

SYMONS'S MONTHLY METEOROLOGICAL MAGAZINE.

XLII.]

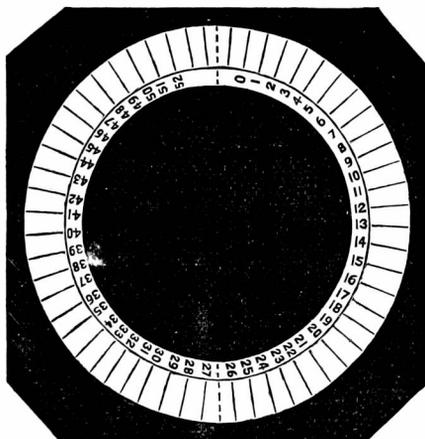
JULY, 1869.

[PRICE FOURPENCE
or 5s. per ann. post free

THE INDICATIONS OF THE SKY.

(Continued from page 66.)

HAVING now to describe Saussure's Cyanometer (κύανος blue, and μέτρον a measure), we have extracted from the pages of almost the only English meteorologist who has used it, his account of the construction and mode of using this ingenious instrument.



“OF THE CYANOMETER.

“One of these instruments having been put into my hands by Professor Pictet at Geneva in the summer of 1816, I brought it home to make trial of its use, but the almost continual recurrence of turbid skies since that period has nearly defeated my purpose hitherto. I shall, however, describe and figure it for the readers' information. The figure is drawn one-fourth of the actual dimensions. I have not attempted to express more than the general outline.

“The Cyanometer of Saussure is, in effect, a circle of small pieces of paper tinted with blue and pasted on a card, which is open in the middle and folds in two with the patterns inward. They are numbered from 0 to 52; the last is or the color of solid indigo, that is, nearly black, and the colors lighten gradually through the whole series till at 0 nothing remains but the white paper; the color goes quite to the outer edge, but on the inner, a space is left for the number. Its use is, to assist the judgment in determining the degree of intensity of the blue color of the sky, which varies greatly in different seasons and still more indifferent

climates and at different elevations in the atmosphere. For this purpose it is held up in such a direction that while a full light falls on the pattern, the sky may be seen at the same time, and the card is turned till the sameness or near approximation of the tint of some number is decided on, which is then set down for the color of the sky.

"This invention is chiefly useful to the traveller, who, in ascending mountains and in changing climates, meets with a range of color to which a single situation scarcely affords a parallel. About half the range of the scale may be found, probably, in our own skies. That they do not attain to the intensity of those on the Continent, is manifest from the surprise with which our travellers view for the first time the blue rivers and lakes of those countries. They forget that they are in fact contemplating, in a natural Cyanometer, a phenomenon, to which, by gradual approach, the eye had already become accustomed when turned to the vault of heaven.

"Simple as this little instrument appears, I have great doubt whether our workmen, who may attempt it, can give it any improvement, save, perhaps, by securing the back with morroco leather and providing a case. The form and size were certainly adopted after mature reflection and different trials. Those who incline to exercise their ingenuity on this subject, may do it with more promise by trying different combinations or thicknesses of *blue glass*, to be viewed against a ground of dead white in the manner above mentioned."

Saussure evidently adopted various sizes, if not actual varieties of the instrument, some being less than 4 inches in diameter, others as much as 8 inches. The mode by which he obtained the large number of 53 gradations was ingenious and careful, although probably liable to error, and we think more troublesome than modern opticians would like to undertake, except at a price which would prohibit the general use of the instrument. In order to draw out its scale, Saussure availed himself of the well-known fact that the difference between two very similar shades of colour is imperceptible beyond a certain distance. Taking, therefore, as his measure of distance that at which a circular black spot 0.15 inch in diameter, painted on a white ground, became invisible, he prepared a series of sheets of paper, coloured with various shades of blue, and beginning with the extremes, he selected a series, the difference of shade between each of which was such as to become invisible exactly at the distance at which the black spot was also imperceptible. It will be obvious from this description that there are very great difficulties in the way of so constructing these instruments that their indications shall be accordant.

Our readers will notice that Howard referred to the possibility of substituting tinted glass. This plan was tried by Professor Trail, who thus refers to it in his Treatise on Physical Geography, in the Seventh Edition of the *Encyclopædia Britannica* :—

"Some years ago we endeavoured to give greater permanence to the tints by employing thin films of blue glass in constructing a cyanometer. The first degree was formed of a single film enclosed between plates of thin crown glass, and each succeeding degree consisted of an additional film."

Saussure* gives a great many results of observations made by himself in various places, which are therefore probably fairly comparable, and show—(1) that the deepest blue is in the zenith at mid-day on mountain

* Voyages dans les Alpes, 4to Genève, 1786.

tops, and (2) that in plains and at all altitudes above sea-level the deepest blue is at mid-day and in the zenith. We greatly object as a rule to long extracts, but when our precursors have expressed in clear and forcible language the views we desire to lay before our readers, we think it more honourable to quote verbatim from their works than to bring forward the ideas of others in words of our own. With this brief preface we proceed to quote from the excellent [but in a perfect state rare] treatise on meteorology by Kaemtz :—

“Blue color of the air.—One part of the luminous rays is absorbed, the other reflected by the air ; the latter, however, does not act equally on all the colored rays, of which white light is composed ; it acts like a milky glass, it rather allows the rays of the red extremity of the spectrum to pass, and, on the contrary, reflects the blue rays ; but this difference is not sensible until the light has traversed large masses of air. De Saussure has shewn that the blue color of the sky is due to the reflection of light, and not to a peculiar color belonging to the aerial particles. If the air were blue, he said, mountains that are very distant, and that are covered with snow, ought to appear blue, which is not the case. An experiment made by Hassenfratz also proves that the blue ray undergoes the greatest reflection. Indeed, the thicker the stratum of atmosphere in which the ray traverses, the more do the blue rays disappear, which make the red ray visible : now, when the sun is near the horizon, the ray traverses a greater thickness of the atmosphere ; thus this body appears to us red, purple or yellow. The predominance of red, and the absence of blue, when the sun is near the horizon, have been confirmed by an experiment of Hassenfratz : he passed the solar light through an opening, and received it on a prism ; he then measured the width of the prism at a certain distance ; the observation was repeated when the sun was at different heights above the horizon. In the long days of summer, at mid-day, the length of the prism was 185 parts ; and in winter, during the shortest days, at sunset, only 70 parts. All the rays of the extreme violet were wanting, for the spectrum was only composed of red, orange and green, an evident proof that all the blue rays had been absorbed. The blue rays also are often wanting in rainbows that appear a short time before sunset.

“Other apparatus has been devised, but all are intended for measuring the intensity of the blue. Now, as the atmosphere presents other colors, such as yellow, red, greyish blue, &c., instruments should be constructed for each of these colors. The following apparatus might serve to indicate the shade of color, but I leave others the care of verifying by actual experiments the utility of this idea. The colour of objects is due to the want of certain of the colors of white light ; thus, then, if we knew the principal elementary colors in white, and in the light coming from any body, we might know the color of that body. In order to determine the number of elementary colors, we should select a perfect prism of flint glass, and fix it at the extremity of a tube 11·8 or 15·7 in. long. The light of a body whose color we desire to know is received through a narrow opening, and the prism decomposes it ; but in order to distinguish the colors well, they are received, as they pass out from the prism, on the achromatic object-glass of an astronomical telescope. By means of a micrometer-screw the length of the spectrum and the width of each color is measured ; in this way we may not only indicate with great accuracy the different shades of the sky, but on repeating the experiment when the sun is at different heights above the horizon, we arrive at a positive knowledge of the number and the nature of the different elementary colors of solar light.

“The mere contemplation of the sky at once proves to us that its color is not the same at all points of the same vertical ; it is generally deeper in the zenith, then it becomes brighter towards the horizon, when it is frequently completely white. This contrast becomes still more striking by the use of the cyanometer. Thus de Saussure found one day that the color corresponding to No. 23 of his cyanometer was in the neighbourhood of the zenith, and that corresponding to

No. 4 near the horizon ; M. de Humboldt arrived at analogous results. But the color of the same part of the sky changes very regularly during the day ; in that it becomes deeper from morning to mid-day, and becomes clearer from this time until evening.

“When we ascend from the plain to mountains the sky appears deeper and deeper ; the chamois-hunters and shepherds have long known this. Deluc was the first to direct attention to this fact, which de Saussure verified in the Alps and M. de Humboldt on the Cordilleras. In our climates the sky has the deepest blue color when, after several days rain, the east wind drives away the clouds. According to M. de Humboldt the sky is bluer between the tropics than in the higher latitudes, but paler at sea than in the interior of countries.

“The color of the sky is modified by the combination of three tints—blue, which is reflected by the particles of air, the black of the vault of heaven that forms the ground of the atmosphere, and finally, the white of the vesicles of fog and flakes of snow that swim in the atmosphere. Indeed, the tint of the blue rays is darkened by the black color of space, and, on the other hand, it is made lighter by the white of the vesicles of fog. When we ascend in the atmosphere we leave a great portion of the vesicles of vapour beneath us, so that while rays reach the eye in less proportion, and the sky being covered with a lesser number of particles reflecting its light, its color becomes of a deeper blue. For the same reason the blue in the neighbourhood of the horizon is less intense than at the zenith. If the sky is paler in the open sea and in high latitudes, than in the interior of the continents and in the neighbourhood of the equator, it must be attributed to the vesicles of fog.”

In spite of ourselves, the above extract has led from the original subject of this article—the cyanometer—to what must, we presume, be held to be its legitimate successor—the spectroscope—and cannot refrain from pointing out how nearly its present form was sketched, five and twenty years since, by the indefatigable Professor of Dorpat. The length of this article precludes our discussing the subject of spectroscopic observations of the atmosphere on the present occasion.

(To be continued.)

THE SPRING OF 1869.

To the Editor of the Meteorological Magazine.

SIR,—It may interest some of your readers to learn a few details of the weather on the north-east coast during the last quarter.

The 27th of March was remarkable for one of the most violent snow-storms I ever encountered, followed by a hurricane of wind at night, accompanied by thunder and lightning. The sea was a magnificent sight on the morning of Easter-day, the only difficulty was to see it without being blown away.

The beginning of April was cold, though not excessively, but from the 10th to the 14th exceptionally hot. At Ripon, on the 11th, the thermometer was as high as 77°, being 2°·5 higher than in the very warm April of 1865. Here the max. was 74° on the 14th. A thunder-storm occurred about 7 p.m. that evening, the cloud rising slowly out of the W. in the afternoon. At Ripon, thunderstorms were passing on different sides from noon to 8 p.m. In discussing the onward movement of a storm, it ought to be remembered that there are often a considerable number of different storms passing simultaneously on the same day in different districts. After the thunderstorm the weather was cold till the 20th, a sharp frost occurring on the 19th.

After this there was fine weather to the end of the month, the temperature however not exceeding 64° here, while at Ripon it reached 74° .

May was remarkable here for cold, cloud, and considerable rainfall. On the 3rd the max. was only 42° , heavy rain continuing all day. On Monday, the 10th, the wind changed for some hours to the S.W., and the temperature rose to 59° , a point never exceeded throughout the whole month. The general direction of the wind was N. to E., but it occasionally blew from the N.W. and S.E. The equatorial current was almost wholly absent, the wind never continuing more than a few hours at a time in the S. and S.W., apparently only passing through those points as it veered round. On three days, the 1st, 11th and 12th, it veered through all the points of the compass within 24 hours. This is considered by the people here a mark of fine weather. I have certainly not observed it except when the sun was powerful. The mean temperature of the air during May was only $44^{\circ}8$, probably one of the coldest Mays ever known. The air was generally moist, and twice, during rain with the wind from the sea, the rain cloud descended to this level (340 feet), causing complete saturation. The neighbouring moors (600 to 800 ft.) were frequently enveloped by it. I have rarely known nimbus in summer descend much below 1000 ft. further inland, even in persistently wet weather in Cumberland, although in winter I have on one occasion emerged *above it* at only 800 ft. Total rainfall in May 3.01 inches, evaporation in 5-inch cylinder, 2.11 in.

June opened with a severe hoar frost, followed by an immediate rise in temperature. It soon became hot, reaching 78° on the 7th, but a reaction set in immediately. A thunderstorm had occurred at 10 p.m. on the 6th, and 24 hours afterwards the cold polar current streamed down from the upper regions of the atmosphere. It seems that thunderstorms occur when the contrast in temperature between the polar and equatorial air-currents is very marked, which seems to be the case this year, but was not so last year, for want of a sufficiently cold polar wind; hence the paucity of thunderstorms last year, and their frequency this. Another thunderstorm occurred on the 15th. The barometer had sunk at 9 a.m. to 29.04; at 3 p.m. clouds gathered; and between 3.30 and 5.30, 0.66 in. fell, the wind veering from S.E. to W. Soon after midnight a terrific gale from N. awoke every one. It is remarkable that the coming storm escaped the vigilance of the Meteorological Office, although their returns for the 15th show a *rapidly increasing difference* of barometrical pressure between stations in the W. and E. The absence of warning doubtless increased the number of disasters. Next morning rain to the amount of 1.02 in. was measured for the 24 hours, and the ther. was as low as 44° . Since then better and warmer weather has prevailed, with a drier air and very little rain. I cannot say, however, that I have observed the drought predicted by Mr. Brumham. I think such researches valuable, but if I may venture on a word of criticism, I must say that in ascribing last year's drought, which began in April, to the position of the moon on July 20th, not long after which (August 6th), wet weather set in,

he did seem to me to "put the cart before the horse"—the effect before the cause. Apologizing for this intrusion upon your space,

I remain, your obedient Servant,

F. W. STOW.

Hawsker, near Whitby, June 28th.

THE TEMPERATURE OF JUNE, 1869, COMPARED WITH PREVIOUS YEARS.

To the Editor of the Meteorological Magazine.

SIR,—That the past month has been an exceedingly dull and cold one, most people will admit, and the annexed figures show to what extent it has been colder than the other years mentioned. Its effects on vegetation would have been more telling, but for the forward state things were in at the end of April, and the good condition of the ground at that time; but as it is, only the most robust herbage makes any progress, tender and delicate things merely exist, and may be said to drag out a wretched existence. The absence of sunshine has also told disastrously on the fruit crop, which in many cases will not be more than one-tenth of what it was last year. Grass has been plentiful, and in places the cereals do not look amiss, there being a prospect of plenty of straw. The unexpected cold has induced many to retain fires in their sitting rooms, and when it is borne in mind that the thermometer has eight times fallen below 40°, and on two or three occasions there were visible tokens of frost, we may conceive what a month we have passed through. It has, however, been a dry month, only 0·87 in. of rain falling; but the same month in 1858, 1867 and 1868, were still more dry, but it has been colder than any corresponding one I have on record excepting 1860, which was a very wet month. The following figures show the average max. and min. temperature in degrees for the 30 days in each month, and also the rainfall:—

	Aver. Max.		Aver. Min.		Rainfall.
June, 1857.....	81·0	.....	50·8	.....	1·67
" 1860.....	66·0	.....	43·6	.....	5·09
" 1865	76·7	.....	48·5	.....	1·17
" 1868.....	74·2	.....	49·0	.....	·51
" 1869.....	67·2	.....	42·8	.....	·87

From the above it will be seen that the temperature of June, 1860, was somewhat lower than the past month, but the rainfall of that year was excessive, 5·09 in. falling on 23 days, doubtless depressed the temperature, whereas the first ten days of the past month were tolerably fine; the night temperature, however, has been lower than I have any record of, and in addition to the frost of the 1st, registered here, other low-lying places in the district reported frosts on 11th, 12th, 15th and 17th. The barometer has usually been high, and excepting about the 10th, when we had thunder, it has been pretty steady. The winds in the early part of month mostly S.W., but latterly have been in a contrary direction; on the 21st it veered from N.E. to N.W., and nearly W., being N.W. at noon that day, when we had rather a heavy shower of rain.—Yours, &c.,

J. ROBSON.

Linton Park, Staplehurst, Kent, July 2nd, 1869.

NOTES ON JUNE, 1869.

6th.—Sharp earthquake at Gibraltar at 5.57 a.m. Mirage prevailed in several parts of the English Channel from 3 to 6 p.m. ; the apparent altitude of Beechy Head was over 1000 ft.

13th.—CULLODEN.—Fresh snow on the high hills, and continuing till the 16th ; it was two inches deep on the Highland Railway at its highest level at Dalwhinnie.

14th.—Snow at Braemar. Gale off Tyne and Tees.

15th.—Snow reported from Dumfries, Auchendrane, Castle Toward, Logierait, and Aberdeen, but only as seen on the hills. From Dumfries it is said to have remained till the 22nd, and from Aberdeen it is stated the hills were several times covered with snow ; nor was the snow confined to Scotland, as it is stated to have fallen at Mesandbecks, Selside near Kendal, and other places on 15th.

SNOW IN JUNE.—The most extraordinary weather at present prevails in the county of Westmoreland, and has done so for many months past. On Wednesday morning (16th) the hills to the north were entirely covered with snow, and the drifts were three or four feet in depth ; nor was this strange and unseasonable phenomenon confined to the higher range of mountains, on the contrary, the white wintry mantle had fallen as far down the valley as Stavely, a village between Kendal and Windermere, and occupying a most sheltered position. The scene was most extraordinary, and, so far as the memory of the oldest inhabitant went, quite without precedent in the whole range of atmospheric phenomena. A sharp cold wind prevailed from the north, and the general appearance of the sky and clouds was more suggestive of February than the middle of June. Indeed, the wind has been, with few exceptions, northerly for the last six months. Vegetation of all kinds is very backward.

15th.—Thunderstorm in London between one and two p.m. ; lightning struck the sailing barge SX lying in the Thames off Charlton, and ignited the straw with which it was laden ; thunderstorm also at Whitby, see page 85.

18th.—Snow 7 inches deep on the Yorkshire Moors.

26th.—Snow on Skiddaw.

MIRAGE ON THE NORTH-EAST COAST.—A beautiful and perfect mirage was visible from Hartlepool on Saturday afternoon. The whole of the horizon of the sea was reflected in the sky, with several ships and screw steamers far out at sea going southwards, plainly visible, inverted on the surface. The town of Redcar, with some minor villages visible on the Cleveland coast, also presented a most singular and beautiful appearance in the air while the mirage lasted. Towards six o'clock the phenomenon gradually faded away, being replaced by heavy masses of dark clouds, which, for a time, presaged a thunderstorm.

26th.—Earthquake at Bologna, which stopped the clocks and rang the bells.

VIOLENT THUNDERSTORM.—A Monaghan correspondent writes :—

"This locality was visited to-day (Sunday, June 26th) by a thunder and rain storm of great severity. The sky about noon became overcast, and shortly afterwards a whirlwind swept round the neighbourhood of Killevan, much to the terror of the inhabitants. In its course it tossed chimneys, stripped houses, tore up trees, and laid cattle prostrate. The sound as it passed resembled the whistling of an engine. Shortly afterwards the rain began to pour, and continued incessantly for two hours, the thunder being absolutely terrific. I have not heard that any serious damage has been sustained."

LUNAR AND SOLAR INFLUENCE ON THE WEATHER.

To the Editor of the Meteorological Magazine.

SIR,—Your correspondent Mr. Ryves appears to have misunderstood some portions of my letter. Allow me to point out a few instances:—

1. There was nothing in my letter to lead to the supposition that I "regarded" a slight deficiency in the seven (not six) months' rainfall (from March to September inclusive) "as sufficient evidence of a drought." If Mr Ryves will refer to that letter, he will see that I gave other evidence. This shows that the deficiency to which he refers was not "regarded" by me "as sufficient evidence of a drought," but merely as a link in the chain of evidence. It is quite true that a slight rainfall deficiency does not of itself prove the occurrence of a drought, but it is equally true that even an average rainfall is insufficient evidence that a drought did not occur. For instance, July, 1826, was a month of such remarkable drought that the meadows were parched up, to the same extent as in 1868, and yet the rainfall, according to Howard, was 2·6 in., which is about the average. This was the result of heavy showers on a few days. In June, 1856, and June, 1865, similar phenomena occurred. In the latter month we had 25 consecutive days without any rain; yet, notwithstanding this prolonged drought, the rainfall of June, 1865, exceeded the average. If we extend our comparison to the whole season, we find a similar analogy between 1826 and 1865. In the former year the rainfall of the period from March to September inclusive, was 14·7 in.; in the latter year the corresponding period gave 14·6 in. So the rainfall of the extremely dry season of 1826 was actually greater than that of 1865. The truth is, in both seasons we had very great drought, with occasional heavy rains or showers. In 1826, however, there was no month so much below the average in rainfall, or so much above it in temperature, as September, 1865, was. So the year which your correspondent thinks very weak in evidence as to drought is in reality very strong. This he must admit, unless he is prepared to assert that the summer of 1826 was not a very dry one; for if his objection applies to 1865, it does equally so to 1826.

2. I never had anything to do with astro-meteorology, as Mr. Ryves supposes. I do not believe in it. The stars (unlike the sun and

moon) are too remote to exert any appreciable influence on the tides of the ocean, and for the same reason they are incapable of exercising any appreciable influence on the air.

3. In the two rules relative to lunar influence I said nothing about heat, nor did I say that hot weather was to be expected in May or June of the present year, as Mr. Ryves thinks I did. Heat sometimes accompanies the drought produced by lunar influence, but the instances are not so frequent as in the drought caused by the solar influence referred to in the last of the rules. Therefore I did not mention heat in the first two rules, or allude to it in the forecast. It was a period of deficient rainfall that I expected and nothing more.

Mr. Ryves thinks that if my "rule has anything in it, it ought to hold good of all places on the same meridian." In answer to this objection, I may say that the laws I gave were deduced from observations made in this district, and as regards these parts they have certainly been invariably correct. Whether Italy, Scotland, and other places are similarly affected by them, or whether through the law of compensation they are affected in a totally different way, must be determined by future investigation.

Your correspondent asserts that in the south of Europe the summer of 1868 "was as exceptionally cold and wet as it was here dry and warm." It is by no means clear that such was the case, although the weather of Rome was so bad. Certainly it was not so in Tuscany. In the *Times* of July 6th, 1868, the special correspondent gives the following account of the weather in the neighbourhood of the capital of Italy:—

"The accounts of the harvest continue exceedingly favourable. Some rain we had last week did much good to the green crops, and no serious damage to the corn in process of cutting. In the province of Pisa, says a paper published in that city, 'the crops of grain exceed all expectations. The oldest among the peasants can hardly remember such a year. Corn is falling in the markets. The recent rains must have benefited the Indian corn, which in some places had begun to suffer from the drought.' " So Tuscany may be set against Rome.

The long period of deficient rainfall which Mr. Ryves seemed to think would not occur, commenced the day after he wrote his letter. The average rainfall at Greenwich for the period between the 28th of May and the 4th of July is about 2.50 in. The amount registered there during the corresponding period of the present year has been 1.15 in., which is more than 50 per cent., below the average of 54 years. In other places a similar deficiency has occurred. In fact the period has been on the whole unusually dry and unusually cold. In the long period of deficient rainfall which should occur or begin next month, it is by no means certain that there will be any continuance of great heat.—Yours, &c.,

G. D. BRUMHAM.

Barnsbury, July, 1869.

REVIEWS.

[We regret to find that some recent reviews in these pages have been thought unnecessarily severe. We do not concur in the sentiment. We hold that if any useful purpose is to be served by reviews, those who write them must never hesitate to mention every point in which the works reviewed fail to reach the most advanced state of knowledge on all the subjects treated of. But in elementary works this rule does not apply, and in such cases the reviewer should see that all branches are developed to an equal extent, and that up to that limit nothing is incorrectly stated. The standard must therefore rise with every advance of knowledge, and the reviewer must keep *au courant* therewith; hence he will be necessarily often compelled to point out defects which can hardly be called faults; hence also a good reviewer will probably have to criticize far oftener than to praise, and hence another instance of the advantages of anonymous journalism. The sole object of this magazine being the *advancement* of the science, we are confident it would be a retrograde and suicidal step to lower by one iota our standards of accuracy, and we are loth to believe that any persons who possess a real desire for the progress of meteorology can disapprove our resolution.—ED.]

Meteorological Report for the Year 1868. By the Rev. R. F. WHEELER, M.A. [From the Natural History Transactions of Northumberland and Durham.] Stanford, 8vo., 82 pages, and folding tables.

This publication continues to improve yearly. In noticing the report for 1867, we pointed out that the editor would confer a benefit in every respect if he abandoned the large folding tables and substituted consecutive paging; this has been done so far as rainfall, temperature, and pressure are concerned, and none but handy sized tables remain. The editor commences by a brief reference to the frequent slight shocks of earthquake felt in 1868, and then proceeds with detailed notes on the several months, prefacing each month by a line or two of an appropriate saw; some of them are common enough, others are new to us, and all are surely worth the little space they occupy.

January—"When the grass grows in Janiveer,
It grows the worse for't all the year."—*Old Proverb.*

Scarcely corroborated by 1869?

February—"February fill dyke, be it black or be it white,
But if it be black, its better to like."—*Old Proverb.*

We never saw this second line before, as to the first three words of the first line, see *British Rainfall*, 1863, page 15, where the fact that February is in many places a dry month is reconciled (by Rev. W. H. Milner) with its filling the dykes, by considering that the month being

dry and often windy, snow does not lie evenly on the ground, but is blown into the dykes, &c., which it fills to the brim, but this explanation is by no means generally accepted. It may be, that as the term "dyke" is a north country one, we have in this proverb a recognition of the high per-centage of rain in the winter months in mountainous districts.

March—"Comes in as a lion and goes out like a lamb."—*Old Proverb.*

April—"March winds and April showers,
Bring forth May flowers."—*Old Proverb.*

May—"Look at your corn in May, and you'll come weeping away ;
Look at the same in June, and you'll come home in another tune."
—*Old Proverb.*

June—"Calm weather in June sets the corn in tune."—*Old Proverb.*

July—"A shower in July, when the corn begins to fill,
Is worth a plough of oxen, and all belongs theretill."—*Old Proverb.*

August—"All the tears St. Swithin can cry,
St. Bartlemy's mantle wipes dry."—*Old Proverb.*

September—"September blow soft till the fruit's in the loft."—*Old Proverb.*

October—"A good October and a good blast,
To blow the hog acorn and mask."—*Old Proverb.*

November—"November take flail, let ships no more sail."—*Old Proverb.*

December—"He who sows his land, trusts in God."—*Spanish Proverb.*

After full particulars of thunderstorms and various other phenomena, a very copious and important series of tables is given. None but those who have themselves undertaken to carry 60 or 70 pages of tabular matter through the press can fairly estimate the pains Mr. Wheeler must have taken to prevent more errors appearing on his pages ; and yet we have two indictments—one against Mr. Wheeler, and one against either Mr. Wheeler or Mr. Symons, and under each indictment there are a series of counts. To take Mr. Wheeler's first. On page 61 the min. temperature in September is 48·60, the max. 65·07, the mean should be 56·835 but it is given as 51·83 ; unfortunately this is not a misprint but a miscalculation, for the annual value is also wrong, and to render it still more provoking the error is repeated on pages 34 and 35. We regret to find that Mr. Wheeler admits tables of temperature with *two* places of decimals ; unless the observers in Northumberland are far ahead of their *confrères* in other parts, we think hundredths of a degree of temperature an unwise attempt at refinement. Another practice to which we demur is that of adopting different methods of obtaining mean temperature at some stations from that at others. For instance, page 60 *et seq.* At North Sunderland, Wallington, Crag-side, Wylam, Seaham, Sedgfield, and Alston, the arithmetical mean of the max. and min. is taken ; but at Bywell, Allenheads, and North Shields, although the same data exist, a different method is adopted.—At Durham both values are given.

The collection of rain returns is remarkably complete and well arranged, but not in all cases correct. We will take first those errors which belong to the author or the printer, and then the more numerous ones in which the error may be chargeable to them, to Mr. G. J. Symons, or to the various observers. Page 43, Stanhope Castle,

37.75 from 39.68 is 1.93, not 1.83; page 44, Ushaw, 25.75 from 26.88 is 1.13, not 1.01; page 46, Cresswell, the mean of 19.82 and 19.95 is 19.89, not 19.58; page 48, Park End, 33.14 from 34.33 is 1.19, not 0.19, and 33.14 should be 33.31; page 54, Crag-side, the observations consist of 8 months in 1867 and the whole of 1868, the amounts being 16.25 and 25.54 respectively: these have been added and divided by two, giving 20.89, but that on consideration will be seen to be the average for 10 months, not for a year. Out of 15 pages of tables these are all the errors clearly appertaining to the author, and we wish so short a list was more frequent. We now come to certain cases in which different returns are published by Mr. Wheeler from those given by Mr. Symons, and these will be best thrown into a tabular form:—

	Nat. His. Trans., 1868.	British Rainfall, 1868.	Diff.
Darlington, South End...	37.75	37.25	— .50
Greta Bridge	28.81	28.69	— .12
Sedgefield	26.93	26.84	— .09
Seaham Hall	22.66	22.56	— .10
Otterburn	34.06	32.64	—1.42

We hope the parties concerned will clear up these discrepancies.

Lastly, we give a list of returns not given in Symons' *British Rainfall*, 1868, viz.:—

Station.	Ht. above Ground.		Ht. above Sea.	Depth of Rain,
	ft.	in.	ft.	1868.
Darlington (Brinckburn) .....	...	.....	40?	21.75
Newcastle W. Works, Hallington Village	0	6	469	28.69
Fawcett	0	6	563	27.08
Woodford	0	6	...	29.17
Camphill	0	6	676	30.60
Green Crag	0	6	800	29.89
Valley of N. Tyne .....	..	.....	...	30.11
Horsley, near Bywell	0	6	...	23.77
" "	0	6	...	24.10
Crag-side Rothbury .....	...	...	400	25.54

(To be continued.)

Report on the Proper Principle of Drainage to be adopted in the towns of Oxford, Eton, Windsor and Abingdon. By COL. EWART, R.E. Harrison. 8vo., 20 pages.

Sewage Irrigation: Being a Second Letter addressed to the Hon. the Lord Provost, on the Sewerage of the City of Glasgow and the Purification of the River Clyde. By MICHAEL SCOTT, C.E. Maclehose, Glasgow. 8vo, 40 pages.

Suggestions for the Sanitary Improvement of Labourers' Cottages and of Villages. By W. MENZIES, Deputy Surveyor of Windsor Forest. Longman. 8vo, 52 pages.

THESE three works are scarcely within the province of these pages, but their titles, coupled with the fact that all of them enter into questions of the amount of rainfall in various districts, add one to the many proofs of the practical use of systematic and accurate meteorological observations.

JUNE, 1869.

Div.	STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL.					TEMPERATURE.				No. of nights below 32° on grass
		Total Fall.	Difference from average 1860-5	Greatest Fall in 24 hours.		Days on which ≥ 1 or more fell	Max.		Min.		
				Dpth.	Date.		Deg.	Date.	Deg.	Date.	
		inches	inches.	in.							
I.	Camden Town	1·03	— 2·02	·47	13	6	89·3	7	35·6	1	0
II.	Staplehurst (Linton Park) ...	·87	— 1·87	·29	15	6	88·0	7	32·0	1	0
III.	Selborne (The Wakes).....	1·81	— 1·42	·96	13	8	78·0	7	33·5	1	1
IV.	Hitchen	1·19	— 1·45	·49	13	9	82·0	7	39·0	16	0
V.	Banbury	1·64	— 1·64	·47	13	9	85·0	7	34·0	1	0
VI.	Bury St. Edmunds (Culford).	1·71	— ·87	·31	13	9	87·0	7	24·0	16	10
VII.	Bridport	1·14	— 2·10	·48	13	6	78·0	7	38·0	1	0
VIII.	Barnstaple	·54	— 3·58	·23	3	5	82·0	8	42·5	21	...
IX.	Bodmin	·54	— 3·50	·12	13	10	72·0	27	43·0	12	0
X.	Cirencester	1·52	— 1·86	·35	13	8	...	...	...	...	...
XI.	Shifnall (Haughton Hall) ...	·96	— 2·15	·20	2	10	81·0	6, 7	43·0	11†	0
XII.	Tenbury (Orleton)	1·12	— 2·50	·22	17	8	84·2	7	34·0	1	0
XIII.	Leicester (Wigston)	1·71	— 1·05	·61	13	10	80·0	7	37·0	16	...
XIV.	Boston	1·76	— ·43	·41	18	13	87·5	7	40·8	12	0
XV.	Grimsby (Killingholme)	1·49	...	·32	13	12	82·0	7	40·0	1	...
XVI.	Derby.....	1·41	— 1·48	·41	18	10	82·0	7	40·0	1	...
XVII.	Manchester	1·12	— 2·22	·34	14	9	82·2	7	36·0	1	...
XVIII.	York	1·05	— 1·05	·40	15	10	81·0	7	38·0	1	0
XIX.	Skipton (Arncliffe) ...	1·96	— 2·14	·68	15	11	77·0	7	33·0	17	...
XX.	North Shields	1·27	— 1·47	·57	15	10	73·0	6	38·0	1	0
XXI.	Borrowdale (Seathwaite).....	5·13	— 5·38	1·04	15	12	...	...	...	...	...
XXII.	Cardiff (Town Hall).....	·84	...	·32	14	8	...	...	...	...	...
XXIII.	Haverfordwest	·58	— 3·07	·34	1	7	76·6	6	34·6	11	...
XXIV.	Rhayader (Cefnfaes).....	...	...	...	...	...	...	...	...	...	...
XXV.	Llandudno.....	·82	— 1·47	·27	15	7	73·5	24	39·3	1	...
XXVI.	Dumfries	1·02	— 1·88	·48	14	8	81·0	26	36·0	1	0
XXVII.	Hawick (Silverbut Hall) ...	1·17	...	·62	15	10	...	...	...	...	...
XXVIII.	Ayr (Auchendrane House) ...	1·87	— 1·48	·40	14	11	72·0	26	30·0	1	4
XXIX.	Castle Toward	2·71	— ·78	1·24	14	9	76·0	25	30·0	9	3
XXX.	Leven (Nookton)	2·53	+ ·29	1·15	15	12	72·0	26	37·0	11	2
XXXI.	Stirling (Deanston)	2·74	— ·18	·92	15	10	74·2	26*	34·0	11	0
XXXII.	Logierait	2·11	...	·68	14	12	...	...	...	...	...
XXXIII.	Ballater	2·48	...	·89	14	11	73·0	26	28·0	1	1
XXXIV.	Aberdeen	2·37	...	·78	15	13	74·2	26	37·4	1	0
XXXV.	Inverness (Culloden)	1·69	...	·94	14	10	70·1	25	38·0	1	0
XXXVI.	Fort William .....	...	...	...	...	...	...	...	...	...	...
XXXVII.	Portree	3·09	— 1·69	·83	6	19	...	...	...	...	...
XXXVIII.	Loch Broom	1·67	...	·30	14	16	...	...	...	...	...
XXXIX.	Helmsdale	·89	...	·23	17	11	...	...	...	...	...
XL.	Sandwick	1·97	+ ·43	·63	6	14	64·3	25	40·0	14	...
XLI.	Cork	·18	...	·07	4	4	...	...	...	...	...
XLII.	Waterford	·32	— 2·66	·17	4	7	81·0	29	42·0	14	...
XLIII.	Killaloe	1·45	— 2·18	·68	4	7	78·0	26	37·0	16	0
XLIV.	Portarlington	·83	— 2·42	·41	5	10	77·0	26	36·5	13	...
XLV.	Monkstown	1·16	— 1·46	·20	4, 13	12	73·0	7	35·0	14	...
XLVI.	Galway	1·60	...	·87	4	6	78·0	25†	42·0	14	...
XLVII.	Bunninadden (Doo Castle) ...	1·11	...	·28	14	14	76·0	25	33·0	9, 14	0
XLVIII.	Bawnboy (Owendoon)	1·07	...	·38	12	13	82·0	30	35·0	13	0
XLIX.	Waringstown	1·13	...	·30	14	9	77·0	26	34·0	13	0
L.	Strabane (Leckpatrick)	2·10	...	·44	14	16	76·0	25	33·0	14	0

* And 30th. † And 27th, 29th & 30th. ‡ And 12th and 13th.
 + Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON THE MONTH.

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.

LINTON PARK.—A dry and very cold month, with visible frost on 1st, and *ther.* only 1° above freezing on 17th; *T* on 15th. The average day temp. being more than 8° below that of last year, and that of the nights about 5°·4 lower than those of last June, the month was most ungenial for vegetation.

SELBORNE.—6th, 7th and 8th, three warm summer days; temp. 75°, 78°, and 77°, but the most sunless, ungenial June I remember; the oldest people say they never knew so cold a longest day; prevailing winds after the first week N.E.

BANBURY.—Fog on 6th; *rosa canina* in blossom same day; *R* and *H* at 8·45 a.m. on 15th; wheat in bloom on 27th.

CULFORD.—The month just closed has certainly been one of the coldest Junes ever experienced; the temp. has been below 32° on 10 nights, and the mean temp. has been nearly 7° below that of June, 1860. With the exception of the 6th and 7th, the max. temp. of which were respectively 80° and 87°, the weather during the entire month has been uniformly cold and sunless, with wind from N. or N.E.; no *T*.

CIRENCESTER.—Excepting four days, 6th and 7th, and 24th and 25th, June has been unusually cold; N. and E. winds prevailing, and many days hazy and sunless.

SHIFFNAL.—Cold and ungenial till the end of the month, except the 6th and 7th, when max. was 81°. Only three nights above temperate. Sultry, with signs of *T*, on 24th, 25th, 26th, and 27th. Crops of hay unusuabally heavy. Remarkably few swallows, many said to have died from the cold of May; high wind from N.W., doing much damage to the foliage on 15th. Partridges hatched on the 16th; few butterflies, not common white ones; strawberries began to ripen on 24th; on 27th the hawthorn hedges a mass of cobweb blight, from a caterpillar of some moth.

ORLETON.—The *R* chiefly fell during one week in the middle of the month and was less than half the average; no *R* fell after the 18th; no *T* or *L*; with the exception of a few days about the 7th and 27th the temp. was much below the average, and the sky generally cloudy, with wind between the N. and E.; on 15th and 16th a strong gale from W. to N.

WIGSTON.—The mean max. temp. of this month was 10° below that of June last year, that of the min. 1°·5 below, showing that the mean of the month was about 6° below that of June, 1868. The character of the weather has been dull, and but little sunshine.

KILLINGHOLME.—Wild roses began to flower on 10th; first ear of corn on 14th; many swarms of bees; more buttercups in the pastures than usual, and charlock in the cornfields; this last is thought by some to foretell a good crop of turnips. Many cloudy days at the end of the month caused haymaking to be very tedious; the harvest must be late; in many places the leaves of the oaks have suffered from an insect blight of some kind.

DERBY.—But for the length of daylight, June could scarcely have been recognized, so cold and unsummerlike has it been. Northerly winds on 19 days; temp. on the 7th reached 82°, but the mean of the month was 3° below the average, and nearly 7° below that of June, 1868. Hay crops unusuabally heavy. Apple and pear crops a failure.

YORK.—Violent wind and storm on 15th, *T* on 16th.

ARNcliffe.—Unusual continuance of E. and N.E. winds.

NORTH SHIELDS.—Strawberry ripe on 29th; St. Bernard lily, French roses, branching larkspur, perennial lupin, yellow melfoil, perennial aster, sweet william, white and purple fraxmella, gladiolus, African marigold, and ranunculus, in flower between 4th and 29th.

SEATHWAITE.—Not quite half the average rainfall ; only one day on which the fall reached one inch.

W A L E S.

HAVERFORDWEST.—With the exception of two days during the first week, and the last six days, this was one of the coldest Junes of which I have any experience, and, (with the exception of June, 1859, when only .30 in. fell), the driest in the last 20 years ; notwithstanding which, in consequence of the wet May, the hay crops are much above the average. Should the present drought continue, water will be very scarce ; even at the end of the second week large ponds were emptier of water than I have ever noticed so early in the year.—[ERRATUM : May should have been described as “one of the wettest,” not “the wettest May for 20 years,” as May, 1865, had 5.75 in., exceeding May, 1869, by 0.10 in.]

LLANDUDNO.—Wheat in ear on 17th ; privet and elder also in flower. T in early morning on 8th.

S C O T L A N D.

DUMFRIES.—The month has been dry ; for several days in the second week the weather was very cold, and on the morning of the 16th the hills were covered with S, which did not disappear until the 21st ; from the 22nd to the close of the month the weather was very hot and droughty ; pastures getting brown ; the hay crop light, but grain crops, turnips and potatoes looking well ; the season about three weeks later than last year ; both rainfall and temp. below the average.

HAWICK.—Continued warm weather after the 18th ; previously there were many bright warm days, but the nights were chilly, with ther. at times approaching the freezing point. Severe storm of wind and R on the 15th ; at the end of the month R much wanted.

AUGHENDRANE.—With bar., and bar. range and humidity all about the June mean, the mean temp. has been low. Rainfall deficient, evaporation great, and heavy dews common. The amount of cloud and force of wind are also both about the June mean, but the polar current has prevailed to an unusual extent, and on 15th especially produced great disturbance both of bar. and ther., clothing at the same time our hills with S. On seven days the exposed black bulb rose to 110°, and on four nights fell below 32° ; river nearly dried up, springs low ; hay crops light.

CASTLE TOWARD.—First few days mild, with fine growing showers, but became cold again up to the middle of the month ; 1.24 in. of R fell in 16 hours on the 14th ; S on the distant hills on the 15th ; it has been so dry since, that springs are very low, and some are dried up ; plants have been difficult to keep clean, and several turnip fields have suffered from fly.

DEANSTON.—All the R of this month fell before the 18th ; the 15th was a very wild day, with strong easterly wind and heavy sleety R ; S on the Ochills and Grampians. Latter part of the month very bright and warm, but easterly winds ; no T.

LOGIERAIT.—Heavy R with much cold about the middle of the month ; on the morning of the 15th the hill tops covered with S, which remained to the following day ; from the 24th great heat and rising bar.

BALLATER.—The weather, up to the middle of the month, very unsettled, and unusually cold for the season ; S lying for days on the neighbouring hills, an unprecedented sight for June ; rainfall rather above average, but, during the last fortnight, none fell, and now the want of it is beginning to be felt although the crops are still looking splendid. Bar. high and steady during the latter half of the month.

ABERDEEN.—The first three weeks of the month were cold and ungenial, the hills being several times covered with S, the last week was fine and warm ; rainfall slightly above the average ; winds from N.W. greatly in excess of average ; drought beginning to be felt ; T in evening of 3rd, T, with heavy showers of H on 4th, T on 24th, fog on 20th.

CULLODEN.—Fresh S on high hills on 13th, 14th, and 15th, and two inches deep on Highland Railway at highest level near Dalwhinnie.

PORTREE.—Some fine growing showers, and the weather generally favourable to the crops, though the potatoes were blackened by the frosts of the 1st and 14th ; latter part of month warm and dry, rather too dry for the pasture grass.

LOCHBROOM.—We have seldom or ever experienced a June so cold and dry as this ; frost and S upon the heights have been very prevalent. Crops are very backward, and stock in bad condition, but the latter part of the month was rather more summer-like.

SANDWICK.—The early part of June was cold, with northerly winds, the latter part dry and pleasant for the animal kingdom, but the vegetable world was dry, and crying for water.

I R E L A N D.

KILLALOE. Prevalence of N.E. winds. My potatoes were not injured, but in many places they were, for many mornings at an early hour the fields were white with frost, though the ther. on stand was never below 37°.

DOO CASTLE.—Dry month, latter end sultry ; crops began to show very well towards the end of the month notwithstanding the great drought.

WARINGSTOWN.—Fine and dry, but earliest part of month cold ; crops looking very well except early sown flax.

LECKPATRICK.—Very cold month, the average temp. lower than any June this last seven years ; during latter part of the month wind invariably from the N.E. ; crops and fruit late.

WHY HAVE WE COLD WEATHER AT MIDSUMMER?—Amongst the various causes to which the present cold weather at midsummer has been attributed is the fact that at this moment the disc of the sun has an unusual number of spots. The *Giornale di Roma* publishes a communication from the celebrated astronomer, Padre Secchi, on this subject, in which that savant says—"The sun is at this moment at a period of an unusual prevalence of spots. On the morning of the 7th, 33 principal ones were counted. disposed in seven or eight groups. Their number is rapidly approaching a maximum. The whole surface of the luminary is covered with them, and it appeared to us several times to present the aspect of a mass of white flakes on an ash-coloured ground."

SINGULAR PHENOMENON.—A phenomenon of a most extraordinary nature has lately been witnessed by the inhabitants of the borders of the Caspian Sea. This huge salt lake is dotted with numerous islands which produce yearly a large quantity of naphtha, and it is no uncommon occurrence for fires to break out in the works and burn for many days before they can be extinguished. Early last month, owing to some subterraneous disturbances, enormous quantities of this inflammable substance were projected from the naphtha wells, and spread over the entire surface of the water, and becoming ignited, notwithstanding every precaution, converted the whole sea into the semblance of a gigantic flaming punch-bowl many thousands of square miles in extent. The fire burnt itself out in about forty-eight hours, leaving the surface strewn with the dead bodies of innumerable fishes. Herodotus mentions a tradition that the same phenomenon was once before observed by the tribes inhabiting the shores of the Caspian Sea.—*Pall Mall Gazette*.