

S Y M O N S ' S
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THREE WHIRLWINDS.

WE have been favoured by Mr. Wheeler, C.E., of Boston, with very full notes of the damage produced by a whirlwind on the north-east side of Boston, and Mr. Wheeler has also supplied maps whence the annexed one has been drawn. From these data we have compiled the following narrative.

On the afternoon of July 30th, between 2 and 5 p.m., nearly an inch of rain fell. After the rain ceased it became on the N.E. outskirts of the town intensely dark, and then a violent wind swept over a tract about 100 yards wide and a quarter of a mile long. The whole destruction was supposed to be over in two minutes.

A writer in the *Lincolnshire Guardian* says that the wind seemed to blow from all quarters towards Boston Market Place, and after a conflict the currents proceeded eastwards, making at the same time a loud noise. The noise is generally described as resembling the passage of several traction engines, and one writer says that it was a sort of whistling and rumbling combined, louder than thunder and not at all like it.

Phenomena of this kind pass so rapidly that it is not easy to be certain as to their sequence, although frequently the injuries themselves prove what it must have been. In this instance there is no doubt that as a broad general fact the line of injury was roughly from S.W. to N.E., from Main Ridge to Vauxhall Lane. The most south-westerly damage was the removal of some slates from the roof of Mr. Fenton's house (A) in Main Ridge, opposite Chapel Row, 1,200 feet east of the Market Place. The first distinct statement is from Mr. Leng, a builder, who was in the yard to the south of the letter C; he observed a few tiles whipped off the house at B (*) before his gate at C was blown open; then the shed D was blown down, the windows of the shop E were broken, and a stack of timber F blown into the adjoining garden to the east. At G there was a boarded fence 6 ft. high, of which about 100 feet was demolished, and carried eastwards.

* Some spouting from B was carried across Maud Foster Drain.

On crossing Maud Foster drain, which is about the size of a large canal, the water was sucked up about 1 ft. 6 in. or 2 ft. A little damage was done to the houses in Maud Foster Terrace, but nothing more serious than the loss of a few tiles and a few broken windows. The large pond ($1\frac{1}{2}$ to 2 acres) at H was much disturbed. According to some witnesses, its whole surface was lifted up from 1 ft. 6 in. to 2 ft., according to others even 3 ft., but that Mr. Wheeler says is impossible. Others says that it appeared to "boil all over and to swirl about."

Respecting this and other details, Mr. Wheeler remarks, "The wind created a vacuum as it passed along, lifting up the water in the river in small waves, and affecting the interior of the houses through the chimnies."

Several of the small houses in Ashill Row were slightly damaged, as was also the house in Church Road marked I. The fence K was blown down, and all the fruit trees, &c., torn up. A wooden shed at L, which was 8 ft. square and about 10 ft. high, was carried over the strawstack M into the garden at N. The roof was taken off the workshop at O, and part of the wooden spouting was found in the Frieston Road, 200 yards distant.

Hence to the foundry at P, there was open ground and the foundry received the full force of the wind. The chimney was blown down, part of the roof was taken off, and a strongly built shed smashed. The gable end and much of the roof of the house Q was taken off, and many of the tiles were carried across the road into the windows of the opposite houses, especially into R. This house was much damaged; a stack of chimnies was blown down, and part of the roof carried away, the ceiling of one bed-room was knocked down, the back doors were torn off their hinges, and a plum tree, 8 ft. high, was lifted bodily out of the ground in the garden. The adjoining houses S, T, U, V, were more or less damaged. No trace of injury was found in the open country beyond these houses.

On Friday, August 19th, about 3 p.m., a whirlwind passed in a north-easterly direction across the N.W. of Lincolnshire, passing close to the town of Brigg. The path undoubtedly extended from Upton, a village four miles S.E. of Gainsborough to Elsham, four miles N.E. of Brigg, a distance of nearly twenty miles, and in all probability extended further in both directions, one account stating that it commenced at the river Trent, E. of Lincoln, travelled across Lincolnshire, crossed the Humber, and disappeared in Yorkshire. The storm was accompanied along the greater part of its course by heavy rain, but at one or two points none at all fell.

Observers at Corringham and Grayingham noticed the heavy massing of the clouds, and the characteristic dark funnel-shaped cloud analogous to the upper portion of a waterspout.

The damage to the crops was very considerable, large quantities of grain being carried away and distributed promiscuously over the

country, and there was the usual complement of large trees snapped short off, and roofs and outbuildings destroyed, but apparently the track lay over very open country, or else the storm was not of the most severe character, as there are few reports of important structural damage to houses or substantial buildings, though several persons appear to have had narrow escapes from falling debris, &c.

At Upton, several sheep are said to have been rolled about and deposited in a ditch; at Springforth, a farmstead appears to have been directly in the track, and of course suffered considerably; all the farm buildings were unroofed, and some of them demolished; the stacks were overthrown, and the house suffered considerable damage to the roof and windows. At an adjacent house the kitchen was unroofed, and the windows broken, and the roof of one shed is reported to have been carried 100 yards; at Kirton in Lindsey, the minor damage was considerable, and a mill and its machinery was much injured. The windmill at Hibaldstow had the top shifted bodily 9 inches, and one of the sails was broken off, a piece of it weighing 4 stones, being carried half a mile, and a fragment 3 miles; the board schools and other buildings had their roofs damaged. At Brigg, several large trees and a greenhouse were blown down; the roof of the brewery was much damaged, and several children are said to have been lifted off their feet, and thrown down. To the north-east of Brigg, the damage appears to be of the general minor character.

To the Editor of the Meteorological Magazine.

SIR,—At a few minutes after 1 a.m. on Tuesday, the 9th inst., a destructive whirlwind just touched the edge of Bricket Wood, where it adjoins the high road close to a toll-gate about half-way from Watford to St. Albans. I have traced its path for half-a-mile or more in a S.W. and N.E. direction. In this course large trees are uprooted and portions of others broken off and scattered in all directions. One beech tree—about 11 feet in circumference 3 feet from the ground, and scarcely less 12 feet from the ground, and at least 60 or 70 feet in height (it had been sawn in pieces when I measured it)—fell across the high road, and another, which I did not measure, fell across a bye road leading to Waterdell Farm, at right angles to the former. Between these two a few branches are carried away from some fir trees at the extreme edge of Bricket Wood, and on, towards St. Albans, a small garden is laid waste, some trees have their lower and larger branches cut clean away, some are split down as if by lightning, and one has the upper portion cut off and carried away without injury to the lower branches. Other trees, in the direct path of the storm if it had travelled in a straight line, are quite uninjured.

The time of occurrence, and that the storm was a whirlwind, I was told by the toll-gate keeper, who had been up at 5 minutes to 1 to open the gate, and was awakened by the noise of the wind and the

crashing of the trees shortly afterwards. A more detailed account will, I believe, be presented to the Watford Natural History Society by a member residing in the neighbourhood.

I am, Sir, yours truly,

JOHN HOPKINSON.

Wansford House, Watford, 19th August, 1881.

To the Editor of the Meteorological Magazine.

SIR,—At 1.15 a.m. on the morning of the 9th inst., we were visited for a few minutes by a most tremendous gust of wind, which I estimated to be about "8" Beaufort notation, but the movement was very peculiar in the air, for though there was a force that rocked the large old elms close to my window nearly down to the ground, yet the large arms tossed wildly *to and fro*, but did *not* bend, as in a common gale, mainly in one direction, and then regain position.

The highest rate of movement appeared to be at 1.15 a.m., but I had been roused, as well as two others in the house, by the noise about four minutes before, and about the same number of minutes after, the great disturbance ceased.—Yours very truly,

ELEANOR A. ORMEROD.

Dunster Lodge, Spring Grove, Isleworth.

THE BRITISH ASSOCIATION AT YORK.

IT was generally understood that the Jubilee (or Jubile according to Dr. Haughton) meeting of the B.A. was to be a good one, but we think that few expected so brilliant a gathering as assembled to commemorate its original foundation. The special features of York society are fairly represented by its Minster, its Walls, and its Railway station. York stands pre-eminent as an ecclesiastical and antiquarian centre, but neither of these elements would furnish a large contingent to a B.A. meeting; but York is essentially a railway centre, and the North-Eastern directors rose to the occasion, and thus the meeting was largely recruited from Leeds, Bradford, and other surrounding towns. Moreover, York has never forgotten that its then new Museum sheltered the first B.A. meeting; and while the men of York with an able Lord Mayor at their head, had resolved that they would do their part and did it right well, the old members of the B.A. in many cases broke up their well-earned rest, in order to share in that meeting which they thereby helped to make a great success.

York possesses only one daily paper, *The York Herald*, but it discharged its extra duties with great credit to itself and benefit to all concerned, and as there was in addition an ample staff of representatives of the press from all parts of the Kingdom, the reporting was very well done. We, however, of course confine our notes to the proceedings bearing upon Meteorology.

First comes the list of meteorologists present at York, and this list was so long, that we have had to exclude all who are not known to us as Meteorological writers or observers. This necessarily involves risk of error, but we were bound to give either a shortened list or none at all.

Adams, Prof. J. C., F.R.S.	Cambridge.
Bateman, J. F., C.E., F.R.S.	London.
Bell, J. Lowthian, F.R.S.	Northallerton.
*Binnie, A. R., C.E.	Bradford.
*Black, Surgeon-Major.....	Edinburgh.
Brady, Sir Antonio	Stratford.
Chadburn, A.	Sheffield.
Clark, J. Edmund	York.
Corbishley, Rev. J.	Ushaw.
Crowdson, Rev. G.	Kendal.
Crossley, E.	Halifax.
*Curley, T., C.E.	Hereford.
Curtis, A. H.	Dublin.
*Cushing, T.	London.
Deacon, G. F., C.E.	Liverpool.
*Dines, G.	Walton-on-Thames.
*Dymond, E. E.	Apsley Guise.
*Dymond, Miss	Exeter.
Elliot, R.	Hawick.
Elliot, Sir W., F.R.S.	Wolfelee.
Evans, J., F.R.S.	Hemel Hempstead.
Everett, Prof. J. D., F.R.S.	Belfast.
*Field, Rogers, C.E.	London.
Filliter, E., C.E.	Leeds.
Fryer, J. F.	York.
Galton, F., F.R.S.	London.
Gilbert, J. H., F.R.S.	Harpenden.
*Glaisher, J., F.R.S.	Blackheath.
*Glaisher, J. W. L., F.R.S.	Cambridge.
Harrison, J. P.	London.
*Haughton, Rev. S., F.R.S.	Dublin.
*Healey, G.	Windermere.
Hennesy, H., F.R.S.	Dublin.
Hopkinson, J.	Watford.
*Howlett, Rev. F.	Alton.
*Jackson, M.	Ramsgate.
Knight, J. R.	Liverpool.
Knowles, G.	Shipley.
Larmor, Prof.	Galway.
*Latham, Baldwin, C.E.	London.
Lippincott, B. C.	Bristol.
Lloyd, Mrs.	Dolgelly.
Mackeson, H. B.	Hythe.
McLandsborough, J., C.E.	Harrogate.
Marten, E. B., C.E.	Stourbridge.
Mello, Rev. J. M.	Chesterfield.
*Muirhead, H., M.D.	Cambuslang.
Murdoch, J. B.	Glasgow.
Mylne, R. W., C.E., F.R.S.	London.
*Peggs, J. W., C.E.	London.
Pengelly, W., F.R.S.	Torquay.
Perry, Rev. S. J., F.R.S.	Stonyhurst.
*Preston, Rev. T. A.	Marlborough.

Procter, J. R.	Clementhorpe.
Richardson, H.	Cherry Hill.
*Scott, R. H., F.R.S.	London.
Smelt, Rev. M. A.	Cheltenham.
Smith, D.	Birmingham.
*Smith, Prof. H. J. S., F.R.S.	Oxford.
Stanley, W. F.	South Norwood.
*Symons, G. J., F.R.S.	London.
Talmage, C. G.	Leyton.
Tarbotton, M. O., C.E.	Nottingham.
Taylor, T.	Aston Rowant.
*Verney, Capt. R.N.	Rhianva.
Vincent, Rev. W.	Postwick.
*Watts, W.	Piethorne.
Wheeler, W. H., C.E.	Boston.
*Whipple, G. M.	Kew.
Woodd, C. H. L.	Hampstead.
Woodward, C. J.	Birmingham.

The extent to which the above list has been compressed is curiously illustrated by the fact that at the Meteorological Breakfast, the unprecedentedly large number of 40 sat down, and yet only 24 names in the above list are marked with the * indicating presence at it. The other 16, although more or less interested in the development of Meteorology, are not known to us as actual workers, and thus at present fail to obtain insertion.

REMARKABLE HAILSTONES.

To the Editor of the Meteorological Magazine.

DEAR SIR,—On the 27th August last I sent you a description of some remarkable hailstones which fell here. I had an opportunity myself of seeing last week some of the same, as well as others of an equally extraordinary shape.

I was in the Rainthal, a valley running up to the glacier at the base of the Zugspitz, with a friend, the Rev. James T. Fowler, vicar of Whittle-le-woods, Lancashire, when we were overtaken by a thunderstorm, at an elevation of about 3000 ft. (or 700 ft. above this valley). The storm lasted nearly an hour and a half, during which time rain descended in torrents, accompanied by heavy hail.

We took refuge in a small hay hut, in front of which ran a small track about a yard wide, between tall grass on either side. In this track, in the space occupied by the front of the hut (about four yards in length) we picked up hailstones as shewn in the accompanying sketch. The drawings were made on the spot by Mr. Fowler, and represent exactly the size and shape of the stones. 1 & 2, and 3 & 4, represent respectively the largest and smallest stones of the two shapes. Nos. 1 to 5 fell continuously as long as the storm lasted. Nos. 1 and 2 (which were exactly like hazel nuts), and 5 were opaque like porcelain and snow white. Nos. 3 and 4, (which with No. 11 will be recognized as the same as those of last year) were transparent, convex above, concave below, and perfect circles.

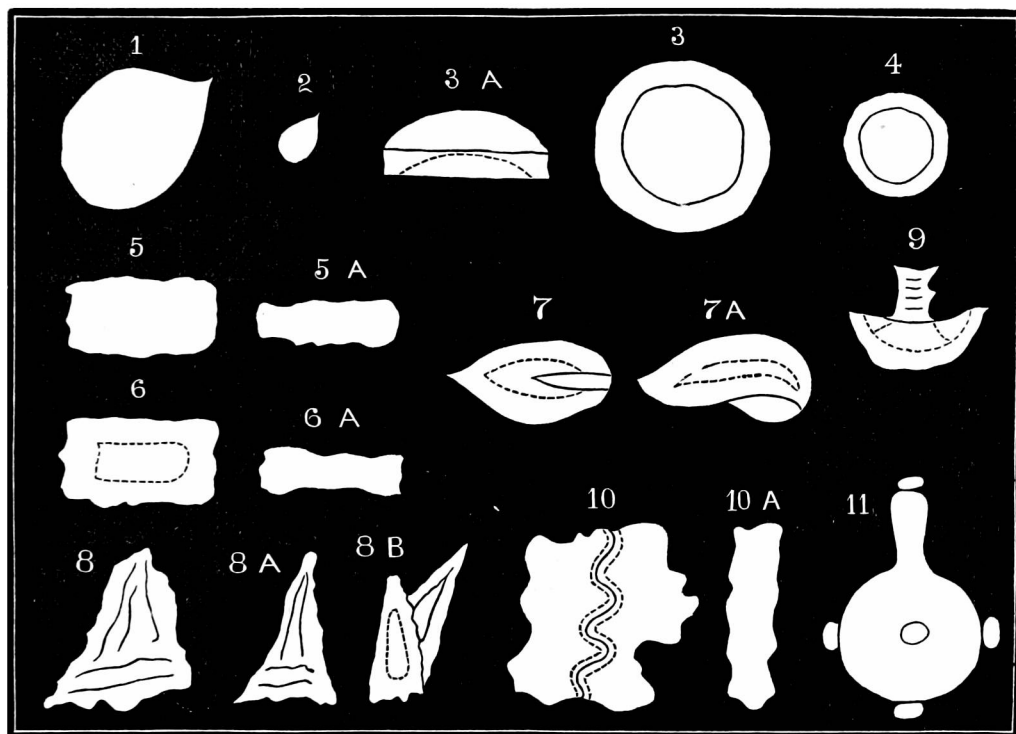
The remainder were all more or less transparent, and fell at intervals during the storm, after a more than ordinary brilliant flash of lightning.

In the sketch, the spaces between the dotted lines in Nos. 6, 7, 8B, and 10 were transparent as glass. In No. 8 A represents the side view of the stone, and B the end view.

No. 7 were like almonds split in half. No. 9 was like a mushroom and like No. 3 when viewed from above.

No. 10 resembled two pieces of rough ice dovetailed together, and was transparent at the dovetail.

No. 11 was precisely the same as those of last year, and the knobs were, as then, symmetrically placed.



Two days afterwards I was about 700 feet further up the mountain, and there the hail must have been much more severe, the ground being strewn with leaves and twigs of trees, the former in many cases perforated by the stones.—Faithfully yours,

MICHAEL FOSTER WARD, F.R.A.S. F.M.S.

Partenkirchen, Bavaria, 4th July, 1881.

THE SUMMER OF 1881.

To the Editor of the Meteorological Magazine.

SIR,—On the 2nd of May last (see *Met. Mag.*, Vol. XVI., p. 80) I predicted that “the coming Summer should be not unfrequently rather dry in character, though changeable and often cool.” I also

said "that the mean temperature of the period from the second week of July to the second week of August, would probably be warmer than the average at Greenwich." Now, although the rainfall of June was almost equal to the average, July only 0·4 in. below, and August more than an inch and a half above the average of the last 66 years ; yet, I think it will be remembered that the weather in these parts was not unfrequently dry up to the second week of August, indeed sometimes *very* dry. The Summer (June to August inclusive) has also been "changeable and often cool." Its violent changes of temperature appear to constitute its chief characteristic, and out of the 92 days, we had 56 cool ones and only 36 that were warm. The mean temperature of the Summer was about 0·3 cooler than the Greenwich adopted average, but the period from the first day of the second week in July to the first day of the second week in August was 1°·8 warmer than the average. June was cooler than the average ; we had two short intervals of cold weather even in July ; and a long period of cold set in at Greenwich on the 9th of August. So the Summer forecast has been exactly fulfilled.

Your readers will perhaps like to know that the 15th of July last is not only remarkable for having the highest maximum temperature ever recorded at Greenwich (97°·1), but is equally distinguished by having the highest mean daily value (79°·5) ever recorded at that Observatory. The highest previously recorded (as shown by Mr. Glaisher's tables) are 79°·2 on the 24th of July, 1818, and 79°·1 on the 15th of July, 1825.—Yours truly,

GEORGE D. BRUMHAM.

Barnsbury, 5th September, 1881.

THE HEAT IN JULY.

THERE was in the article in our last number one point left in some uncertainty, owing to the non-arrival of a letter from the National Observatory at Paris. It will be remembered that we gave (on page 117) a list of ten instances since 1704 on which the temperature at the National Observatory is reported to have reached 99°·9 or upwards, and at the same time stated that M. Renou had given reasons for considering most of these readings too high. But even if all of them are too high, it seems difficult to believe that the recent heat was unprecedented, for the max. at the National Observatory was only 97°·7. Doubtless some of the French authorities will discuss exhaustively both of the following questions—(1) at what stations, if any, was the temperature absolutely unprecedented ? (2) what was the distribution of temperature on July 19th, and by what was it produced ? Meanwhile, as we have been favoured with several records, we give a summary.

TEMPERATURE IN PARIS AND ITS ENVIRONS, JULY 19TH, 1881.

LOCALITY.	Distance and bearing from Cathedral of Notre Dame.		Max. temp.	
			Fahrenheit.	Centigrade.
Wissous	7	miles S.	101°·1	38°·4
Parc St. Maur	7	" S.E.	101°·1	38°·4
" " (Old Station) ...	6½	" S.E.	101°·1	38°·4
Chenevières	9	" S.E.	100°·2	37°·9
Montsouris Observatory	2½	" S.S.W.	99°·0	37°·2
National	1½	" S.S.W.	97°·7	36°·5

From this it seems to have been two or three degrees hotter in the open country than in the city itself.

We may take this opportunity of quoting a few results which have reached us from verified thermometers, since the previous article was written :—

97°·0 on a Burrows stand, at Moor Hall, Harlow, Essex.
 94°·5 on a Stevenson stand, at Guildown, Guildford.
 89°·0 on a modified Glaisher stand, at Branch Hill, Hampstead.
 87°·7 on a Stevenson stand, at St. Aubin's, Jersey.
 87°·0 on a „ „ at Leicester.

THE RAINFALL OF THE PAST TWO YEARS.

To the Editor of the Meteorological Magazine.

SIR,—I beg to call your attention to the great contrast in the rainfall of this district during the two years ending 31st August, 1881. The following table will show this.

A difference of 118 per cent. between the two years. There was no fall that reached an inch in 24 hours during the first year, but in the second year there were no less than six falls of over an inch.—
 Yours truly,
 J. PARK.

78, Blatchington Road, West Brighton, Sept. 2nd, 1881.

	BRIGHTON.		EASTBOURNE.		LITTLE-HAMPTON.		ST. LEONARDS		HAILSHAM.	
	79-80.	80-81.	79-80.	80-81.	79-80.	80-81.	79-80.	80-81.	79-80.	80-81.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Sept.	3·41	5·25	3·13	3·64	3·86	5·14	3·02	3·91	3·13	2·43
Oct.	·83	6·18	1·37	8·48	1·23	7·41	1·12	8·07	·88	6·37
Nov.	1·09	4·16	1·13	4·92	·74	4·27	1·03	4·78	1·35	4·11
Dec.	1·03	4·08	·86	4·96	·87	4·28	·98	5·00	1·20	4·64
Jan.	·63	2·50	·52	*1·18	·47	1·98	·42	*1·17	·49	*·56
Feb.	2·76	3·52	3·46	3·26	3·31	3·24	2·90	1·91	3·28	2·86
March.	·91	2·85	·81	3·23	·90	2·53	·68	3·22	·50	2·87
April.	1·77	·64	1·94	·58	1·82	·65	2·23	·65	1·69	·78
May	·38	1·07	·09	1·31	·48	1·05	·07	1·09	} 2·61	·89
June	1·56	3·42	2·78	2·51	1·61	2·11	3·14	2·75		2·52
July	3·22	2·34	2·87	1·97	3·20	2·12	4·00	2·68	3·28	2·00
Aug.	1·02	4·51	·41	4·22	·90	4·26	·55	3·99	·41	4·69
Total...	18·61	40·52	19·37	40·26	19·39	39·04	20·14	39·22	18·82	34·72
Pr. cent	100	218	100	208	100	201	100	195	100	184

[We have added to Mr. Park's table the amounts for four other stations, which indicate that the difference between the two years was greatest at Brighton, decreasing gradually all round, and the decrease continues northwards, the total for the second year expressed as a percentage of the first being at London 151, Barnstaple (Devon) 150, and Mansfield (Notts.) 134.—Ed.]

* These amounts are probably too small, owing to the difficulty of measuring the great fall of snow on January 18th.

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

XII.—ITALY.

THE meteorological service in Italy is so complicated that it is difficult to give a satisfactory *résumé* of it. In addition to the Central Office, there is a large number of observatories and stations more or less completely furnished, which are for the most part independent establishments, but many of the so-called "observatories" only correspond to our stations of the second order.

1. *The Ufficio centrale di Meteorologia* at Rome. We possess some long series of observations from Italy, owing to the early foundation of some of the Observatories, *e.g.*, Bologna (1723), Milan (1760), Padua (1767), Florence (1774), Rome, Collegio Romano (1787), Palermo (1790). M. Toaldo, the first Director of the Padua Observatory, established a system of more than sixty observers; the materials which he collected, mostly referring to temperature and rainfall, were published in a complete manner by M. Schouw, in his *Tableau du climat et de la végétation de l'Italie* (Copenhagen, 1839).

Towards the middle of the present century an attempt was made to organize an extensive system on an uniform plan in connection with the Museum of Pisa. A *prima pubblicazione* was issued containing some old and new observations made at Florence, since which no other publication appeared. A decided advance was made when the Government took the matter in hand, and by decree of 13th December, 1863, appointed a Committee for Weather Telegraphy, and in the next year established a section for Meteorology at the Ministry of Agriculture. In April, 1865, a Committee was charged with the collection of materials for a work on the climate of Italy. The only result, so far as we know, was the publication by M. Schiaparelli, entitled *Sul clima di Vigevano*, near Milan (1868).

In 1865, the meteorological section of the Ministry of Agriculture began the issue of the *Meteorologia Italiana*, containing 10-day means of about 30 stations, and out of this section sprang the Central Office in 1877. A superintending council of nine members was appointed, one of whom, M. P. Tacchini, is the Director of the Central Office at the *Collegio Romano*. About 80 stations now send in their observations every 10 days; 8 stations are of the first order, and about 20 have one or more self-registering instruments. The observations are generally taken at 9h, 3h, and 9h, and at some stations 6 times daily. About 20 of the stations take synchronous observations, which are sent every 10 days to Washington. All the stations were inspected in 1877.

Publications by the Central Office. These have assumed various forms; from 1865-73 they were large folio vols., containing observa-

* Continued from *Meteorological Magazine* for August.

tions partly *in extenso* and partly 10-day and monthly means. From 1874-7 a *Bollettino decadico* was issued, and from 1875 a *Bollettino mensile* has been issued, containing observations published on the plan recommended by the International Meteorological Committee. In January, 1878, the observations of 38 stations, and in 1879, 24 stations (only) were published. In the *Supplemento alla Meteorologia Italiana*, and now in the *Memorie e Notizie della Meteorologia Italiana* meteorological articles are published, forming really a Meteorological Repertory. In the *Meteorological Magazine* for January last attention was drawn to the increased activity of the Central Office, under the able superintendence of M. Tacchini, and to the first volume of the *Annali*.

The following general discussions may be specially mentioned :—

1872, Riassunto delle osservazioni eseguite nel settennio, 1866-72.

1878, *G. Grassi*, Sul calcolo della temperatura media diurna in Italia.

1878, *G. Grassi*, Sul calcolo dell'andamento annuale delle temperatura in Italia.

In the first volume of the *Annuario statistico Italiano* there are 11 years' means of the principal stations (1866-76).

Since the year 1872 several forest meteorological stations have been established on the same system as in Bavaria. Full particulars respecting these stations are given by M. Cantoni in the *Memorie e Notizie* for 1876 and 1878.

Considerable attention is paid to Agricultural Statistics. The observations include temperature of air and soil, solar radiation, humidity, evaporation, rainfall, and the state of the sky. In accordance with the proposal of M. Cantoni, the instruments are exposed to sun and rain on a iron support called *albero meteorico*, and latterly a kind of Stevenson's thermometer screen is employed at some stations.

The air-thermometers are placed at 20 ins., 3 ft. 3 ins., and 5 ft. above the ground ; and earth-thermometers are placed at depths of 10 ins., 18 ins., and 25 ins.

Radiation is observed by an apparatus by Bellani (*Radiometro collettore*), consisting of two bulbs filled with alcohol, one blackened and the other white.

For evaporation, Piche's little instrument is used. In March and October, observations are made at 8h, 11h, 2h, and 5h, and in the other summer months at 7h., 11h., 3h., and 7h. Some of the results deduced from these observations are published in the *Supplemento alla Meteorologia Italiana*, 1876, III., and 1877, I., and *Memorie e Notizie*, 1878, II. and III. Since November, 1879, a *Bullettino di Notizie agrarie*, has been issued containing 10-day means of temperature, the days of rain, thunderstorms, &c., at about 50 stations, together with notices upon the state of the crops, fruits, &c.

From the same date the Central Office has issued a daily *Bullettino meteorico*, containing the usual tables, and weather charts, and occasionally interesting notices of the weather.

The funds at the disposal of the Central Office were at first, before the amalgamation of other services, £2,000, mostly provided by the Ministry of Agriculture, which also pays for the printing. The Director draws part of his salary from another office.

2. The *Ufficio centrale meteorologico della R. Marina*, at Florence. This office was established in December, 1863; the first Director was the well-known M. Matteucci, whose book of Meteorological Instructions is still in use. On his death M. Donati was appointed Director, and subsequently M. Pittei. This service has now been amalgamated with the Central Office at Rome. Its principal duties were the organization of an extensive telegraphic weather service, chiefly in the interests of the marine, and the issuing of storm warnings with the FitzRoy signals. The funds at the disposal of this office were £500. We presume that this sum has now been transferred to the Central Office at Rome.

3. The "*Commissione idrografica*." This Commission was formed in December, 1866, for the organization of rainfall and hydrometrical observations. In January, 1880, there were 500 rain stations, and about 850 hydrometrical stations; the observations are sent to the Ministry of Public Works. The rain gauge adopted by the Commission has a large receiver, of about two square feet (one-fifth square metre).

Hitherto the Commission has only published one bulletin (1872) in addition to a report upon its activity. It has also published 11 volumes of graphical representations of rainfall, &c., (*Bullettino idrografico*, Fasc., I-XI, Rome, 1873-1878).

4. The "*Osservatorio del Collegio Reale Alberto*," at Moncalieri, and the *Corrispondenza meteorologica Italiana Alpina—appennina*." This Observatory was established in 1859, by M. F. Denza, and is now one of the best organized observatories in Italy; the funds are provided by the Barnabite College. The observatory restricts its labours entirely to meteorology, and embraces all the observations of a station of the first order.

The *Bullettino meteorologico* has already reached 13 vols. (1866-78). In 1872 a system of rainfall stations was established in Piedmont, which soon extended to all Upper Italy. The stations number about 300. The monthly values are published in the Moncalieri bulletin.

The untiring energy of M. Denza established the *Corrispondenza meteorologica Italiana Alpina—appennina*, in connection with the Alpine Clubs. The stations number about 115, and are distributed over the whole of Italy. About 20 of the stations have been established at the cost of the Government, and the remainder at private cost, amounting to not less than £10,000. The observations are taken generally three times daily, and most of the stations have been inspected by M. Denza. The results of the barometrical comparisons are published in "*Confronti dei barometri delle stazioni meteorologiche Italiane*." The observations are published in 8 vols. (1872-9) containing 10-day means; monthly means are published in the Quarterly Bulletin of the Italian Alpine Club, and some observa-

tions are given in greater detail in the Moncalieri bulletin. This system has now been formed into an Italian Meteorological Association, with which is amalgamated the Italian Meteorological Society.

(To be continued).

SUPPLEMENTARY TABLE OF RAINFALL IN AUGUST, 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	5·39	XI.	Carno, Tybrite	5·66
"	Margate, Acol	2·73	"	Corwen, Rhug	5·31
"	Littlehampton	4·26	"	Port Madoc	5·90
"	St. Leonards	3·99	"	Douglas	5·31
"	Hailsham	4·69	XII.	Carsphairn	4·44
"	I. of W., St. Lawrence. 4·11		"	Melrose, Abbey Gate ...	6·30
"	Alton, Ashdell .....	...	XIV.	Glasgow, Queen's Park. 3·33	
III.	Great Missenden	6·39	XV.	Islay, Gruinart School.. 2·37	
"	Winslow, Addington ... 4·75		XVI.	Cupar, Kembach	5·54
"	Oxford, Magdalen Col... 4·64		"	Aberfeldy H.R.S. ....	...
"	Northampton	3·95	"	Dalnaspidal .....	...
"	Cambridge, Merton Vil. ...		XVII.	Tomintoul	3·34
IV.	Harlow, Sheering	4·89	"	Keith H.R.S.	2·63
"	Diss	4·73	XVIII.	Forres H.R.S.	2·77
"	Swaffham	4·52	"	Strome Ferry H.R.S. ...	4·51
"	Hindringham	3·18	"	Lochbroom	3·65
V.	Salisbury, Alderbury ... 5·96		"	Tain, Springfield	1·78
"	Calne, Compton Bassett 4·90		"	Loch Shiel, Glenfinnan. 6·68	
"	Beaminster Vicarage ... 7·06		XIX.	Lairg H.R.S. ....	...
"	Ashburton, Holne Vic.. 8·67		"	Altnabreac H.R.S.	3·71
"	Langtree Wick	4·49	"	Watten H.R.S.	1·61
"	Lynmouth, Glenthorne. 5·84		XX.	Fermoy, Glenville	4·66
"	St. Austell, Cosgarne ... 4·84		"	Tralee, Castlemorris ...	5·80
"	Taunton, Fullands .....	...	"	Cahir, Tubrid	4·92
VI.	Bristol, Clifton	5·64	"	Tipperary, Henry St... 5·64	
"	Ross	4·77	"	Newcastle West	5·55
"	Wem, Sansaw Hall	3·32	"	Kilrush	4·83
"	Cheadle, The Heath Ho. 5·81		"	Corofin .....	...
"	Coundon	5·61	XXI.	Kilkenny, Butler House ...	
VII.	Melton, Coston	4·73	"	Carlow, Browne's Hill.. 4·40	
"	Horncastle, Bucknall ... 4·57		"	Navan, Balrath	5·01
VIII.	Macclesfield Park	5·28	"	Athlone, Twyford	5·95
"	Walton-on-the-Hill	5·51	"	Mullingar, Belvedere ... 4·89	
"	Broughton-in-Furness ... 5·79		XXII.	Ballinasloe	4·44
IX.	Wakefield, Stanley Vic. 3·43		"	Clifden, Kylesmore 8·42	
"	Ripon, Mickley	6·03	"	Crossmolina, Enniscoe.. ...	
"	Scarborough	7·53	"	Carrick-on-Shannon ... 3·59	
"	Mickleton	6·46	XXIII.	Dowra .....	...
X.	Haltwhistle, Unthank.. 5·42		"	Rockcorry	3·82
"	Shap, Copy Hill	6·22	"	Warrenpoint	4·78
XI.	Llanfrechfa Grange 5·57		"	Newtownards	4·01
"	Llandovery	5·81	"	Carnlough .....	...
"	Solva	3·30	"	Bushmills	3·21
"	Castle Malgwyn	3·99	"	Buncrana	3·21
"	Rhayader, Nantgwillt.. 6·43				

AUGUST, 1881.

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.	Difference from average 1870-9	Greatest Fall in 24 hours.		Deg.	Date.		Max.		Min.			
				Dpth	Date				Deg.	Date.	Deg.	Date.		
													inches	inches.	in.
I.	Camden Square.....	4.89	+ 2.15	.84	12	19	84.6	5	42.3	28	0	0		
II.	Maidstone (Hunton Court)...	3.57	+ 1.33	1.02	12	17	...	...	...	...	...	...
III.	Strathfield Turgiss	5.38	+ 2.96	1.35	12	17	77.4	4	38.0	29	0	0		
IV.	Hitchin	4.70	+ 2.42	.62	8	20	78.0	5	45.0	31	0	...		
V.	Banbury	5.40	+ 2.70	.90	23	19	81.0	5	40.0	28	0	...		
VI.	Bury St. Edmunds (Culford)...	4.82	+ 2.65	.67	29	21	83.0	5	37.0	27	0	...		
VII.	Norwich (Cossey).....	3.64	+ 1.02	.63	29	19	86.5	5	42.0	28	0	...		
VIII.	Bridport	5.72	...	.86	22	17	69.0	7, 10	35.0	28	0	...
IX.	Barnstaple.....	5.60	+ 1.50	.69	8	22	79.0	6	44.0	28	0	...		
X.	Bodmin	4.63	— .21	.74	8	24	70.0	5	44.0	28	0	0		
XI.	Cirencester	5.37	+ 1.71	.74	25	16	...	...	...	...	...	...
XII.	Church Stretton (Woolstaston)	4.48	+ .40	.81	16	22	82.5	1	43.0	30	0	...		
XIII.	Tenbury (Orleton)	3.88	+ .16	.52	22	18	81.0	5	37.7	28	0	0		
XIV.	Leicester (Town Museum) ...	5.18	...	1.36	8	19	82.0	5	41.0	28	0	0		
XV.	Boston	4.34	+ 1.73	1.08	8	16	85.0	5	42.0	28	0	...		
XVI.	Grimsby (Killingholme)	5.28	+ 2.36	1.10	16	21	81.5	5	46.0	12	0	...		
XVII.	Mansfield	5.72	+ 2.59	1.34	23	24	82.7	5	41.3	28	0	0		
XVIII.	Manchester (Ardwick).....	5.39	+ 1.47	.55	18	25	83.0	5	44.0	28	0	...		
XIX.	Wetherby (Ribstone)	4.04	+ 1.41	1.02	30	9	...	...	...	...	...	...
X.	Skipton (Arncliffe)	7.11	+ 1.31	2.05	25	25	76.0	4	38.0	1	0	...		
XI.	North Shields	4.76	+ 1.67	.78	23	21	79.0	5	41.2	28	0	0		
XII.	Borrowdale (Seathwaite).....	13.53	+ 2.49	3.76	25	28	...	...	...	...	...	...
XIII.	Cardiff (Ely)	5.85	+ .52	1.07	8	20	...	...	...	...	...	...
XIV.	Haverfordwest	4.89	— .08	.96	21	20	70.6	4	38.0	31	0	...		
XV.	Aberystwith (Goginan) .....	...	...	...	...	...	...	...	...	...	...	...
XVI.	Llandudno.....	4.92	+ 1.73	.87	29	20	72.2	4	45.7	2	0	...		
XVII.	Cargen	5.88	+ 1.61	1.54	25	19	66.8	4	40.2	2	0	...		
XVIII.	Hawick (Silverbut Hall) ...	5.44	+ 1.54	1.26	25	17	...	...	...	...	...	...
XIX.	Douglas Castle (Newmains)..	3.89	— .41	1.03	25	17	...	...	...	...	...	...
X.	Kilmory	3.53	— 1.69	.97	25	18	...	...	34.0	31	0	...
XI.	Appin Airds .....	...	...	...	...	...	...	...	...	...	...	...
XII.	Mull (Quinish)	5.56	...	1.02	7	21	...	...	...	...	...	...
XIII.	Loch Leven	4.50	+ .42	1.10	26	13	...	...	...	...	...	...
XIV.	Arbroath	3.94	+ .61	1.04	25	14	73.0	4	39.0	29	0	...		
XV.	Braemar	4.86	+ .43	2.56	25	23	69.2	4	31.0	23	1	9		
XVI.	Aberdeen	3.16	...	1.35	25	18	70.0	3, 4	36.0	23	0	...		
XVII.	Portree	7.64	+ 2.61	1.31	7	23	...	...	...	...	...	...
XVIII.	Inverness (Culloden)	3.16	+ .16	1.05	26	15	71.0	4	36.0	23	0	2		
XIX.	Dunrobin	1.84	...	.50	25	15	69.5	4	40.0	23	0	...
X.	Sandwick	3.42	+ .52	.69	5	21	64.8	5	42.4	25	0	0		
XI.	Cork (Blackrock).....	5.40	+ 1.57	1.21	23	16	78.0	6, 15	36.0	31	0	...		
XII.	Dromore Castle	6.90	...	.95	24	22	...	...	...	...	...	...
XIII.	Waterford (Brook Lodge) ...	6.52	...	2.08	24	21	69.0	8*	35.0	31	0	...		
XIV.	Killaloe	6.86	...	.94	11	25	80.0	8	41.0	+	0	...
XV.	Portarlington	5.31	+ 2.24	.96	18	25	69.0	4	41.5	20	0	...		
XVI.	Monkstown	5.71	...	.95	28	20	...	...	...	...	...	...
XVII.	Galway	5.50	+ .84	1.02	24	22	70.0	5	44.0	28+	0	...		
XVIII.	Waringstown	4.77	+ 1.33	1.01	25	20	78.0	4	36.0	31	0	...		
XIX.	Londonderry.....	2.86	...	1.02	25	20	72.0	5	43.0	31	0	1		
X.	Edenfel (Omagh)	3.79	+ .14	1.06	25	27	71.0	4	31.0	31	1	0		

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

* And 11, 23.

+ Various.

‡ And 31.

METEOROLOGICAL NOTES ON AUGUST.

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.—A very wet and unsettled month; fine crops, which it is impossible to get in; potatoe crop the best for some years, but damaged by the wet.

HITCHEN.—The coldest August for more than 30 years.

BANBURY.—The three latter weeks of the month were disastrous to the corn crops; wheat much mildewed, and in many cases sprouted. T and L on 8th and 23rd; high wind on 10th, 19th, 24th, 25th, and 26th.

CULFORD.—The most dreary August ever remembered, most of the crops if not spoiled will be very much damaged. T on 17th, 18th, and 24th.

COSSEY.—A very fickle month after the 8th, with a low temperature and high winds from N.W., which enabled many farmers to cart and stack their corn in fair order.

BODMIN.—A cold, rainy, and unseasonable month; mean. temp. 62°·1.

CIRENCESTER.—The wettest month in the year to the present time, and the latter part of it cold and ungenial; corn much injured.

WOOLSTASTON.—A very harassing month to farmers; harvest operations, which began early, at a complete standstill for the last three weeks, and the quality of the grain much injured.

ORLETON.—The first seven days were fine and dry, with a temp. above the average, but the remainder of the month was very cloudy and wet; most unfavourable for the ripening and harvesting of the grain crops. Mean temp. nearly 2°·5 below average, and lower than that of any other August since 1860. The bar. was generally low after the 7th, and the wind cold and rough, especially on the 11th, 19th, and 26th. L and T on 8th and 23rd.

LEICESTER.—T and L on 9th and 23rd; L on 27th.

BOSTON.—The constant rain during the month interfered most seriously with the ingathering of harvest; the cutting of the corn commenced at the beginning of the month, and none had been stacked at the end.

GRIMSBY.—After the first week rain fell almost daily, and often in considerable quantities, damaging the corn to a great extent; potatoes have resisted the disease wonderfully. T and L on 8th and 29th.

MANSFIELD.—TSS on 8th, 17th, and 23rd.

ARNCLIFFE.—Unusually sunless and much rain; TS on 18th.

NORTH SHIELDS.—TS on 22nd; T on 4th, 17th, and 21st.

SEATHWAITE.—Fearfully wet weather: four falls of rain exceeding one inch in 24 hours.

WALES.

HAVERFORDWEST.—A rather changeable month; weather close and damp; very wet from 21st to 29th; crops very good and looking healthy, for although much R fell, no harm has resulted to the grain owing to the strong wind and low temp.

LLANDUDNO.—Notwithstanding a few fine days the month was cold, wet, and sunless: Mean. temp. more than 3°·5 below the average.

SCOTLAND.

CARGEN.—A cold dull rainy month: mean temp. 55°·9, 3°·1 below the average; sunshine, 173 hours, 43 hours below average. T on 22nd.

SILVERBUT HALL.—A cold, wet, and sunless month; potatoe disease spreading. T on 22nd.

QUINISH.—The month was like the two previous ones, very wet and cold. The rainfall of the 3 months, June–August, 19·35 in., is greatly in excess of that of any similar period.

BRAEMAR.—A very ungenial, cold month; crops very late.

ABERDEEN.—Sunless and cold except the first few days; rainfall about the

average. Heavy H showers on 27th. The squally weather during the month greatly hindered the herring fishery on the N.E. coast.

PORTREE.—The coldest August on record, and very wet; hard frost on the morning of the 29th, which blackened the potatoes.

CULLODEN.—Month cold and very ungenial; harvest late, turnips improving considerably.

SANDWICK.—Cold, from the prevalence of northerly winds; rainfall above the average, and the weather very cloudy. Barometer readings low. Crops about a fortnight later than usual. Wind reached a velocity of 40 miles an hour on 11th and 26th.

IRELAND.

DROMORE.—Hay crop good and heavy, but secured with difficulty, and in some cases injured; potatoes have suffered in heavy ground, but there is still a good crop.

WATERFORD.—Temperature very low all through the month, the rainfall of the 24th, 2·08 in. has only once been exceeded since 1875: 1·07 in. fell in an hour and a half.

KILLALOE.—Only five wetter Augusts since 1848; harvest greatly retarded and much injury to hay crop.

WARINGSTOWN.—The frequent rains of the latter part of the month rendered it very difficult to save late hay, and delayed harvest operations, but up to the end of the month no really serious damage had been done.

LONDONDERRY.—Crops looking well, and harvest work going on vigorously after the 18th.

EXTREME SUMMER HEAT.

A correspondent writes under date Odessa, August 12th—"Referring to the great heat of the present summer in certain parts of the United States and of Europe, especially in England and France, a local newspaper draws attention to a statement, presented to the French Academy in 1811 by Dominic Kassini, asserting that the years 1684, 1686, 1691, 1699, 1701, 1704, 1712, 1726, 1727, and 1781 were also remarkable for extreme summer heat. This list was, however, unaccompanied by details, and the summer of 1793 appears to be the first respecting which complete information exists, and which was probably the most intense that had been known in France up till that time. The preceding spring was a cold one, and lasted so long that household fires were kept up during the whole of June. But on the 4th July a warm wind set in, and by the 8th of that month the thermometer rose to 38 centigrade (100·4 Fahr.) in the shade. That abnormal heat, according to a writer at the time, especially as it followed upon such continuous cold, produced most ruinous effects. Every green thing in the fields dried up, the fruit upon the trees was burnt to cinders, furniture assumed all sorts of strange forms through being warped, and the earth everywhere showed cracks and crevices. This state of things lasted until the 17th of July, when a heavy hailstorm occurred and requickened nature. Although the summer of 1819 was temperate in Europe, it was so hot in Asia Minor that at Bagdad the thermometer rose, even in the most sheltered places, to 120 deg., and at midnight stood at 108. There the season was followed by heavy rains, which caused death to numbers of people, and even destroyed whole caravans during their journey. The next remarkably hot summer occurred in 1822, when, as in the year immediately preceding, fields on some parts of the Continent, especially in Alsace and Lorraine, were so over-run with mice that in the neighbourhood of Strasburg two millions of these little animals were killed in a couple of weeks; and this fact of their appearing in such great numbers in Spring has been accepted by some as a precursor of great heat. The harvest of that year was so early, too, that fresh flour was sold at some of the French markets on the 28th of June. The summer of 1832 is still remembered for its intense heat and its cholera, which carried off 18,400 persons in Paris alone, while that of 1811, on the other hand, is remembered for its abundant vintage and its comet. Since that time, the summers of 1842 and 1875 appear to have been the hottest in Europe."—*Leeds Mercury*.

[Of course we do not hold ourselves responsible for the accuracy of all these statements, but the paragraph seems of sufficient interest to justify preservation.—Ed. M. M.]