

SYMONS'S

MONTHLY

METEOROLOGICAL MAGAZINE.

LIV.]

JULY, 1870.

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THE THUNDERSTORMS OF JUNE 16TH-17TH.

VERY few words of introduction or explanation are required to preface the following accounts with which we have been favoured by several correspondents, and which are followed by a series of extracts from various papers, printed, as is our custom with quotations, in small type. These reports, coupled with those of our regular contributors (on pages 98-100) render the following deductions tolerably certain:—

- I. The storm was felt earliest in Devon, Dorset and Somerset.
- II. In those counties alone was the hail seriously destructive.
- III. The storm was felt gradually later towards the Yorkshire coast.
- IV. The lightning was most destructive in the Midland Counties, but considering its frequency was very harmless.
- V. Very little rain fell except in the Eastern and North-Eastern counties, in several of which it was very heavy, *e.g.*, Granchester Mill, Cambridge, 1·40; Killingholme, 2·25; York, 1·17; Malton, 1·35; and Whitby, 2·00.

To the Editor of the Meteorological Magazine.

SIR,—On the 16th and 17th of June we had a succession of thunderstorms here. The 16th was a very oppressive sultry day, the shade maximum being 80°·4, and the solar 132°. About 5 p.m. dense clouds formed in S.W., and at 5.50 lightning was seen, the flashes occurring about one per minute, followed at 6 by heavy rain. A lull then occurred till 6·45, when the second storm commenced, coming up from S.W. At 7 there was a very heavy fall of hail, with rain, lasting 7 or 8 minutes, the lightning frequent and vivid. The storm passed off to N.E., and the evening was fair till 10 o'clock. The third storm commenced at this hour, and lasted about 20 minutes, the lightning being very bright, accompanied with torrents of hail. The fourth storm commenced at 2 a.m. on 17th, and lasted till 2.40, but although of longer duration, was much less violent than the preceding ones. All the storms came up from S.W., but the wind gradually shifted to W. by daylight of 17th.

A sheep was killed in a field close to the city, by the lightning, and at Shockerwick (4 miles E.) a large quantity of glass in greenhouses was

destroyed by the hail. The bar. fell two-tenths of an inch between 9 p.m. 15th and 9 a.m. 16th.—Yours faithfully,

C. S. BARTER, M.B.

27, *Paragon, Bath*, June 20th, 1870.

BATH.—Thunderstorm on 16th; rain = '69.—C. P. RUSSELL.

To the Editor of the Meteorological Magazine.

SIR,—You will probably like to have some particulars of the remarkable local hailstorm of the 16th instant.

Unfortunately I was from home, and can only give you information as gathered by putting together the accounts of a good many different people.

The storm commenced at Maiden Newton about 4.45 p.m., and lasted 10 minutes or more. The hailstones were of two sizes: the smaller ones precisely of the shape and size of confectioner's "acid drops;" the larger ones more or less oblong, slightly ragged, and at least an inch in one diameter. The weight of these ranged from an ounce to an ounce and a half. The smashing of glass was universal, probably one pane in every three exposed to the storm was broken. No rain fell, and only very distant thunder was heard. There was more or less of this distant thunder for about 12 hours from 3 p.m., and about 9.30 p.m. was a considerable storm close at hand, but I know of no accident. The total rainfall was 0.57, but I expect that the hailballs rebounded out of the gauge funnel.

The storm passed over Abbotsbury, Maiden Newton, Evershot, and Sherborne, but only a little rain fell at Dorchester. The hail was least at the former place, and greatest at the latter, so far as I can learn.

Faithfully yours,

P. H. NEWNHAM.

Frome Vauchurch, Maiden Newton, Dorchester, June 30th, 1870.

STRATHFIELD TURGIS.—Thunderstorm on 16th at 5 and 7.15 p.m., rain = .42.—C. H. GRIFFITH.

To the Editor of the Meteorological Magazine.

SIR,—I send you a few particulars as to the thunderstorm of last night. A large but not very black cloud had been forming and rising in the south from 4 to 7 p.m. At 7.15 the sky was overspread suddenly, and 0.01 of rain fell; no thunder was heard. At 7.45 a short spurt of rain came down, = 0.08. Thunder (not very loud) and distant lightning accompanied it. After this an odd-looking arc—the Cupid's bow of the artists (though I never saw a bow of that shape), appeared in the clouds about 20° S.W. of the zenith. This was formed of some very dark vapour, with a deep grey cloud below it (to which it was the margin) and light stuff above and outside it. I could not perceive that it moved, although of course it was doing so. The lightning began to play along it as the sky grew darker, and rain began to fall heavily. Suddenly one great spread of lightning entirely broke up this

bow; before the flash it was quite distinct; after the flash it was nowhere. Then some pelting rain came down, but no hail, so far as I know. This was at 8.30 p.m. The cloud split into two (as nearly all thunder clouds do with us), and the bulk of it went N.W., and the side slip travelled eastwards. Plenty of lightning appeared, of most beautiful ramifications. I saw one flash like a series of streamers, all tending upward. The reflection was of a pale blue tint, not deep blue, as sometimes. After this storm had divided itself, and while we got its reflex from the north, a deep grey cloud began to rise from due S., and the wind (which had worked from S.W. to N.W.) backed to the S. quite suddenly. This last storm came up at a moderate pace; the lightning was very beautiful, and the rain still more so. We had 0.49 in all, and most of it fell before midnight. Take it altogether, I never knew so nice a storm. There was no violence about it; all the lightning went upward, and a lady might have watched the whole with nothing to make her nervous. The cloud-movements were very slow, and the thunder never cracked at all. In short, the clouds were higher (I think) than in dangerous thunderstorms, and the interchange of electricity seemed to be among them alone.

Yours truly,

R. D. BLACKMORE.

Teddington, June 17th, 1870.

CAMDEN TOWN.—Rain began at 7.35 p.m.; thunder first heard at 7.37 p.m.; lightning first seen in S.W. at 8.2, distant $3\frac{1}{2}$ miles, and came no nearer; the storm kept off and on all the evening, with sharp showers at 10.22 and 11.24 p.m. The lightning was most brilliant (pink) about 1 a.m. on 17th. Total rain, = 0.49 in.—G. J. SYMONS.

To the Editor of the Meteorological Magazine.

SIR,—At 9 a.m., bar. (cor. and red.) read 30.067 falling, thermometer in shade 72°, and wind S.E., but at 1 p.m. it changed to the S., where it remained for the rest of the day. The weather was most oppressively hot, thermometer in shade reached 87°3 and 140° in sun. At 7.30 p.m. distant thunder first heard, and showers with occasional lightning, principally sheet, during the evening.

The storm really began about 11.30 p.m., accompanied with very vivid forked and sheet lightning, and very heavy but not continuous rain, lasting on and off till about 2 a.m., after which the storm gradually subsided. The atmosphere seemed at times suffocatingly hot. The storm clouds appeared to come up from the W., the wind being S., and moved in a N.E. direction. Only 0.20 inch of rain fell here during the whole time. The barometer at 10 at night was 29.885 inches, having fallen 0.182 in. during the day.

Yours truly,

FRANCIS NUNES, M.A., F.M.S.

Heathfield Lodge, Chislehurst, Kent.

To the Editor of the Meteorological Magazine.

SIR,—The great heat of yesterday was last night followed by a very violent and protracted thunderstorm, lasting with little intermission for 7 hours. Distant thunder was first heard in S. about 6 p.m. 7.30 p.m., thunderstorm. Lightning vivid, but not frequent; slight rain at 7.45. 9 p.m., vivid lightning in S. and S.W., with distant thunder. 10.15, violent thunderstorm, lightning incessant and intensely vivid; storm right overhead from 10.25 to 10.40. At 10.30, a tree was struck by lightning at Forty Hill, Enfield. Heavy rain at 10.30. Storm ceased at 11 p.m. 12, midnight, storm again approaching from S.S.W.

17th, 1 a.m., heavy thunderstorm, storm continued till 2 a.m., and vivid lightning and distant thunder in S.E. till 3 a.m.

Barometer at 9 p.m. 29.84, having fallen from 30.02 at 9 a.m. Max. temp. in shade, 88.5; amount of rain gauged, .41.

Yours truly,

THOS. PAULIN.

Winchmore Hill, 17th June, 1870.

HARROW.—Thunderstorm on 16th, rain = .56 in.

To the Editor of the Meteorological Magazine.

SIR,—You may like to have a few notes as to the thunderstorm on June 16th and 17th. We had not much of it here, but it seemed to be severe to the west of this, and to be moving northwards. I left Chelmsford for this place on the 16th at 7.45 p.m., and saw the first flash of lightning about half an hour after in the direction of W. by S., and met the rain about 8.50. The lightning was very frequent, but the thunder not loud enough for me to hear above the noise of my conveyance. The storm approached this between 2 and 3 a.m. on the 17th, with some heavy rain for a short time, but I only marked 0.12 in. after all in the morning. I was told that a heavy shower fell at Dunmow on the afternoon of the 17th. The total rainfall for the last six months has been only 5.06 in., which has fallen on 63 days. The total rainfall has been—

| | | |
|------|-------|-----------|
| 1866 | | 28.03 in. |
| 1867 | ... | 24.50 „ |
| 1868 | | 21.59 „ |
| 1869 | | 25.50 „ |

Total in 4 years 99.62 in.

Average 24.9 in.

So the rainfall of the last six months has been a little more than a fifth of the four whole years' average. The hay crop here is next to nothing. The wheat looks very good.—Yours truly,

EDWARD MAXWELL.

High Roding Rectory, Dunmow, Essex, 1st July, 1870.

To the Editor of the Meteorological Magazine.

Sir,—We have had a continuance of thunderstorms with slight

intermissions, from 9 p.m. on the 16th to 3 p.m. to-day, principally from S.W.; at Granchester Mill the fall was 1·40 in., 1·06 in. of which fell in an hour and a half, from 11.30 to 1 p.m. to day; the thermometer fell 10 degrees, from 70° to 60°, from 11.30 a.m. to 1 p.m.; at Beech House (only two miles distant) we have had only 0·78 in. during the same time, viz., on 16th and 17th.—Yours truly,

JAMES NUTTER.

Beech House, Cambridge, June 17th, 1870.

To the Editor of the Meteorological Magazine.

SIR,—A lightning-storm of the grandest description visited our district last night between the hours of 9 p.m. and 2 a.m. The day had been very sultry; max. temp. in shade 82°; in sun, by vacuum thermometer, 128°; wind S.; the sky a good deal overcast with the higher formations of cloud. About 8.30 p.m., lightning was seen and distant thunder heard in S. or S.E., and from that time the storm continued to approach, till it reached a climax at 10 p.m., with some very vivid lightning, and one crashing peal of thunder, followed by a downpour of rain. From 10 to 11 p.m. there was a partial lull in the storm, though lightning continued to flash rapidly in N.E., accompanied by distant thunder. Soon after 11 lightning began to appear again in S., and from 11.30 p.m. till 2 a.m. of the 17th, there was an almost incessant display of lightning of the most magnificent kind, with a nearly continuous roll of thunder. The frequency and intensity of the electric discharges during this time, especially from about midnight up to 2 a.m., were something astonishing, scarcely, if at all, inferior to the great storm which visited the midland districts on the night of the 29th of last September, of which I sent you a description at the time. A house about a quarter of a mile from the Vicarage was struck by the lightning and the roof injured, but beyond this I have not yet heard of any casualty in our neighbourhood from last night's storm. The amount of rain measured this morning was 0·92 in., a most welcome supply after the long drought. The weather this morning has been overcast, with occasional light showers, and distant thunder at intervals, the wind veering in turn to every point of the compass.

I am, Sir, yours, &c.,

GEORGE T. RYVES.

Sutton Vicarage, 10 miles N.E. of Spalding, June 17th, 1870.

MONKMOOR, SHREWSBURY.—Thunderstorm, rain = 0·15 in.

LANNERCH PARK, ST. ASAPH.—Thunder on 16th; rain, = ·50 in.—WHITEHALL DOD.

To the Editor of the Meteorological Magazine.

SIR,—We had a heavy fall of rain in this district on Thursday and Friday, the 16th and 17th of June, 2 inches falling within 24 hours. The following amounts caught in the experimental gauges show that when there is heavy downpour, with excessive humidity of the air

and little wind, neither size of gauge nor height above ground make much difference.

Magnitude Series.—24 in., 1.93; 12 in., 1.98; 8 in., 1.98; 6 in., 2.00; 5 in., 1.98; 4 in., 2.00; 3 in., 1.99; 2 in., 1.99; 1 in., 2.04.

Elevation Series.—Isolated level, 2.03; at 6 inches, 2.00; at 1 ft., 1.99; at 5 ft., 1.97; at 10 ft., 1.95.

Form and Material Series.—8 in. with flange (zinc funnel), 2.01; 5 in. with flange (copper funnel), 1.98; 5 in. upright rim (zinc), 2.03; ditto (copper), 1.98; 5 in. ordinary rim (copper), 1.98; ditto (zinc), 1.96; ditto, japanned tin, 1.96; ditto glass, 1.96; Crallan's disc gauge, 1.64.

The small quantity caught in the 24 in. gauge is probably occasioned by the flatness of the funnel. For about half an hour it rained at the rate of more than an inch per hour, and at 11.45 a.m. on Friday I noted 0.03 in. in half a minute—3.6 in. per hour. This very heavy splashing rain coming at an angle of about 70°, doubtless caused some out-splashing from gauges with flat or shallow funnels.

I am, Sir, your obedient servant,

F. W. STOW.

Hawsker, Whitby, June 25th.

P.S.—The fall registered at Ling Hill was: top of hill, 1.60; north slope, 1.59; lighthouse garden, 1.74. At Grosmont, 6 miles inland, the fall was 1.70.

BRISTOL.—The storm burst over Bristol about 6 o'clock in the evening, and for upwards of three hours the rain descended on the parched earth, accompanied by vivid lightning and some loud peals of thunder.

WINCANTON.—In Somersetshire the tempest was accompanied by a hailstorm. At Wincanton in that county thousands of panes of glass were broken by the hail. Masses of ice fell which measured 5½ inches in circumference.

DORSETSHIRE.—On Thursday a heavy storm occurred in the neighbourhood of Stalbridge. The hailstones, some of which are described as being as large as pigeons' eggs, were partly globular and partly elongated. They continued to fall for about five minutes, and were followed by drenching rain. During the hailstorm, birds were killed, and the windows of greenhouses, in many instances, destroyed.

WEYMOUTH.—On the 16th there were several thunderstorms coming up from S.S.W., the lower current being from E.S.E., but after 6 p.m. from S.W. and W. Slight rain fell from 2.40 p.m. to 2.45, then heavier from 3.17 to 3.20. Thunder was first heard at 3.30 p.m., and zigzag lightning seen in S. at 3.40, both of which continued till 4.30, with occasional heavy rain. The lightning was only half a mile distant at 4 p.m. This storm gradually died away in the N.E. Another storm came up in the W. at 5 p.m., gradually passing off to N. after 6. I saw forked lightning in the N.W., about 10 miles off, at 6.26. There was distant thunder and lightning in the W. almost incessantly from about 6.20 to 9. The storm came nearer from 8 to 8.45, during which time there were a few showers. Another storm came up at 9 and lasted till 9.37, the lightning being very vivid and of a pink colour, and the thunder occasionally very loud, though the lightning was not less than about 3 miles off, towards the west. This storm was accompanied by heavy rain from 9.30 to 9.36, and 9.40 to 9.45. Distant lightning was seen in the eastern horizon at 10.30 p.m., and occasionally through a fog which had come on, from 11 to 11.15.—E. E. GLYDE.

PORTSMOUTH.—A smart, although brief, thunderstorm has burst over here, passing from a south-easterly to a north-easterly direction, with vivid flashes of

sheet lightning, and rain for a short period fell heavily. The whole was over between 6.30 and 7 p.m.

NEWBERRY.—The lightning was very vivid, and the peals of thunder very loud. The rain fell heavily for some time.

LONDON.—Slowly and surely, as all men who are sensitive to the influences of the atmosphere may have known days and days before, the tempest of Thursday night burst with appalling grandeur over London; that tempest had been collecting its forces for the attack. A heat no greater in degree, perhaps, than the normal heat of an English midsummer, and certainly less than the least heat of the tropics, but very much severer in its kind, had been experienced all over the country, but to a most unsupportable extent by dwellers in the pent-up neighbourhood of cities and large manufacturing towns. At all the meteorological stations, during Thursday, the barometer fell; but, the change being very uniform, the relative distribution of pressure was unaltered. Temperature had fallen a few degrees on our western coasts, but it remained still very high in the east and south of England. Rain and fog were reported from the west, and everywhere the sky was cloudy, the sea being very calm, and smooth as oil. Showers fell in Yorkshire, and revived the hopes of the farmers that the young clover seed sown among the corn may now soon appear. It was late in the evening when rain began to fall, and fall heavily, round London; many persons returning by road from Ascot were caught in the earliest showers, but the full force of the storm was not felt till somewhat later. The vividness of the lightning in London was remarkable. Often it lingered so long as to give the effect of an intensely bright moonlight, and, on its subsiding, the darkness was left blacker than before. We learn, from all parts of the country, that the storm was very general; rain having, in many places, commenced in the daytime, as, for instance, at Liverpool. The disturbed electrical condition of the atmosphere on Thursday night interrupted the working of the telegraphs so much as to cause serious inconvenience to the newspapers, whose intelligence from London was much delayed. A fire, which is supposed to have been caused by lightning, broke out about 10 o'clock on Thursday night, at Stoa's Nest Farm, Coulsden, Surrey, in the occupation of Mr. G. Smith. A stack of hay of about 50 loads, and three straw stacks of 20 loads each were destroyed; a cow-shed, two stables, a cart-shed, and a granary were burnt, and had fallen down; the store-shed and contents were slightly damaged by fire and water. A house of three rooms, occupied by Mr. J. Kent, was burnt, and another house seriously damaged. The storm seems to have passed over nearly the whole of England, and was everywhere accompanied by heavy rains, which will prove of the utmost value to the crops. About a quarter to 1 in the morning, the lightning broke a large window in a shed of the London Gaslight and Coke Company, in Battersea.

COULSDEN.—The storm of last night was very severe at the village of Coulsden, near Croydon. It was reported that a man named Joshua Martin was killed by lightning, and that a girl had shared his fate.

CAMBRIDGE.—The storm continued here for several hours; the lightning was unusually vivid, and several fires were occasioned by it in the neighbourhood. An old malting, situated about nine miles from the town, was burnt down. Several fires were caused by the electric fluid at Swavesley and other places in the locality.

LEICESTERSHIRE.—The storm here was one of the most severe witnessed for some years. The drought has been severely felt in this county, and the unfortunate results of a short supply of rain are made evident by the unusually slight crop of hay, which has been mown within the past week to prevent the scorching rays of the sun from burning up even the small crop there was to gather in. At about 10 o'clock on Thursday night the storm was at its height, and the rain poured down in sheets of water, which in a few minutes literally flooded the fields which a few hours before were dry and parched.

LINCOLNSHIRE.—The storm raged here with great intensity. Widespread alarm was felt in the district, and not without reason, as was proved by at least one event. Several accidents are reported, though no definite particulars have been obtained regarding them. A curious incident occurred in the neighbourhood of Long Sutton. The lightning struck a horse, singed the hair over one of the

animal's eyes, cut a piece out of its back, and slightly injured it in one of the hind legs.

THRAPSTONE. — At Thrapstone, Northamptonshire, a man was struck by lightning, and is not expected to recover.

HEMSWELL. — About 5 o'clock on Thursday night, during the thunderstorm which then prevailed, a woman, named Mrs. Atkinson, was struck dead by a flash of lightning at Hemswell, near Gainsborough. She sat at tea in her own house at the time. A man who was sitting at the table had his arm greatly scorched.

STAINWELL. — In the north of Yorkshire about a third of an inch of rain fell on Thursday night. Shortly before noon on Friday another thunderstorm set in, accompanied by exceedingly heavy rains. At Stainwell a few sheep were killed by the lightning, but no other accident is reported from Yorkshire.

MALTON. — The heaviest rainfall ever registered at Malton occurred between 10 a.m. and 2 p.m. on Friday, when 1·85 in. of rain fell, equivalent to 135 tons of water to the acre. At 2 p.m. rain ceased, and up to Saturday night no further fall occurred. On Saturday the farmers reported that the rains will afford a capital turnip season, but that they are too late for the corn and hay crops, especially on sandy lands. Old hay has risen £1 per ton. Clovers to mow and graze after sell from £8 to £12 per acre, and bad crops.

SCARBOROUGH. — The long wished for rain began to fall at Scarborough and in the neighbourhood on Thursday evening, several smart showers coming down freely up to nine o'clock, accompanied with thunder and lightning. About two o'clock yesterday morning, rain, with thunder, again occurred. The morning after that time was not so unfavourable as to prevent an excursion train to the York Gala from being well freighted; but from 10 o'clock until three it rained heavily and incessantly. Considerable damage was done in several gardens, the heavy rain washing and scouring the earth away. Shortly before noon, thunder and lightning prevailed, one particular flash being of remarkable intensity, while the thunder was so loud as to cause sensible vibration. The lightning struck the roof of the house, No. 7, Albemarle-terrace, partially stripping it of slates and breaking the spars. Several people were momentarily stunned, but nothing more serious has been reported.

Heavy thunderstorms were again experienced in the eastern counties on Friday, and torrents of rain fell throughout the day.

THE HEAT IN JUNE, AND THE DROUGHT.

WE have been favoured with many notes upon the above subjects, several of which we append.

With respect to the heat, allowance must be made for differences of stand and of position; subject to this, the following abstract will be interesting:—

ENGLAND.

| <i>Six Highest Returns.</i> | | <i>Six Lowest Returns.</i> | |
|------------------------------|-------|------------------------------|-------|
| Middlesex, Winchmore Hill. . | 92°·0 | Devon, Ashburton..... | 75°·0 |
| London, Camden Square | 91°·2 | Northumberland, N. Shields.. | 75°·8 |
| Kent, Beckenham | 90°·8 | Cornwall, Bodmin..... | 76°·0 |
| „ Greenwich Observatory. | 90°·2 | „ Penzance | 77°·0 |
| Middlesex, Harrow | 90°·0 | Devon, Dartmoor | 77°·0 |
| Leicester, Wigston..... | 90°·0 | „ Sidmouth | 77°·5 |

Concerning the drought, we leave our correspondents' letters and the usual monthly table and remarks to speak for themselves—supplementing them only by drawing attention to the large hay crop in parts of Scotland and Ireland. In London we have had about seven inches rain in six months, instead of twelve inches, or very little more than half our average; and in the last three months two inches instead of six and a half,

To the Editor of the Meteorological Magazine.

SIR,—In comparing the thermometer readings in the *Meteorological Magazine* with my observations here, I find that the maximum in London in May was $85^{\circ}\cdot 1$; Maidstone, 87° , &c., &c. Here it only reached $68^{\circ}\cdot 6$. Our minimum was $34^{\circ}\cdot 0$. I also observe the highest temp. in the shade at Greenwich on the 22nd of June was $90^{\circ}\cdot 2$; at Sidmouth it was $77^{\circ}\cdot 5$. The thermometers have been verified at Kew. The rainfall in June was $0\cdot 65$, falling on 4 days. It may be gratifying to some people to know where the temperature is lowest at this time of year.—I am, truly yours,

J. I. MACKENZIE, M.B., F.M.S.

Sidmouth, June 4th, 1870.

To the Editor of the Meteorological Magazine.

SIR,—On 21st inst. my maximum thermometer in Stevenson's stand read $83^{\circ}\cdot 5$; on 22nd, $86^{\circ}\cdot 7$. Highest solar reading, 21st, $142^{\circ}\cdot 5$; 22nd, 141° ; solar thermometer *in vacuo*, bulb and one inch of stem blackened, placed on grass. To-day the minimum temperature (3 a.m.) 49° .—Yours faithfully,

C. S. BARTER, M.B.

27, The Paragon, Bath, June 24th, 1870.

To the Editor of the Meteorological Magazine.

SIR,—I think you would like to know the account of rainfall here for six months, to compare with others:—

| | Inches. | No. of Days. | Greatest fall. | |
|----------------------|---------|--------------|----------------|----------|
| January | 1·98 | 16 | 0·33 | on 7th. |
| February | 2·27 | 9 | 0·83 | on 6th. |
| March (up to 12th). | 1·01 | 4 | 0·49 | on 2nd. |
| March (13th to 31st) | ·08 | 2 | | ... |
| April | 0·45 | 5 | 0·26 | on 29th. |
| May | 1·16 | 6 | 0·51 | on 11th. |
| June | 0·65 | 3 | 0·55 | on 16th. |
| Total in six months | 7·60 | 45 | | |
| Total from March 13 | 2·34 | | | |
| to June 30, incl.. | | | | |

I am, yours faithfully,

JOHN DRUMMOND.

The Boyce Court, Gloucester, 1st July, 1870.

To the Editor of the Meteorological Magazine.

SIR,—As you will probably be giving statistics of the drought in the next number of your *Meteorological Magazine*, I forward particulars for this district. I am inclined to think the western half of Berkshire has suffered more than any other in England, for rains have been reported from all parts, while here not the tenth of an inch fell between May 15 and July 1. The thunderstorm of June 16 gave us only $0\cdot 03$, and the showery weather of the 24th and 25th, which in London sent the funds up and wheat down, was represented here by $0\cdot 05$.

Rainfall at Wantage.

| | |
|----------------|-------|
| January | 1·43 |
| February | 1·85 |
| March | 1·42 |
| April | 0·56 |
| May | 1·15 |
| June | 0·09 |
| | <hr/> |
| | 6·50 |

Max. temp., 86°, June 22nd; highest barometer, 30·56, June 6th.

Yours faithfully,

E. C. DAVEY.

Wantage, July 1st, 1870.

To the Editor of the Meteorological Magazine.

SIR,—In your next number of the *Meteorological Magazine* I shall look for some statistics of this long, and, so far as my experience reaches, quite unprecedented drought. In this part of the country we have had no rain to speak of since the snow storm of March 13. The effect on our sandy soil may be “better imagined than described.”

I add a few figures for the sake of comparison.

| | |
|--|--------------------------------------|
| Rainfall on 6 days of April, 0·3200 in., | = 1·2109 below mean of 15 years. |
| „ 7 „ May 0·7500 „ | = 1·1934 „ „ |
| „ 4 „ June 0·5900 „ | = 1·5723 „ „ |
| Total half-year's rainfall on 55 days to June 30, 7·2925 in., | = 3·7688 in. below mean of 15 years. |
| Total rainfall from March 13, 1870, exclusive, to July 3, inclusive, (4 lunar months)..... | 2·15 in. |
| Ditto during thunderstorm in the night of July 11 and morning of July 12, 1868 | 2·36 „ |
| Difference in favour of Jupiter Tonans | <hr/> 0·21 in. |

I am, Sir, yours very truly,

WM. FREDK. HARRISON.

Bartropps, Weybridge Heath, 7th July, 1870.

To the Editor of the Meteorological Magazine.

SIR,—You may like to have my 6 months' rainfall for comparison with others.

| | Rainfall. | | Days, 010. |
|----------------|-------------|-------|------------|
| January | 1·656 | 4·821 | 15 |
| February | 1·120 | | 12 |
| March | 2·045 | 1·471 | 13 |
| April | 0·366 | | 5 |
| May | 0·723 | 3 | 6 |
| June | 0·382 | | 3 |
| | <hr/> 6·292 | | <hr/> 54 |

The rain seems to avoid us here, and on 1st inst., when there was a fair fall at many places, I only had 0·040.

On 22nd June my thermometer on Glaisher stand reached 90·8; my next highest records of the year so far being—

| | | | |
|--------------|------|--------------|------|
| May 21 | 84.5 | June 16..... | 86.5 |
| „ 22..... | 81.4 | „ 19..... | 82.1 |
| June 13..... | 80.9 | „ 20..... | 81.7 |
| „ 14... .. | 82.4 | „ 21..... | 84.7 |
| „ 15... .. | 81.7 | | |

My highest minima were—

| | |
|---------------|------|
| June 3 | 56.0 |
| „ 17 | 59.0 |
| „ 23 | 60.6 |

My lowest (also in June)—

37.9 on June 6th.

I am, dear Sir, yours truly,

PERCY BICKNELL.

Foxgrove, Beckenham, Kent, 4th July, 1870.

To the Editor of the Meteorological Magazine.

SIR,—The rainfall of the past half year being of an extraordinary small amount, I thought you would be interested to have the account of it, which I accordingly enclose, and also a statement shewing the average here for the first half of the year from 1860.

Rainfall in 1870.

| | |
|----------------|-------------------------|
| January | 1.29 |
| February | 1.685 |
| March | 1.92—1st quarter, 4.895 |
| April | .52 |
| May | .99 |
| June | .265—2nd quarter, 1.775 |

| | |
|-----------------|------|
| Half year | 6.67 |
|-----------------|------|

| | |
|------------------------|-------|
| Average, 1860-69 | 12.46 |
|------------------------|-------|

| | |
|------------------|------|
| Deficiency | 5.79 |
|------------------|------|

Rainfall in first half-year from 1860 to 1869.

| | | | |
|------------|-------|------------|---------|
| 1860 | 16.51 | 1865 | 11.935 |
| 1861 | 9.5 | 1866 | 17.735 |
| 1862 | 13.66 | 1867 | 12.4 |
| 1863 | 10.38 | 1868 | 10.15 |
| 1864 | 8.95 | 1869 | 13.395 |
| | | | 124.615 |

| | |
|----------------------------|-------|
| Average for 10 years | 12.46 |
|----------------------------|-------|

Yours truly,

JAMES WESTON.

Tanfield Lodge, Croydon, 2nd July, 1870.

To the Editor of the Meteorological Magazine.

SIR,—The drought and unusual heat we have had is, I think, worthy of notice. The following is our rainfall since January ;—

| | |
|----------------|----------|
| January | 1.44 in. |
| February | 1.01 „ |
| March | 2.24 „ |
| April..... | 0.41 „ |
| May | 0.79 „ |
| June | 0.39 „ |

Total 6.28 in.

The deficiency of rain cannot be far short of 5 inches in this locality, and is, I believe, unparalleled up to the present time.

| Max. in shade. | | Max. in shade. | |
|----------------|-------|----------------|------|
| June 13 | 82°.4 | June 18..... | 74°0 |
| „ 14 | 80°7 | „ 19..... | 82°3 |
| „ 15 | 83°0 | „ 20..... | 78°2 |
| „ 16 | 87°3 | „ 21..... | 82°0 |
| „ 17 | 73°1 | „ 22..... | 89°8 |

The heat in this high situation on the 22nd was very remarkable, and I cannot at all remember feeling anything like it before. The dryness of the air was very great at times during this period of heat.

Yours truly,

FRANCIS NUNES, M.A., F.M.S.

Heathfield Lodge, Chislehurst, Kent, July 1st, 1870.

To the Editor of the Meteorological Magazine.

SIR,—The deficiency of rain the last three months at this place is shown on the accompanying table, which represents the rainfall of the first six months of the driest seasons we have had the last 16 years.

| | 1855. | | | 1858. | | | 1870. | |
|----------------|-----------|--------------|--|-----------|--------------|--|-----------|-------------|
| | Rainfall. | No. of days. | | Rainfall. | No. of days. | | Rainfall. | No. of days |
| January | .47 | 15 | | .79 | 6 | | 1.66 | 21 |
| February | 1.24 | 14 | | .77 | 6 | | 1.14 | 19 |
| March | 1.69 | 17 | | .80 | 9 | | 1.64 | 17 |
| April | .26 | 5 | | 1.93 | 11 | | .43 | 4 |
| May | 2.32 | 12 | | 2.16 | 13 | | 1.14 | 7 |
| June | 1.21 | 11 | | .67 | 3 | | .32 | 5 |
| Total | 7.19 | 74 | | 7.12 | 48 | | 6.33 | 73 |

By the above it will be seen the rainfall of the past three months, April, May, and June, has been under two inches, being less than any three spring months the past 16 years. The total rainfall of the six months contrasts also strongly with that of last year, when upwards of 15 inches fell, while in 1866 nearly 17 in., and in 1860 nearly 18 inches of rain fell in the same time; fortunately the ample fall of last year maintains our wells and springs, otherwise the supply for domestic use would be much less than it now is, but it may be low enough yet before the end of summer.

J. ROBSON.

Linton Park, Maidstone, July 1st, 1870.

THE RECENT DROUGHT.

From the "Daily News."

“At a season of the year when rain is seldom wanting; in March, when ‘a peck of dust’ is worth ‘a king’s ransom,’ in changeful April, and in May, which

is usually but a second April, there has prevailed this year a most unusual drought. The fields have been parched to brownness, cattle have not only been deprived of their usual spring pasturage, but the roots which would have served for their winter food have been injured or destroyed. The hay crop has been a miserable one, and even cereals have been endangered; in fact, all the food supplies of the people have either directly or indirectly been seriously threatened. Yet the moisture which would have refreshed our fields has been all the while close at hand. Even when our skies have been clear during the past few months, the upper regions of air have been abundantly supplied with the water for which our fields have been languishing. The moist south-westers have blown over the country, yet without bringing the needed rain. The skies have even been for the most part cloud-laden, yet the winds have drifted onwards those vehicles of the precious moisture, which needed only a slight change of course to have brought fatness to the land. We have, in fact, been once again reminded how slight the causes are, which may make all the difference to us between abundant rain supplies and droughts such as those of the past three months and the summer of 1868. The moisture-laden air current which comes from over the Atlantic may flow so low that the western hills rob it of its wealth of water, and suffer dry air alone to pass over the rest of the country; or, on the other hand, the south-westerns may range so high as to carry the moisture-laden clouds past our isles, not to discharge their stores of water until they near the upper slopes of the Scandinavian Alps; or, lastly, the south-westerns, may be beaten back through all the summer months by the dry winds from the east, and so a real dryness of the air prevail, as during the exceptional weather of May, 1866. Yet it is comparatively seldom that we owe our droughts to such a real dryness of the upper regions of the atmosphere. The proof of this is found in the fact that our summer nights are seldom cold. In countries where the soil by day 'is as fire, and the wind as flame,' the cold at night is intense; but the moisture in our English skies protects us from these vicissitudes. Yet it is not without a sense of disquietude that the meteorologist regards our skies when drought afflicts the land, for though he knows that abundant supplies of moisture are there suspended, he also knows that those supplies may pass away to nourish other lands than ours, unless the steady flow of the upper air currents be fortunately interfered with.

"It is in seasons of drought that we are led to consider somewhat more thoughtfully than usual what it is that rain really does for our land. There is little in the progress of a shower of rain to indicate the action of nature's giant forces, yet we see really in the shower the unloosening of a mighty spring which has been wound up by the sun's action elsewhere. There is nothing more amazing in the lessons taught by modern science than what we have learned respecting the real significance of the apparently most commonplace phenomena of nature. 'I have seen,' says Tyndall, 'the wild stone avalanches of the Alps which smoke and thunder down the declivities with a vehemence almost sufficient to stun the observer. I have also seen snowflakes descending so softly as not to hurt the fragile spangles of which they were composed; yet, to produce from aqueous vapour a quantity which a child could carry of that tender material demands an exertion of energy competent to gather up the shattered blocks of the largest stone avalanche I have ever seen, and pitch them to twice the height from which they fell.'

"Even as wonderful is the 'force-equivalent' of the rain-showers which nourish our fields. We can well understand that the country should languish when rain is denied to it, if we consider that a day's steady rainfall over a region no larger than Middlesex has been shown to correspond to the action of a force capable of raising more than 3,000 millions of tons to the height of a mile. All the coal which men could dig from the earth in many centuries would not give out, a modern writer tells, 'enough heat to produce by the evaporation of water the earth's rain-supply for a single year.'

"Placed as the British Isles are in the direct course of the Gulf Stream, it may be regarded as on the whole an unlikely thing that for many months together they should be left without rain. Yet it does happen, from time to time, that even when the south-westerns are carrying across our land the moisture-laden air

from the Atlantic, we suffer from protracted droughts. Nay, in our summer months we have commonly more to hope from easterly and north-easterly winds—dry though these winds are—than from the moist south-westers. The steady rains of winter, doubtless, come from the west; but in summer the contrary is often observed, the easterly winds, though dry themselves, forcing the south-west winds which they encounter to part with their supplies of moisture.

“But there are few subjects on which meteorology throws less light than on the causes which influence the dryness or wetness of our summers. At times it would almost seem as though the weather of tropical and sub-tropical regions were brought to us with the northing of the summer sun; and then we have a species of *monsoon* in the rains commencing about St. Swithin's Day. But during other summers an irregular variation prevails, corresponding more closely with the position of our country within the temperate zone.

“The attempts to discover any traces of periodicity in the recurrence of dry and moist summers has not hitherto been rewarded with success. If Professor Piazzi Smyth, the Astronomer Royal for Scotland, should succeed in establishing his strange theory that there are what he calls supra-annual changes of temperature—that is, variations taking place in a period not associated with the common year—it may be just possible that some trace of connection between these changes and the occurrence of moist and dry seasons may be detected. It would be surprising indeed if, as Professor Smyth suggests, some of our weather changes should be found in any way associated with the red flames around the sun; but, undoubtedly, the evidence yet adduced on this point is far too narrow to establish a theory upon.

“Nor again does there seem to be any evidence in favour of the view that our climate is undergoing a gradual change whether as respects temperature or humidity. Two such seasons of drought following so closely as those we have experienced during the past months and in 1868, might lead us to fear some such change, especially since it is a well-known fact that in some countries the rainfall has notably diminished in the course of so short a period as twenty or thirty years, remaining thenceforth permanently less than of yore. But it needs only a moderate acquaintance with the records of past seasons to enable one to record instances of droughts even more remarkable than that of 1868, when the sparks from passing locomotives fired the grass on railway cuttings and embankments. Hear, for instance, how Gilbert White, of Selborne, describes the heat which prevailed during the summer of 1783. ‘The heat was so intense,’ he says, ‘that butcher's meat could hardly be eaten the day after it was killed, and the flies swarmed so in the lanes and hedges that they rendered the horses half frantic and riding irksome. The country people began to look with a superstitious awe at the red lowering aspect of the sun. Milton's noble simile in his first book of *Paradise Lost* frequently occurred to my mind, and it is indeed particularly applicable, because, towards the end, it alludes to a superstitious kind of dread with which the minds of men are always impressed by such strange and unusual phenomena :—

“ ‘As when the sun new risen
Looks through the horizontal, misty air,
Shorn of his beams; or, from behind the moon,
In dim eclipse, disastrous twilight sheds
On half the nations, and with fear of change
Perplexes monarchs.’ ”

ON THE RAINFALL OF SOUTH-WESTERN EUROPE AND ALGERIA.

(Concluded from page 70.)

The clouds which thus arrive from the Mediterranean, are condensed in winter principally on the shore, the first cold surface, although low, which they meet. In spring, when the soil is warmer, the vapour-bearing clouds pass it, and are condensed on the high lands—cold, by

virtue of their altitude. In summer the high temperature of the air and of the soil is almost entirely opposed to condensation, especially on the shore, except during storms, and the clouds pass even the loftiest plateaux and lose themselves in the dry aerial ocean of Sahara and the whole interior of Africa. Lastly, in autumn, when the soil cools, the rain on the coast is relatively greater than that on the high lands.

An appendix gives a short note on the rainfall observed during the last few years at the military hospitals, and at Biskra.

[We are sure our readers will agree with us in thinking that the considerable space we have devoted to a partial re-production of Professor Raulin's memoirs has not been greater than their importance merits. The detail in which we have given them renders it unnecessary for us to add many remarks, but there are a few points which claim attention, and if these notes indicate hesitation on our part to accept all the data, we wish it distinctly understood that it is with some of the observations, and not with Professor Raulin, that we are dissatisfied.]

In Professor Raulin's previous memoirs, he has generally given the height of the rain gauges above the ground, as well as their altitude above sea level. That he has not done so in this case, materially lessens the value of the returns, and can only, we presume, be due to a lack of information.

Our main objection, however, is to the general tables converted on pages 50 and 51 of this magazine. Of these we will quote a few instances; and, first, the returns from Djedjeli. The fall in 1862, 71·11 in., is 29 inches *above* the average; at the nearest stations, Constantine, it was 4½ inches *below* the average; at Sétif 3 inches below, and at Bougie 14 inches below. At most stations it was about 5 inches below, therefore, Djedjeli reports 34 inches more than seems probable, *i.e.*, 71 instead of 37. Possibly Professor Raulin has the *monthly* values, if so, he may be able to throw some further light on this.

Another puzzling return is Bougie, in 1866, 74 inches, or 22 inches *above* the average, while *every* other station was more or less below it.

Lastly, it is of the very highest importance that the record kept by the officers of the department of Ponts-et-chaussées (usually such good observers) should be closely examined. Thirty years' observations are given, the decennial means being—

| ALGIERS. | | CONSTANTINE. | |
|----------|---------|--------------|----------|
| 1838-47 | = 37·01 | 1838-47 | = 29·020 |
| 1848-57 | = 31·73 | | |
| 1858-67 | = 26·05 | 1868-67 | = 23·912 |

Hence we find reported a decrease of 30 per cent. in 20 years, and this decrease is confirmed by the returns from Constantine, but flatly contradicted by the observations made by M. Hardy at a second station in Algiers, which for a few years agree with those of the department, but latterly, when the officers of the Ponts-et-chaussées were reporting about 25 inches, M. Hardy was stating the fall to be 40 or 50 inches. The Oran register, which alone is available in considering this point, shows little variation, and, if anything, a slight increase.

Hence, we are not only left in uncertainty as to the actual fall at Algiers, but also as to its being increasing, stationary, or decreasing.

Professor Raulin has, however, done good work, and it would be completed by the gauges being carefully examined, and their construction and position described by himself or some competent deputy.—Ed.]

FINE MIRAGE IN THE CHANNEL.

To the Editor of the Meteorological Magazine.

SIR,—The party on board my yacht "Hadassah," on her passage from Alderney to Guernsey on Saturday, 21st May, witnessed a phenomenon so striking, and in these latitudes so rare, that I am tempted to send you a short account of it. The wind was light from E.N.E., the sky cloudless, the sun very hot, and the barometer steady at 30·21. There had been some signs of fog in the morning, but they had disappeared. At about half-past three in the afternoon we observed over the small island of Herm a peculiar hazy reflection, which became more and more defined until it presented an exact inverted image of the land beneath. A similar effect was soon visible round the whole horizon. The islands Alderney, Guernsey, Jersey, Sark, and Herm, seemed raised to more than twice their natural height; sharp pointed outlying rocks were capped with inverted images of themselves, apparently balanced upon them point to point like enormous rocking stones. The Ortach rocks, of which we had previously lost sight, were now to be seen with startling clearness in the air. The Casquets, with its three lighthouses, presented a most curious appearance: the lighthouses were drawn out into colossal pillars, on whose summits rested a huge mass of rock, clearer in outline than the real island beneath. Ships were seen sailing keel upwards through the air, every sail and spar distinct, and in some cases the images were re-duplicated. Several of the vessels thus reflected were below the horizon and invisible to us. The northern end of Guernsey, where the land runs low, was twice reflected in the air, so distinctly that even those who were familiar with the island found it hard to recognize it. We seemed to be looking at some half submerged country, where countless still lagoons were divided from each other by narrow strips of land. As we neared Guernsey the picture became less distinct, but meanwhile the mirage was becoming more wonderful still over Alderney. Here the deeply marked cliffs were magnified to an apparent height of many hundred feet, and no scene painter devising a grand transformation scene ever dreamed of more fantastic groups of basaltic columns, grottos, and rock arches, with the tide flowing beneath, than was exhibited by the island and the isolated stacks around it. Having remained visible for more than three hours, the panorama of wonders gradually faded away, and by seven o'clock the horizon was clear save where a dark narrow line of cloud or mist hung low in the N.E. I may add, for the information of weather prophets, that this unusual state of atmosphere was not the forerunner of high wind or any change in the weather.

THOS. WARING.

Schooner "Hadassah," Queenstown, June 15th,

JUNE, 1870.

| Div. | STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.] | RAINFALL. | | | | | Days on which -01 or more fell. | TEMPERATURE. | | | | No. of Nights below 32° | |
|--------|---|----------------|--|----------------------------------|-------|------|------------------------------------|--------------|------|---------|---------|----------------------------------|--|
| | | Total Fall. | Differ- ence from average 1860-5 | Greatest Fall in 24 hours. | | Max. | | Min. | | | | | |
| | | | | Dpth | Date. | Deg. | | Date. | Deg. | Date. | | | |
| | | | | | | | | | | | inches. | in. | |
| I. | Camden Town | ·83 | — 2·22 | ·49 | 16 | 3 | 91·2 | 22 | 43·5 | 6 | 0 | 0 | |
| II. | Maidstone (Linton Park) | ·32 | — 2·42 | ·16 | 1 | 5 | 88·0 | 22 | 43·0 | 6, 10 | 0 | 0 | |
| III. | Selborne (The Wakes) | ·51 | — 2·72 | ·24 | 16 | 3 | 82·8 | 22 | 39·0 | 24 | 0 | 0 | |
| III. | Hitchen | ·79 | — 1·85 | ·57 | 16 | 5 | 81·0 | 22 | 44·0 | 6 | 0 | 0 | |
| IV. | Banbury | ·75 | — 2·53 | ·32 | 24 | 8 | 85·0 | 22 | 41·0 | 6 | 0 | 0 | |
| IV. | Bury St. Edmunds (Culford) | ·98 | — 1·60 | ·55 | 24 | 6 | 85·0 | 16‡ | 40·0 | 5, 6, 9 | 0 | 0 | |
| V. | Bridport | ·76 | — 2·48 | ·50 | 16 | 2 | 79·0 | 22 | 41·0 | 14 | 0 | 0 | |
| " | Barnstaple | ·92 | — 3·20 | ·78 | 1 | 4 | 80·0 | 22 | 46·0 | 24 | 0 | 0 | |
| " | Bodmin | ·91 | — 3·13 | ·54 | 16 | 11 | 76·0 | 21‡ | 47·0 | 24 | 0 | 0 | |
| VI. | Cirencester | ·75 | — 2·63 | ·65 | 16 | 2 | ... | ... | ... | ... | ... | ... | |
| " | Shiffnal (Haughton Hall) | ·54 | — 2·57 | ·16 | 24 | 9 | 81·0 | 21 | 43·0 | 6 | 0 | 0 | |
| " | Tenbury (Orleton) | ·61 | — 2·91 | ·38 | 16 | 7 | 85·2 | 22 | 38·0 | 6 | 0 | 0 | |
| VII. | Leicester (Wigston) | ·60 | — 2·16 | ·18 | 12 | 6 | 90·0 | 16 | 35·0 | 5 | ... | ... | |
| " | Boston | 1·60 | — ·59 | ·73 | 16 | 9 | 85·0 | 19 | 42·6 | 6 | 0 | 0 | |
| " | Grimsby (Killingholme) | 3·86 | ... | 2·25 | 16 | 14 | 77·5 | 22 | 41·0 | 6 | 0 | 0 | |
| " | Derby | 1·23 | — 1·66 | ·58 | 16 | 13 | 82·0 | 22 | 43·0 | 27 | 0 | 0 | |
| VIII. | Manchester | 1·79 | — 1·55 | ·30 | 16 | 16 | 82·0 | 19 | 43·0 | 2, 6, 7 | 0 | 0 | |
| IX. | York | 2·81 | + ·71 | 1·17 | 16 | 13 | 78·0 | 23 | 44·0 | 6, 28 | 0 | 0 | |
| " | Skipton (Arncliffe) | 3·52 | — ·58 | 1·30 | 1 | 16 | 80·0 | 9 | 39·0 | 28 | 0 | ... | |
| X. | North Shields | 2·44 | — ·30 | ·73 | 26 | 15 | 75·8 | 21 | 43·0 | 10 | 0 | 0 | |
| " | Borrowdale (Seathwaite) | 4·25 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| XI. | Cardiff (Town Hall) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| " | Haverfordwest | 1·18 | — 2·47 | ·54 | 16 | 3 | 76·5 | 21 | 43·5 | 23 | 0 | 0 | |
| " | Rhayader (Cefnfaes) | ·90 | — 3·08 | ·42 | 16 | 10 | 78·0 | ... | 42·0 | ... | ... | ... | |
| " | Llandudno | 1·06 | — 1·23 | ·39 | 11 | 6 | 79·2 | 6 | 47·5 | 1 | 0 | 0 | |
| XII. | Dumfries | 1·51 | — 1·39 | ·24 | 15* | 15 | 81·5 | 6 | 43·0 | 23 | 0 | 0 | |
| " | Hawick (Silverbut Hall) | 1·86 | ... | ·43 | 24 | 13 | ... | ... | ... | ... | ... | ... | |
| XIV. | Ayr (Auchendrane House) | 2·40 | — ·95 | ·30 | 12 | 17 | 73·0 | 6 | 44·0 | 28 | 0 | 0 | |
| XV. | Castle Toward | 2·32 | — 1·17 | ·52 | 12 | 16 | 77·0 | 6 | 43·0 | 11 | 0 | 0 | |
| XVI. | Leven (Nookton) | 1·91 | — ·33 | ·44 | 30 | 16 | 74·0 | 6 | 41·0 | 18 | 0 | 1 | |
| " | Stirling (Deanston) | 1·72 | — 1·20 | ·25 | 26 | 16 | 78·2 | 6 | 38·0 | 10 | 0 | 0 | |
| " | Logierait | ·75 | ... | ·20 | 3 | 12 | ... | ... | ... | ... | ... | ... | |
| XVII. | Ballater | 1·20 | ... | ·18 | 24 | 11 | 78·5 | 21 | 36·0 | 13 | 0 | ... | |
| " | Aberdeen | ·92 | ... | ·29 | 11 | 11 | 80·5 | 21 | 40·7 | 12 | 0 | 5 | |
| XVIII. | Inverness (Culloden) | 1·69 | ... | ·55 | 1 | 14 | 70·2 | 6 | 42·8 | 12 | 0 | 0 | |
| " | Portree | 3·66 | — 1·12 | ·45 | 25 | 24 | ... | ... | ... | ... | ... | ... | |
| " | Loch Broom | 2·36 | ... | ·42 | 24 | 17 | ... | ... | ... | ... | ... | ... | |
| XIX. | Helmsdale | 1·00 | ... | ·11 | 10† | 16 | ... | ... | ... | ... | ... | ... | |
| " | Sandwick | 1·70 | + ·16 | ·29 | 24 | 22 | 65·2 | 21 | 40·0 | 10 | 6 | 1 | |
| XX. | Cork | ·64 | ... | ·26 | 15 | 5 | ... | ... | ... | ... | ... | ... | |
| " | Waterford | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| " | Killaloe | ·71 | — 2·91 | ·36 | 11 | 10 | 81·5 | 5 | 39·0 | 17* | 0 | 0 | |
| XXI. | Portarlington | ·86 | — 2·39 | ·29 | 17 | 16 | 77·5 | 6 | 45·0 | 1 | 0 | 0 | |
| " | Monkstown | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| XXII. | Galway | 1·45 | ... | ·72 | 11 | 12 | 78·0 | 5, 7 | 45·0 | 25 | 0 | 0 | |
| " | Bunninadden (Doo Castle) | 1·53 | ... | ·57 | 11 | 15 | 77·0 | 6 | 37·0 | 17 | 0 | 0 | |
| XXIII. | Bawnboy (Owendoon) | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | |
| " | Waringstown | ·95 | ... | ·34 | 11 | 14 | 83·0 | 5 | 44·0 | 11 | 0 | 0 | |
| " | Strabane (Leckpatrick) | 1·75 | .. | ·26 | 11 | 21 | 78·0 | 5 | 40·0 | 1¶ | 0 | 0 | |

* And 23. † And 19. ‡ And 22. § And 5, 18. || And 28. ¶ And 11, 22.
+ Shows that the fall was above the average; — that it was below it.

METEOROLOGICAL NOTES ON JUNE.

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

ENGLAND.

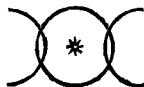
CAMDEN TOWN.—TS from 7.37 p.m. on 16th, to 3 a.m. on 17th; L very vivid.

LINTON PARK.—A very dry but not particularly hot month. T on 4th, 17th, and 23rd; bar. mostly high, excepting on 1st, 9th, 10th, and 11th; winds changeable, but mostly S.W. and W.; vegetation suffering from want of R, there being scarcely any hay; wheat in ear on 11th, being two or three days sooner than the average.

SELBORNE.—The drought during this month has been most injurious to the hay and root crops as well as to gardens; in the last three months less than 3.00 in. of R has fallen. On the 16th, about 6 p.m., during a short TS, a remarkable appearance was observed N.W. of Selborne—a ball of fire falling and leaving a line of light. It is reported that about two miles distance from Selborne the ground was struck and the soil scattered. S.W. wind prevailed from the 9th to the 23rd, afterwards variable; on the 1st the max. temp. was only 56°·5, the lowest for that day that I have known for several years.

HITCHEN.—T on 16th.

BANBURY.—TS on 16th and 17th; solar halq at 11 a.m. on 9th.



CULFORD.—T on 16th and 17th. Another month of extreme drought, and accompanied with high temp. from the 8th to the 24th, when a considerable decrease took place; severe TS on the night of the 16th, with (no?) R falling, and only a slight fall on the 17th amounting to 0.08 in.; T again on 24th, with .55 in.

BRIDPORT.—Very fine month; hay crops very short; heavy T and L on 16th, commencing at 4 p.m. and lasting till 10 p.m., with heavy R. In the neighbourhood there were heavy hailstorms, large flat hailstones fell two inches across and as large as walnuts, breaking a great quantity of glass; R much wanted.

BODMIN.—This month has been remarkable for the continued drought, the springs never having been so low in June within the memory of the oldest person. Average temp. of the month, 61°·6; max. difference of wet and dry bulb, on the 23rd, 8°; average difference, 4°·7.

CIRENCESTER.—A dry and hot month, greatly lessening the hay crops and the growth of straw in the corn crops; but for the R in the middle of May, and the TS on the 16th of June, the spring corn would have been a total failure.

SHIFFNAL.—Exceedingly dry still; temp. up to the 16th, generally exceeding 70°, min., with one exception, not above 55°. The little R that fell dried up directly by the bright sun; pastures burning up; barley coming into ear, only a foot high; prevailing winds N.W. and W.; T in distance on 11th, and again on 16th, only .10 in. of R fell on each day; excessively hot on the 21st and 22nd, when 81° and 78° in shade; next day a sudden fall in temp., which lasted, with N.W. winds, to the end, with little variation. Ash in leaf on 1st; seringa in blossom on 3rd; pear trees infested by grubs, nine-tenths of it destroyed; scarcely a flower on the hollies, which last year were loaded with berries.

WIGSTON.—This locality had not the benefit of the fine R which many parts of the country enjoyed in the middle of the month; corn is generally looking well, particularly wheat, though very short in the stem; no grass; cattle suffering from the continued drought. The last seven days have been very cold and ungenial, with strong breezes. The total fall of R in the last six months has only been 1.50 in. more than fell in May of 1869.

BOSTON.—The first half of the month was remarkable for the dryness and heat of the atmosphere. On the 6th, when the temp. was comparatively cooler and the sky overcast, the dry bulb at 1 o'clock stood at 69°·5 and the wet at 56°; a TS of unusual violence occurred about 10 p.m. on the 16th, and reached its maximum of intensity about 2 a.m. on 17th; the L was more vivid than I ever remember to have witnessed, and the display of the flashes, which continued for many hours without intermission, was grand beyond all powers of description. The hottest day was the 16th, the mean temp. being 70°·1; the black bulb in vacuo in the

full rays of the sun, close to the ground, stood as high as $145^{\circ}2$ on 15th; the hay crops in this district are exceedingly light, and pastures are scanty and brown with the fierce heat; the root crops have also suffered much from the drought; wheat crops, which always agree with dry summers, promise to be abundant, and look exceedingly well; the wheat was in ear on the 20th.

GRIMSBY.—The beginning of the month very dry; no R of any consequence fell before the 16th and 17th, when we had a TS, and 3.00 in. of R fell in about 20 hours; H fell in the form of crystals. The change produced both on corn and grass land was marvellous; wheat began to shoot into ear on 9th, and was in full flower at the end of the month; wild roses began to flower on 13th. During the TS of 16th and 17th a boy was killed at Limber, and the shed which he was in was burnt. The cuckoo sang without its usual stammering note almost to the end of the month.

DERBY.—Another droughty month to be added to the preceding ones, each one of the past half year being below the mean; total, 6.94, against 11.68, the mean of 21 years; to the paucity of R must be added the immense evaporating power of the dry air, which has prevailed so long, still the foliage (excepting the oak) is beautiful; temp. about 2° above the mean, but 2° below that of June, 1868.

NORTH SHIELDS.—TS on 16th; grass cut on the 23rd; strawberries ripe on 22nd, and an abundance of flowers of all kinds.

W A L E S.

HAVERFORDWEST.—A cool, dry June; temp. only reached 70° , or upwards, on seven days; general appearance of the crops, very good; hay quite the average of 20 years. Had it not been for the heavy rainfall, 2.50, which fell on the 11th of May, the drought would have been severely felt here; that R saved us, and accounts for our presenting a better appearance than other parts of the country. Scarletina abating; it has been the most general and fatal epidemic during 25 years. The peculiar state of the atmosphere and singular appearance of the sun last month, was noticed here on 21st, 22nd, and 23rd of May.

RHAYADER.—Very dry month, with wind chiefly N.E.; complaints of great want of food for the cattle and sheep; no herbage on the hills; all crops light, with the exception of wheat.

LLANDUDNO.—Sea fogs on 4th, from 5.30 to 8.45 p.m., on 8th in morning, on 22nd from 10 to half-past in morning, and on 29th, from 8.15 to 9 a.m.; T in afternoon of 16th; eglantine and woodbine in flower in the hedges on 7th; wheat in full ear and barley shooting on 20th; oats in ear on 27th; commenced cutting hay on the 13th.

S C O T L A N D.

DUMFRIES.—The weather, on the whole, has been very favourable for vegetation; during the first five days refreshing showers, to the 11th finer, after which, showery to 19th; close of month fine, with occasional showers; the grain crop looking remarkably fine, rarely been seen so good in this district; grass abundant, and hay a good crop, although the crop suffered from drought in April; the country looks very fresh and beautiful. Temp. of day and night $1^{\circ}34$ higher than June, 1869.

HAWICK.—The copious rains at the latter end of the month came just in time to save the turnip crop, which was suffering much from drought and the fly; there were some large H drops mingled with the T showers of the 24th and 25th; the hay harvest is just commencing, and the crop will bulk largely this season.

AUCHENDRANE.—Bar. slightly above our local mean for June, as were also the bar. range and, more particularly, the mean temp. and the rainfall; but moderate winds, and clouds in excess enfeebled the evaporation, although it exceeded in amount the large rainfall; the weather of this month has been of great fertilizing power, and even the rivers have not suffered from want of water; no TS; never were the woods in finer foliage.

CASTLE TOWARD.—This has been a beautiful month; crops of all kinds, both in the garden and in the field, are abundant and good; the usual supply of stock are unable to keep the grass down; pulled the first strawberries and peas on the 25th.

DEANSTON.—Starlings not numerous, and swallows very scarce this season; about half-an-inch of R in the first three days, then very dry till the 10th, then drizzly and windy; latter part of the month cool and breezy with occasional showers.

LOGIERAIT.—This, upon the whole, has been the finest June for many years; with frequent showers vegetation has made great progress, and, at present, there is the prospect of both an early and abundant harvest; for some days back, however, cold winds have prevailed, and moisture is needed.

BAILATER.—Temp. high during first week, and mean above average for June; rainfall about the average, although the middle of the month was dry, and complaints of injury to crops from this cause were general; northerly winds prevailed, and retarded vegetation.

ABERDEEN.—A warm, dry month, but with very considerable variations of temp.; the crops are looking remarkably well. Max. in sun $148^{\circ}2$ on 21st; min. on grass 28.5 on 12th; fog on 5th, 6th, and 7th; T on 9th, 10th, 15th, 16th, and 17th; L on 10th; H on 10th and 30th; mean bar. and mean temp. above the average, rainfall and wind pressure below it; northerly winds more than usual.

PORTREE.—On the whole, this month has been very cold and stormy, but July has come in very fine.

LOCHBROOM.—This has been a particularly fine month both for the farmer and grazier: the rain is under the average, but the heat has not been great, though the warmth was general, hence the earth retained the moisture, which renders grass and crops quite luxuriant. Never was there a better or earlier crop in this part of the country; turnips have succeeded well, and hay seems plentiful.

I R E L A N D.

KILLALOE.—A remarkable absence of sun, moon, and stars. The smallest rainfall in the month of June for 25 years, the next smallest being June, 1849= $\cdot 73$ in.

DOO CASTLE.—The finest season within the memory of the oldest inhabitant, and this month of June put the climax on the seasonableness. Agricultural prospects high, and everything most blooming. There has been one slight drawback—the prevalence of N. and N.W. winds.

WARINGSTOWN.—Fine, bright, and seasonable; rather cool. All crops looking most promising; hay cutting commenced, and yield in general very large.

REVIEWS.

Report of the Sanitary Committee of the Borough of Nottingham for the year ending December 31st, 1869. Allen and Sons, Nottingham. 8vo, 20 pages.

WE are very glad to find that the Committee have recognised the advantage of making their sanitary year identical with the civil year, and with those of most other towns. It is also issued with commendable promptitude. The meteorological returns are given in praiseworthy detail, and we gladly make a few extracts.

| | |
|--|------------|
| Barometer Highest, December 6th, 9 a.m. | 30.629 in. |
| " Lowest, " 16th, 9.15 p.m.. | 28.761 in. |
| Temp. in Shade, Highest, August 29th..... | 91.2 deg. |
| " " Lowest, December 28th | 11.8 " |
| " in Sun, Highest, July 19th..... | 132.9 " |
| " on Grass, Lowest, December 29th | 8.7 " |
| Total Rainfall (on 192 days) | 27.75 in. |

It would be an improvement if the averages of the various elements for the year, and for previous years, were given at the foot of each column.

NOTE.—Although we have supplemented our usual space by four pages, several articles—"New Instruments at the Gardens of the Royal Botanic Society," Sequel to papers on "Underground Temperature," &c., have to wait for our next.

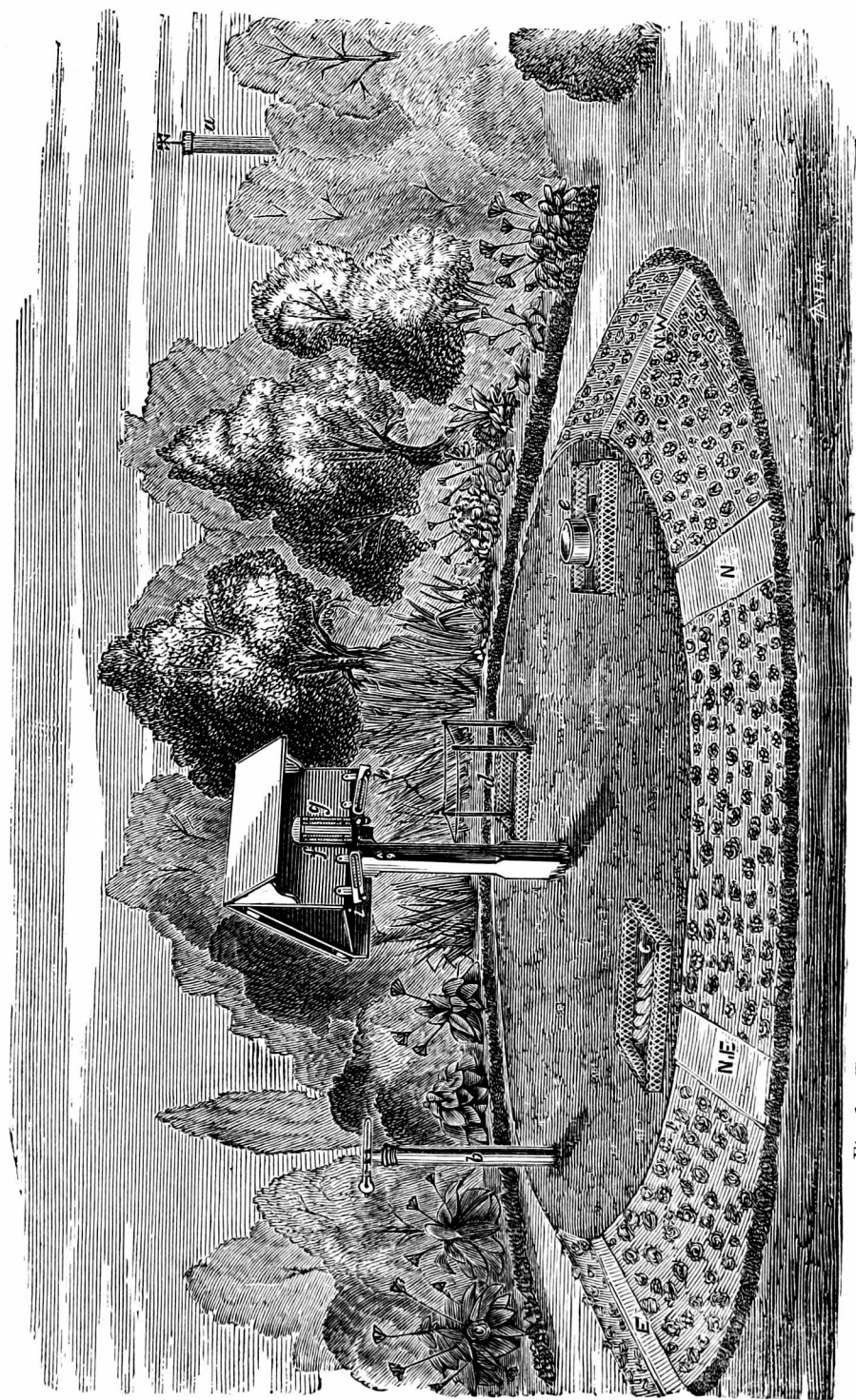


Fig. 1.—THERMOMETRIC GROUND, ROYAL BOTANIC GARDENS, REGENT'S PARK, LONDON.

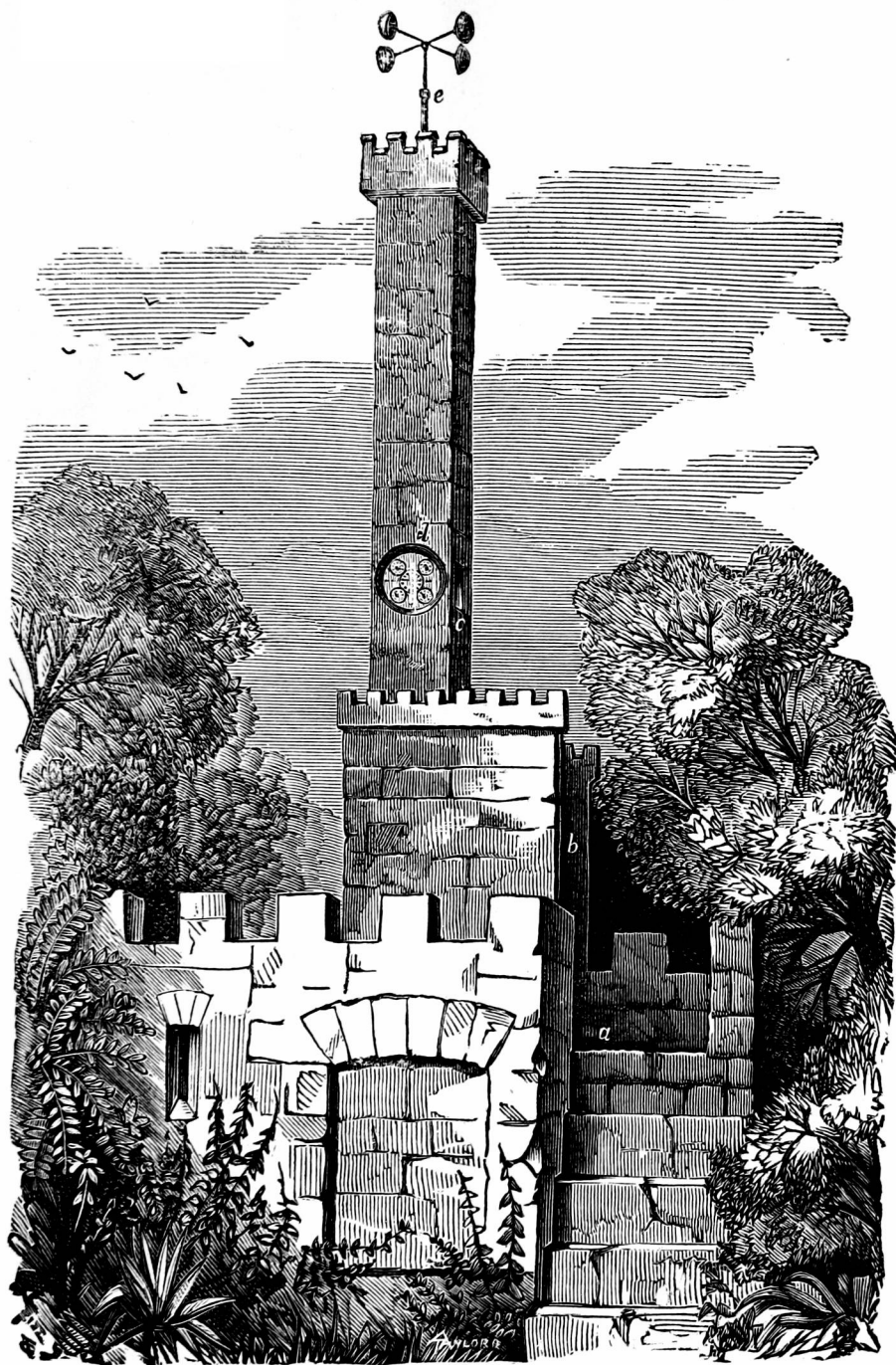


Fig. 3.—ANEMOMETER TOWER, ROYAL BOTANIC GARDENS, LONDON.