORGANIZATION OF THE METEOROLOGICAL SERVICE IN
SOME OF THE PRINCIPAL COUNTRIES OF EUROPE.*

X.—THE METEOROLOGICAL SERVICE IN AUSTRIA.

The Central Office for Meteorology and Terrestrial Magnetism, Vienna.
—Meteorological observations were begun in Austria, as in most other European countries, in the last century, and, as usual, at the astronomical observatory. At the beginning of the present century a considerable number of stations had commenced regular meteorological observations, and in Dove's *Repert. der Physik* (1837-44) about 94 stations in Austria are quoted. At the instigation of Kreil, the Imperial Academy of Sciences of Vienna turned its attention specially to Meteorology in 1847; in 1848 many stations were provided with instruments, and the system was placed under the supervision of a commission. The Central Office owes its existence to this commission, and Kreil was called from Prague and appointed director of the Institution; observations were begun there on the 1st September, 1852.

Kreil published the *Jahrbücher der k.k. Central-Anstalt für Meteorologie und Erdmagnetismus*. The first vol. contains the observations for 1848-49; the eighth and last contains the observations for 1856, and was published in 1861. Subsequently, owing to the want of funds, Kreil was obliged to limit his publications to the Results only. These first appeared (1853-8) in the *Sitzungsb.* of the Academy, and afterwards (1859-63) as an independent work under the title *Uebersichten der Witterung in Oesterreich*.

Such was the pitiable condition of the Central Office when Dr. Jelinek undertook the direction. He soon obtained funds for the publication of the observations, and the first vol. of the *Jahrbücher* (new series), containing the observations for 1864, appeared in the year 1866. The last published is Vol. XVII., n.s. Part I. (1880), or the twenty-fifth volume of the *whole* series. The condition of the service continued to improve, owing to Jelinek's activity and influence with the Ministry, and in May, 1872, the new institution on the *Hohe Warte* at Döbling, a suburb of Vienna, was established. On Jelinek's death in October, 1877, Professor J. Hann, then an assistant at the Central Office, was appointed Director. The following details of the activity of the Central Office, and of the stations in connection with it, refer to the year 1879. Formerly all the stations both in Austria and Hungary sent their observations to the Vienna office, but since the establishment of a Central Office at Buda-Pesth, in the beginning of the year 1871, the Hungarian stations have sent their observations

* Continued from *Meteorological Magazine* for July.

to the latter office. The stations in connection with the Vienna office have nearly doubled in number in nine years, being 122 in 1871, and 239 in 1879, including six stations of the first order. There is on an average one station for about 23 square miles, the stations being closer together than in any other of the larger systems. The stations of the second order are provided with standard barometers on Kappeller's and on Fortin's principles; aneroids are not used. The thermometers are placed in cylindrical metal screens, open at the bottom, and towards the north, and they are provided with conical roofs. The rain-gauges have a receiving area of 1-20th square metre = 9.93in. diameter. Windvanes and atmometers are supplied to a few stations.

At stations of the third order, temperature, cloud, direction and force of wind, and rainfall only are observed; at stations of the fourth order, rainfall only. Excepting at a few mountain stations all the observers are volunteers, and in many instances they supply their own instruments, all of which are verified at the Central Office. At most stations the observations are taken at 7h., 2h. and 9h., local time, at others the hours of observation are 6h., 2h., 10h., or 8h., 2h., 8h. Generally speaking the observers reduce their own observations, which are afterwards checked at the Central Office. Prior to the year 1880, there was no regular inspection of the stations. The best inspected stations are those of the Dalmatian coast by the Adria commission, those of Bohemia, and some of the Alpine stations.

Publications.—The observations are published in the *Jahrbücher* above referred to; for 17 of the so-called international stations (including also Corfu, Alexandria, and Beyrout), and for the Central Office at Vienna, the observations are now printed *in extenso*; for the others only the monthly and yearly results are published.

The following stations also publish their observations monthly in a more or less complete manner:—

Cracow, Lemberg, Klagenfurt, Görz (Gorizia), Trieste, Pola, Trient, and Prague (yearly only).

The materials received at the Central Office since 1851 have been discussed in various ways; of these discussions the following may be mentioned:—

Jelinek: The yearly range of temperature and pressure in Austria and some adjacent stations.—*Denkschriften Akad. Wissensch.* xxvi. *Wien*, 1866.

Jelinek: The daily variations of temperature from the observations of the meteorological stations in Austria.—*Idem* xxvii. *Wien*, 1867.

Jelinek: Five day means of temperature for 88 stations referring to the 20 years 1848-67.—*Sitzungsbericht Akad. Wissensch.* Feb. 1869.

Jelinek: The temperature conditions of the years 1848-63 at the Austrian stations represented by 5 day means.—*Wien*, 1869.

Jelinek : On the annual distribution of days with thunderstorms in Austria and Hungary. (*Sitzungsb. May, 1869.*)

Kostlivy : Five day means of temperature for 24 stations. (*Sitzungsb. March, 1878.*)

Hann : Enquiry into the rainfall in Austro-Hungary. (*Sitzungsb. Oct., 1879, and Jan., 1880.*)

Also observations at individual stations, *e.g.*, Bodenbach, Pola, Trieste, Cracow, &c.

Observations at the Central Office at Vienna.—Fortin's barometer is read at 7 a.m., noon, 2 p.m., and 9 p.m.; a registering aneroid by Hipp records every ten minutes by a mechanism adapted to it by Osnaghi, but the records are not at present used. A Kreil's barograph has been in uninterrupted action for 25 years; this instrument registers every five minutes. There is also a Theorell's printing meteorograph, which records every 15 minutes, but its indications are not utilised.

The thermometers are fitted in a spacious screen about $3\frac{1}{2}$ metres (12 feet) high, by 2 metres ($6\frac{1}{2}$ feet) wide and deep. On the W. and E. sides it is closed by metal with an outer covering of wood, and fitted on the S. and N. sides by louvre-work. The screen contains, in addition to the ordinary thermometers, a thermograph by Hipp, which is used for the interpolation of the eye observations.

Earth thermometers are sunk at depths of 0.37m. (1ft. 2in.), 0.58m. (1ft. 11in.), 0.87m. (2ft. 10in.), 1.31m. (4ft. 4in.), and 1.82m. (6ft.) The deepest three thermometers, are read once daily; the two others thrice daily.

Two rain gauges are placed at a height of $1\frac{1}{2}$ m. (5ft.) above the ground, and one level with the ground, and in addition self-registering gauges are in use.

Anemometers on Beckley's, Osler's, and Osnaghi's principles are in use.

Publications.—From the year 1876, the *Jahrbücher* contained hourly values for pressure, temperature, and wind direction and force; the other observations (three times daily) are published monthly in the *Wiener Akademischen Anzeiger*.

Of the discussions of the observations at Vienna itself may be mentioned :—

Jelinek : On the mean temperature at Vienna from 90 years' observations made at the Observatory.—*Sitzungsb. Wiener Akad. Nov., 1866.*

Hann : Temperature at Vienna [from 100 years' observations. (*Idem, Nov. 1877.*)

Hann : Influence of the winds on the mean values of the principal meteorological elements. (*Idem. 1867.*)

Hann : The daily period of the velocity and direction of the wind. (*Idem. Jan. 1879.*)

Considerable attention is also paid to magnetic observations, and the results are published in the *Jahrbücher*.

Weather Telegraphy.—From January, 1877, the telegraphic weather reports, which had previously only appeared in the newspapers and in the year books, were published in a special bulletin under the superintendence of M. Osnaghi. *Storm warnings* to sea-ports are not yet issued, but *résumés* are sent to Trieste and Pola, and to various foreign institutes. Since the year 1877, forecasts have been issued in the interest of agriculture at the special request of the agricultural societies. These service telegrams are allowed to pass at a reduction of 50 per cent. on the ordinary tariff. Full particulars respecting the utilization of meteorology for the benefit of agriculture, in Austria, may be found in the Austrian weekly journal of Agriculture, No. 6, 1878, and in M. Kostlivy's lecture on "Weather Telegraphy in the service of Agriculture" (Vienna, 1879). The Central Institute is under the Ministry of Public Worship and Education. The funds at its disposal are not fixed; for the year 1880 they amounted to £2,690. The director, three chief assistants, and porter have free residence, and postage and telegraphy (with the reservation above referred to) are also free.

The Stations of the First Order.—There are several stations of the first order in Austria, besides that at Vienna, *e.g.*, the observatories of Cracow, Kremsmünster, Prague; the Hydrographic Office at Pola, and the Nautical Academy of Trieste. But these institutions are not exclusively devoted to meteorology, and are independent of the Central Meteorological Office.

(a) *Cracow.*—In addition to the record of the self-registering instruments, direct observations are taken three times daily, and published in monthly parts. This Observatory also superintends the Galician system of stations of the second and third orders, established in 1865 by the Academy of Sciences of Cracow. In 1878 there were 29 such stations in action; and the observations have been published by M. Karlinski, in *Materyaly do Klimatografii Galicyi*, 1867-78.

(b) *Kremsmünster.*—Observations were begun in 1763, but up to 1790 they were of little value; the temperature, for instance, was only observed once a day, and not at any regular time. From November, 1791, observations were taken three times a day; from 1821, five times a day; and from 1830, ten times daily (from 4 a.m. to 10 p.m.) The older series of observations (1763-1851) have, as far as possible been reduced and published in vol. 1 of the *Vienna Jahrbücher* (Vienna, 1854). The present director, Professor G. Strasser, extended the meteorological work by procuring self-registering instruments in the years 1877-78. These observations are published in detail in the *Vienna Jahrbücher*.

(c) *Pola.*—The Hydrographic Office of the Austrian Navy possesses a very complete set of self-registering instruments. Instruments are verified and supplied to the ships, and voluntary observations are made on the larger vessels. The results of the meteorological observations at Pola from 1864-73 have been discussed by F. J. Pick, and published in *Mittheilungen aus dem Gebiete des Seewesens* (Pola, 1874);

from the year 1872 monthly and yearly summaries have been published. The Director of this Institution is Dr. R. Müller.

(d). *Prague*.—This Observatory was established in the middle of the 18th century; the first meteorological observations date from the year 1752, and have been continued up to the present time. The first "year-book" was published by Kreil in 1839, and this publication was continued without material alteration by the subsequent Directors, Drs. Böhm and Hornstein. Direct observations are made by a Fortin's barometer five times daily, and a mechanical barograph, constructed by Kreil, registers every five minutes. Until 1874, a registering thermometer by Kreil was in operation; there is also a thermograph, by Hipp, in addition to the usual thermometers. The rain gauge is placed 72 feet above the ground. An Osler's anemograph by Adie records the pressure and direction of the wind, and a Robinson's anemograph is always in operation. The Observatory belongs to the University, and the Director is paid as one of the professors. A very noteworthy discussion of the various meteorological elements was published by Dr. Jelinek, which has served as a pattern for many subsequent investigations. *Ueber den täglichen Gang der vorzüglichsten meteor. Elemente aus den stündlichen Beobachtⁿ. der Prager sternwarte abgeleitet.* 70 pp. Fo. 6 plates. Wien, 1850.

(e). *Trieste*.—The meteorological observations at the Commercial and Nautical Academy began in the year 1841. Since that year a complete set of self-registering instruments has been in operation. Direct observations are made five times a day. The observations for the years 1841—73 have been discussed by M. Osnaghi, and the results are published in the year-book of the Vienna Institute (vol. ix. n.s.). The director of the Academy, M. Paugger, has established a service for weather telegraphy, and publishes a daily bulletin.

(3). *The hydrometrical observations in Bohemia*.—This service is in connection with the forest associations, and is chiefly due to the exertions of Dr. E. von Purkyně, and to the liberality of some large landed proprietors. In January, 1880, observations were being made at 715 stations; the mountain declivities are well represented, the highest station being the Schneekoppe, 1,601 metres (5,253 feet). The observers are mostly forest-men, who record phenological observations, rainfall, &c., at the request of their employers. All the rain gauges are placed 1 metre (3 ft. 3 in.) above the ground, and the observations are made at 8 a.m., and are entered on post-cards, and these are sent on the first of each month to the Forest School at Weisswasser. Since January, 1879, M. Purkyně has published the observations of all stations *in extenso*, and has also published a useful index map of the stations. The cost of the service is about £300 a-year, exclusive of the cost of the rain gauges, which amounted to about £800.

(4). *The Austrian Meteorological Society*.—This society was formed by the exertions of the late MM. Jelinek and Fritsch, in 1863, but the first regular meeting was held on the 16th November, 1865.

The journal of the society, *Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie*, which has appeared since 1866, is, without doubt, the leading meteorological journal, and generally recognised repertory for the progress of meteorological science. The present editor is Dr. J. Hann, the director of the Central Meteorological Institution of Vienna, and a meteorologist of great eminence. On the 1st of January, 1879, the number of ordinary and honorary members was 307.

(5). *The "Adria Commission."*—This commission was established in 1865 by Baron von Wüllerstorff. Its duties consist in the investigation of tidal observations, sea temperature, specific gravity of the sea, and meteorological observations of the Adriatic, both on land and on ships. The observations made on land stations have been published in four reports by MM. Lorenz, Jelinek and Osnaghi (Vienna, 1869—78). The fourth report contains a discussion of the daily range of temperature at Lesina (1870—75) by M. Osnaghi.

XI.—THE METEOROLOGICAL SERVICE IN HUNGARY.

The Hungarian Central Meteorological Office at Ofen.—Until the year 1870 the Hungarian stations, 42 in number, were amalgamated with the Austrian system, but they were made an independent service on the 8th of April, 1870, under the direction of Prof. G. Schenzl. In the first vol. of the *Jahrbücher* of the Hungarian Institute, M. Schenzl gives detailed information respecting the earlier observations in Hungary. We may mention especially a discussion of the older observations by A. Berde (Klausenburg, 1847), and the more recent materials, up to 1865 by Prof. Hunfalvi (Budapest, 1865), an extract of which was published in the journal of the Austrian Meteorological Society, vol. ii. We shall briefly notice the duties of this service under the two heads (*a*), the meteorological stations in Hungary; (*b*), the observations at the Central Office.

(*a*). In the beginning of 1879 there were two stations of the first order (Ofen and Agram), 99 stations of the second order, and 13 stations of the third order. Most of the stations of the second order are provided with standard barometers, duly compared at the Central Office, and also with swinging-plate wind gauges, on Wild's principle somewhat modified. The observations are made three times a day. The observers are mostly volunteers, or receive a very small remuneration. The stations have been from time to time inspected by M. Schenzl. At the stations of the third order rainfall only is observed. At the end of the year 1880 the total number of stations amounted to about 130.

Publications—The meteorological observations are published in the Hungarian *Jahrbücher*, vols. i—viii, 1871—8. Since 1874, the plan proposed by the International Meteorological Committee has been adopted, as far as relates to the publication of monthly and yearly *résumés*. The Ofen observations only are published *in extenso*. M.

Schenzl has published a discussion of the earth temperature observations at Ofen, for the years 1863—71 (*Jahrbuch* II., 1872).

(b). The central station at Ofen possesses a barograph, but its indications are not published, for want of funds and clerical assistance. Direct observations of all the ordinary instruments are taken three times daily. The telegraphic weather service is restricted at present to receiving a few telegrams, from which a bulletin is drawn up and posted in some public places and published in the newspapers. We may mention, that particular attention is paid to magnetic observations. The funds at the disposal of this institution amount only to about £1,330 a year.

The Agricultural Society of the valley of the Neutra (a tributary on the left of the Danube), has established two meteorological stations of the second order, and 22 rain stations, in the interest of agricultural meteorology, at the instigation of Baron G. Friesenhof. Complete monthly summaries of these observations are published in the reports of the society for 1876—8. In 1879 the society commenced weather forecasts, based on the *résumés* from Vienna, and on their own observations; in the monthly reports published since October, 1879, account is given of the success of these forecasts.

We are indebted to Dr. G. Hellmann's valuable reports for the above particulars.

J. S. HARDING.

OBSERVATIONS ON BEN NEVIS.

To the Editor of the Meteorological Magazine.

SIR,—In your last number it is stated that I ascend Ben Nevis every day. Kindly allow me to say that a trained assistant usually relieves me at the rate of twice a week. It is certainly hard and trying work, especially so in bad weather; but it must be remembered that, through the kindness of the Scottish Meteorological Society, I take a horse half-way, and this is a great relief to me.

Yours faithfully,

CLEMENT L. WRAGGE, F.M.S.

Fort William, August 2nd, 1881.

GREAT VARIATION IN TEMPERATURE.

To the Editor of the Meteorological Magazine.

SIR,—On Tuesday, July 5th, 1881, the maximum shade temperature here was 92° , and at night there ensued a series of thunderstorms, during which the thermometer fell rapidly. The following day, Wednesday, July 6th, the maximum shade temperature was only $62\frac{1}{2}^{\circ}$, so that the difference between the highest readings of the two successive days was no less than $29\frac{1}{2}^{\circ}$. A change of such extreme and sudden character is seldom experienced, even in this variable climate.—Your obedient servant,

W. F. DENNING, F.R.A.S.

Ashley Down, Bristol, July 11th, 1881.

SUPPLEMENTARY TABLE OF RAINFALL IN JULY, 1881.

[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 .....	...	XI.	Carno, Tybrite	3·13
„	Margate, Acol	1·26	„	Corwen, Rhug	1·20
„	Littlehampton	2·12	„	Port Madoc	5·89
„	St. Leonards	2·68	„	Douglas	2·81
„	Hailsham	2·00	XII.	Carsphairn	4·53
„	I. of W., St. Lawrence.	1·87	„	Melrose, Abbey Gate...	2·37
„	Alton, Ashdell	2·01	XIV.	Glasgow, Queen's Park.	3·80
III.	Great Missenden	1·92	XV.	Islay, Gruinart School..	4·40
„	Winslow, Addington ...	3·34	XVI.	Cupar, Kembach	3·05
„	Oxford, Magdalen Col...	2·18	„	Aberfeldy H.R.S.	1·75
„	Northampton	3·58	„	Dalnaspidal .....	...
„	Cambridge, Merton Vil.	1·64	XVII.	Tomintoul	3·61
IV.	Harlow, Sheering	1·77	„	Keith H.R.S.	5·31
„	Diss	1·94	XVIII.	Forres H.R.S.	4·26
„	Swaffham	2·64	„	Strome Ferry H.R.S. ...	8·40
„	Hindringham	2·22	„	Lochbroom	4·16
V.	Salisbury, Alderbury ...	1·82	„	Tain, Springfield	4·05
„	Calne, Compton Bassett	2·06	„	Loch Shiel, Glenfinnan.	11·52
„	Beaminster Vicarage ...	1·86	XIX.	Lairg H.R.S.	3·77
„	Ashburton, Holne Vic..	3·40	„	Altnabreac H.R.S. ....	...
„	Langtree Wick .....	...	„	Watten H.R.S.	3·10
„	Lynmouth, Glenthorne.	1·78	XX.	Fermoy, Glenville	2·90
„	St. Austell, Cosgarne ...	...	„	Tralee, Castlemorris ...	1·68
„	Ilebrewers, Walrond Pk.	...	„	Cahir, Tubrid	2·16
VI.	Bristol, Ashleydown ...	...	„	Tipperary, Henry St...	1·94
„	Ross	1·53	„	Newcastle West .....	...
„	Wem, Sansaw Hall	1·97	„	Kilrush	1·51
„	Cheadle, The Heath Ho.	2·16	„	Corofin	1·94
„	Bickenhill Vicarage ...	...	XXI.	Kilkenny, Butler House	1·09
VII.	Melton, Coston	2·05	„	Carlow, Browne's Hill..	2·26
„	Horncastle, Bucknall ...	2·91	„	Navan, Balrath	2·44
VIII.	Macclesfield Park	2·74	„	Athlone, Twyford	1·79
„	Walton-on-the-Hill	3·33	„	Mullingar, Belvedere ...	2·40
„	Broughton-in-Furness ..	7·89	XXII.	Ballinasloe	2·01
IX.	Wakefield, Stanley Vic.	1·88	„	Clifden, Kylemore .....	...
„	Ripon, Mickley	5·37	„	Crossmolina, Enniscoe..	1·86
„	Scarborough	3·29	„	Carrick-on-Shannon ...	2·65
„	Mickleton	4·91	XXIII.	Dowra	1·87
X.	Haltwhistle, Unthank..	4·37	„	Rockcorry	1·76
„	Shap, Copy Hill	5·45	„	Warrenpoint	2·69
XI.	Llanfrechfa Grange	3·03	„	Newtownards	3·07
„	Llandovery	3·19	„	Carnlough .....	...
„	Solva	1·47	„	Bushmills	3·33
„	Castle Malgwyn	1·92	„	Buncrana	2·74
„	Rhayader, Nantgwillt..	2·52			

JULY, 1881.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.						Days on which +1 or more fell.	TEMPERATURE.				No. of Nights below 32°	
		Total Fall.	Difference from average 1870-9	Greatest Fall in 24 hours.			Max.		Min.					
				Dpth	Date.	Deg.	Date.		Deg.	Date.				
											inches.	in.		
I.	Camden Square.....	1.85	— .62	.55	5	14	94.6	15	44.3	28	0	0		
II.	Maidstone (Hunton Court)...	1.13	— .91	.36	27	8	...	...	...	...	...	...
III.	Strathfield Turgiss	1.80	— .50	.47	31	11	93.9	15	37.0	28	0	1		
IV.	Hitchin	2.29	— .41	.78	5	12	84.0	5	46.0	20	0	0		
V.	Banbury	2.25	— .73	.56	30	14	88.0	5	38.0	28	0	...		
VI.	Bury St. Edmunds (Culford)...	2.68	— .29	.72	8	15	88.0	5	40.0	28	0	0		
VII.	Norwich (Cossey).....	2.13	— .62	.61	19	12	92.0	15	44.2	28	0	0		
VIII.	Bridport	1.76	...	.45	30	8	...	...	...	...	...	...
IX.	Barnstaple.....	1.83	— 1.72	.57	30	...	87.0	6	34.0	8	0	...		
X.	Bodmin	3.21	— .23	.84	30	17	80.0	5	45.0	27	0	0		
XI.	Cirencester	2.72	— .29	.95	30	11	...	...	...	...	...	...
XII.	Church Stretton (Woolstaston)	1.14	— 1.89	.25	23	13	83.5	5	44.5	7, 21	0	...		
XIII.	Tenbury (Orleton)	1.47	— 1.44	.48	5	13	87.7	5	37.0	28	0	0		
XIV.	Leicester (Town Museum) ..	1.36	...	.40	5	13	87.0	15	43.0	28	0	0
XV.	Boston	3.71	+ 1.18	1.16	6	12	92.0	6	45.0	20	0	0		
XVI.	Grimsby (Killingholme)	1.81	— .97	.91	6	10	85.0	4	46.5	21	0	...		
XVII.	Mansfield	1.30	— 1.39	.37	6	11	85.9	5	44.7	28	0	0		
XVIII.	Manchester (Ardwick).....	3.65	— .16	1.02	27	13	93.0	5	45.0	21	0	...		
XIX.	Wetherby (Ribstone)	2.61	— .00	1.02	6	10	...	...	...	...	...	...
XX.	Skipton (Arncliffe)	7.87	+ 2.92	1.78	31	22	78.0	14	44.0	1	0	0		
XXI.	North Shields	3.65	+ 1.10	1.16	5	12	79.2	14†	41.5	21	0	0		
XXII.	Borrowdale (Seathwaite).....	13.04	+ 4.27	2.48	24	26	...	...	...	...	...	...
XXIII.	Cardiff (Ely) .....	...	...	...	...	...	...	...	...	...	...	...
XXIV.	Haverfordwest	2.37	— 1.56	.58	31	13	80.8	5	38.2	27	0	...		
XXV.	Aberystwith (Goginan) .....	...	...	...	...	...	...	...	...	...	...	...
XXVI.	Llandudno.....	3.41	+ .70	1.80	5	12	74.8	4	47.6	9	0	0		
XXVII.	Cargen	2.32	— .81	.88	5	16	72.6	5	43.6	21	0	0		
XXVIII.	Hawick (Silverbut Hall)...	2.31	— .81	.69	5	15	...	...	...	...	...	...
XXIX.	Douglas Castle (Newmains)..	5.87	+ 2.58	1.10	5	22	...	...	...	...	...	...
XXX.	Loch Long (Arddaroch) .....	...	...	...	...	...	...	...	...	...	...	...
XXXI.	Kilmory	5.59	+ 1.05	1.04	17	25	...	...	41.0	16	0	...
XXXII.	Mull (Quinish).....	7.42	...	1.18	3	27	...	...	...	...	...	...
XXXIII.	Loch Leven	4.20	+ 1.15	.60	6	16	...	...	...	...	...	...
XXXIV.	Arbroath	3.05	+ .41	1.12	6	15	76.0	14	45.0	21	0	...		
XXXV.	Braemar	2.89	+ .03	.51	6	20	70.7	14	39.4	16	0	2		
XXXVI.	Aberdeen	4.43	...	1.57	6	20	75.0	4, 15	43.0	26	0	0		
XXXVII.	Portree	8.96	+ 3.50	.93	3	30	...	...	...	...	...	...
XXXVIII.	Inverness (Culloden)	3.74	+ .96	.85	7	12	69.0	14	42.0	27	0	0		
XXXIX.	Dunrobin	4.10	...	1.04	6	20	67.8	15	39.5	27	0	...		
XL.	Sandwick	4.47	+ 1.81	1.56	6	23	69.9	11	43.8	27	0	0		
XLI.	Cork (Blackrock).....	2.02	— .82	.93	7	10	84.0	4	42.0	20‡	0	0		
XLII.	Darrynane Abbey.....	...	...	...	...	...	...	...	...	...	...	...
XLIII.	Waterford (Brook Lodge) ..	2.40	...	.74	30	13	74.0	4, 15	42.0	20||	0	...
XLIV.	Killaloe	2.64	...	.61	24	21	84.0	18	40.0	21||	0	0
XLV.	Portarlington	1.53	— 1.15	.41	30	22	77.5	17	42.5	26	0	...		
XLVI.	Monkstown	2.05	...	.47	30	12	...	...	...	...	...	...
XLVII.	Galway	2.56	— 1.13	.40	2	24	69.0	6, 17	44.0	27	0	...		
XLVIII.	Waringstown	2.66	— .92	.49	24	18	80.0	14	41.0	22	0	0		
XLIX.	Londonderry.....	2.82	...	.56	24*	21	72.0	5, 14	47.0	20	0	0
L.	Edenfel (Omagh).....	3.00	— .25	.64	16	27	73.0	5	37.0	20	0	...		

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

* And 25.

+ And 15, 18.

‡ And 27, 31.

|| And 27.

METEOROLOGICAL NOTES ON JULY.

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 weather of the month was all that could be desired for agricultural crops, with refreshing rains just at the right time to fill out the grain. The excessive heat caused a rather premature ripening, but not so as to do harm, and the harvest will be plentiful everywhere in this neighbourhood. TS on 5th.

BANBURY.—Thunderstorms on 5th, 6th, 16th, and 26th; high wind on 24th, 30th and 31st.

CULFORD.—Early part of the month very hot and dry, refreshing showers at the close. T on 19th, 24th, and 26th.

BODMIN.—Mean temp. of the month, $64^{\circ} \cdot 2$.

CIRENCESTER.—A fine month, with several very hot days. The corn crops improved greatly during the month.

WOOLSTASTON.—Mean temp. of month, $61^{\circ} \cdot 0$.

ORLETON.—A very fine month with much sunshine, and at times very hot, the nights frequently clear and cold. Frequent light falls of R, but not sufficient to wet the soil to any depth. Mean temp. of the month $0^{\circ} \cdot 5$ above the average. Hay crop the smallest for many years. Distant T on the 6th, 19th, and 26th.

BOSTON.—The shade temp. in the middle of the day on the 6th was 92° , and at the same time on the following day it was 57° , a difference of 35° ; it was again very hot on the 15th, the max. in shade on that day being 91° . The fine sunny weather did an immense amount of good to the crops; the corn, although very thin, looks healthy with full ears; potatoes promise a good crop. Heavy TS on the 6th, with 1.16 in. of R; 1.08 of which fell in about two hours. Very heavy R followed by a whirlwind on the 30th.

KILLINGHOLME.—The finest July for several years past; as often occurs in dry seasons, there were many strong indications of R when none followed. T and L on 6th, 24th, and 31st; sheet L on 5th and 28th; distant T on 9th. Hay crop very light; wheat and barley good, but not heavy.

MANSFELD.—TS on 24th; L on 5th; T on 23rd and 26th.

ARNCLIFFE.—Violent TS on 5th; heavy storm of R on 31st.

NORTH SHIELDS.—Thunderstorms on 5th.

WALES.

HAVERFORDWEST.—The general character of the month was close and damp; no very high temp. occurring except on one occasion, the 5th, when the shade max. registered $80^{\circ} \cdot 8$, followed in the evening and night by a TS of unusual severity, which lasted about three hours; the L was very vivid, but the storms were not so violent as in other places. The air was very relaxing during the remainder of the month, some days were fine and bright, but cloud and damp heat generally prevailed. Mean temp. $59^{\circ} \cdot 9$; S. and S.W. winds blew on 19 days. The night of the 27th was unusually cold, the temp. falling to $38^{\circ} \cdot 2$, and on only seven days did the shade temp. reach 70° .

LLANDUDNO.—From the 8th to the 16th inclusive the weather was fine and bright, but afterwards to the end of the month it was variable and showery; there were only 161 hours of clear sunshine during the month. Severe TS on 5th; mean temp. 3° below the average.

SCOTLAND.

CARGEN.—Rather a cold dull month; mean temp. $1^{\circ} \cdot 5$ below the average. T on 5th; T and L on 26th.

HAWICK.—The month was rather cold throughout, and from the 6th to the 16th high winds prevailed.

QUINISH.—An excessively wet and cold month, making to the end of it a period of seven weeks of continuous wet and cold. Hay crop much damaged, the greater part of it being uncut and over ripe.

ABERDEEN.—Rainfall considerably above the average; and the weather has been cloudy during the day, with low night temperatures, greatly retarding the ripening of the crops in this and neighbouring counties. T and L on 22nd; L on 3rd; distant T on 20th.

PORTREE.—The coldest July on record, and very wet throughout.

CULLODEN.—Temperature low during the month. Cereals a fair crop, particularly barley; potatoe crop promising; turnips very inferior; hay also below an average crop.

DUNROBIN.—Cold, wet, and deficient in sunshine.

SANDWICK.—Cold, wet and cloudy, with a low bar., the pressure being above 30 inches only for a few hours on the night of the 16th. On the 20th the wind, which had been a moderate breeze, burst suddenly at 6 p.m., into a gale of nearly 50 miles an hour, and thus a number of Shetland boats were caught and lost, and many poor fishermen perished. Distant T on 14th.

IRELAND.

WATERFORD.—Distant T on 5th and 26th; prevailing winds S. to S.W.

KILLALOE.—Rain fell frequently during the month, but at no time heavily; the heat was scarcely up to the average, the general character of the weather being dull, calm, and sultry. No T or L. The corn harvest will probably be late.

FROST IN JULY AND AUGUST.

To the Editor of the Meteorological Magazine.

SIR,—On the morning of July 28th, there was frost enough here to cut the potatoes and French beans; they are now all black from its effects. The thermometer here, 3 feet from ground, went to 31°. There was ice on a piece of wet board at 6 a.m.—Yours faithfully,

G. F. MARX.

Arle-Bury, Alresford, Hants, 31st July, 1881.

To the Editor of the Meteorological Magazine.

SIR,—At 10 p.m. on the 1st of this month, the sky was clear; air very sharp. At 4.30 a.m. on the 2nd, it was hard frost. Small pools of water were covered with ice as thick as writing paper; clothes, that had been left out all night, were frozen quite stiff; and the ground looked more like November than August. Fruit will have suffered.—Yours,

W. H.

Copy Hill, Shap, 3rd August, 1881.

WHIRLWIND AT BOSTON, JULY 30TH 1881.

PLAN.

