INTRODUCTION.

It is now five years since the First Volume of the Illustrated London Almanack for the year 1845 was published; and this Volume is the fifth of the series. We avail ourselves of the opportunity which the occasion affords, of expressing our grateful acknowledgements to many Correspondents who have kindly suggested improvements; and assure them that their several wishes have been attended to, as far as our space affords. This Volume will be found to contain fully the usual variety of information.

The Illustrations heading the Calendars are from the pencil of Richard Doyle, Esq., and are engraved by Dalziel.

The Calendar and Second Page of every Month, as well as all relating to Astronomy, Meteorology, and Science, have been under the superintendence of James Glaisher, Esq., F.R.A.S., and of the Royal Observatory at Greenwich.

The Illustrations on the Third and Fourth Pages of every Month are from the pencil of B. Foster, Esq., and engraved by Vizitelly.

The Whole of the matter contained in the Third and Fourth Pages of every Month is from the very able pen of the well-known writer upon Country Scenes, &c., Thomas Miller, Esq.

The remarks upon Gardening are from the well-known Authoress, Mrs. Loudon; and the Domestic Hints are by M. Soyer.

We deem it unnecessary to repeat the explanations which we have already given in the Introduction to the preceding Volumes, as they apply equally well to this; and shall, therefore, only notice the additional explanations required by the additional information.

Calendarial Pages.—The time the Sun souths is given every day, in common clock time, or the time a watch or clock should shew, when the Sun is on the meridian or due south. In preceding Volumes these numbers were given under the head of "Equation of Time;" and they can be used as directed in those Volumes, by considering that "After 12 o'clock" is equivalent to Add, and "Before 12 o'clock" is equivalent to Subtract.

The altitudes of the Sun and Moon, when due South at London, whose latitude is 51½°, are given every day. These numbers will answer equally well for any other place, by taking into account the difference of latitude between London and that place. At all places whose latitude is the same as at London, no alteration is needed; at those places situated N. of London, the numbers are to be decreased; and at places situated S. of London, they are to be increased. Thus the latitude of Edinburgh is 56° nearly, being 4½° nearly N. of London; and if the numbers in this Almanack be diminished by 4½°, they would give the altitudes of the Sun and Moon above the horizon, when they are on the meridian of Edinburgh.

THE THERMOMETER.

This instrument was invented about the beginning of the 17th century, and is still one of the most important instruments used in Natural Philosophy. By its means it is ascertained that all bodies, on being heated, increase in volume, in a different proportion for each. The change is scarcely visible in solid bodies, and they, as well as liquids, expand unequally by equal increments of heat. Mercury approaches more nearly to equality in its rate of expansion, and remains liquid through a longer range of temperature, and is, therefore, justly preferred to water, oil, alcohol, &c., for thermometric purposes. A common thermometer is a tube of very small diameter, terminating at one of its ends by a cylindrical reservoir, so that very minute expansions of the mercury in the reservoir or bulb may be rendered perceptible. In order to obtain the value of these variations, a graduated scale is fixed along the tube. These scales, unfortunately, are different in different countries—to be spoken of presently. In order, however, that each observer may trace these divisions himself, it was necessary that two points of invariable temperature should be determined; and after a long time, and many attempts, it was found that the temperatures of water just freezing and water boiling were always the same. Both these points, however, were long disputed; and even late in last century it was believed that water at Naples began to freeze when the thermometer was 10 degrees above the freezing point, as shewn by a thermometer constructed in England by the directions of the Royal Society (see Dr. Cyrilli's papers in the "Philosophical Transactions," No. 424, page 336; No 430, page 189; No. 434, page 407, 408). The fixedness of the freezing point was at last established, and the erroneous idea was abandoned, that he further north, the greater degree of cold it took to freeze water. The subject occupied the attention of M. Amontons (see Mémoires de l'Académie, 1702, page 204, &c.), Mr. Boyle (see his Experiments on Cold), Dr. Halley, Newton, Dr. Derham, &c., and ultimately the fixedness of the boiling point of water was determined, by taking into account the varying pressure of the atmosphere. Thus this beautiful instrument was perfected.

Thermometers used for meteorological researches are wholly surrounded by the atmosphere, and therefore the mercury in both the stem and bulb are affected by the temperature of the air. The bulbs of those used for chemical purposes are generally only plunged into the liquid. The portion of the stem not immersed in the liquid is not influenced by the heat; and, therefore, the scales of both meteorological and chemical thermometers ought to be graduated differently: the former should be totally immersed in boiling water, whilst the bulb of the latter only should be so immersed, on determining the values of their scales.

At the Royal Observatory, Greenwich, several thermometers have been read at every even hour, both night and day, during the years 1841 to 1847, excepting on Sundays, Good Fridays, and Christmas-days; and the following are the monthly values of the temperature of the air, as compiled from the published volumes of the Greenwich Observations, and the Registrar-General's Reports:—

MONTHLY MEAN TEMPERATURE OF THE AIR AT GREENWICH.

Months.	1841.	1842.	1843.	1844.	1845.	1846.	1847.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
January	33 6*	32.9	39.9	39.1	38 3	43.7	37.0
February	35.3	40.8	36 0	35.2	32.7	43 9	35.5
March	46.2	44.9	42 9	41.5	35.2	43 3	41.4
April	47.0	45 2	47.1	51.7	46.3	47.1	45.3
May	56.8	53.2	52.2	52 9	49.4	54 6	56.4
June	56.4	62 9	56.3	60.7	60.7	65.2	58.0
July	57.8	60.2	60 9	61.4	59.8	64.5	65.4
August	60.5	65.4	62.1	57.7	57 3	63.2	62.1
September ..	58.1	56.4	59.5	56 9	53.6	60.1	54 3
October	48.8	45.4	48.0	49.5	50 2	50.5	52.9
November ..	42.7	42 8	43.8	44.0	45.8	46.0	46 9
December	40.5	45.0	43.9	33 0	41.7	32.9	42.8

The mean temperatures for the years 1841 to 1847 are 48°7, 49°6, 49°4, 48°6, 47°6, 51°3, and 49°5 respectively.

The following table shows the *highest observed temperature* in each month:—

Months.	1841.	1842.	1843.	1844.	1845.	1846.	1847.
	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.	Deg.
January	53.0	46.8	57.0	53.7	51.3	55.3	52.7
February	54.6	53.2	51.9	50.4	48.5	62.3	55.0
March	66.9	60.5	63.7	60.2	59.4	58.0	64.2
April	76.5	73.7	70.8	74.9	70.3	63.0	63.8
May	82.8	74.7	69.5	77.4	68.2	84.3	86.2
June	78.5	87.4	79.3	87.6	86.0	91.1	80.4
July	76.0	78.8	89.8	87.4	83.3	92.3	89.0
August	79.6	90.5	82.8	75.4	77.8	92.0	87.3
September ..	79.6	75.8	79.9	78.0	73.5	86.4	72.5
October	64.6	60.9	70.4	67.4	67.6	67.7	73.2
November....	58.3	55.9	57.5	58.1	59.6	61.5	66.3
December....	53.9	58.2	54.7	49.3	55.5	49.9	59.5

* It will be borne in mind that in reading these numbers the figure to the right of the point shows the number of tenth parts of one degree; therefore, the number ranging with January, 1841, is to be read 36 degrees, and 6 tenths of a degree, and so for all the other numbers.

The following table shows the *lowest observed temperature* every month:—

Months.	1841.	1842.	1843.	1844.	1845.	1846.	1847.
	Deg.	Deg.	Deg.	Deg.	Deg	Deg.	Deg.
January	4.0	23.2	24.0	18.8	24.4	29.4	23.0
February	12.4	26.4	20.3	20.0	7.7	26.9	10.2
March	29.5	29.9	26.5	24.1	13.1	26.5	16.9
April	31.8	28.0	27.2	33.4	29.5	33.3	27.0
May	41.2	36.4	37.3	33.9	34.4	38.3	36.0
June	40.3	44.7	42.9	43.4	43.8	49.4	41.0
July	44.3	45.5	44.6	47.1	44.6	49.1	45.4
August	45.5	47.5	47.2	42.8	43.2	47.5	42.0
September ..	36.6	41.1	34.0	34.8	33.4	39.2	32.0
October	32.2	28.3	28.5	30.8	31.4	35.0	33.0
November....	22.6	31.1	27.4	27.4	29.1	23.4	24.5
December	24.3	30.8	25.6	21.1	28.0	18.8	25.0

For the other Meteorological elements belonging to an English year, we refer to the article on Meteorology in last year's Almanack, and to the Eighth Annual Report of the Registrar-General, recently published.

ON THE GRADUATION OF THE SCALES OF THERMOMETERS.

The graduation of Fahrenheit is used by the English; that of Reaumur by the Germans; that of Celsius by the French, calling it *thermomètre centigrade;* and that of De Lisle by the Russians. The following are the readings for the freezing and boiling points of water upon those scales:—

	Fahr.	Reaumur.	Centigrade.	De Lisle.
Freezing points	32°	0°	0°	150°
Boiling points	212°	80°	100°	0°

Therefore, the number of degrees included between the freezing and boiling points of water, in Fahrenheit's scale, is 180°; in Reaumur's, 80°; in the centigrade, 100°; and in De Lisle, is 150°. So that 9° of Fahrenheit, 4° of Reaumur, 5° centigrade, and 7½° of De Lisle are equal to each other. One degree upon Fahrenheit's scale is therefore the smallest, and one on that of Reaumur's is the largest.

The division "0°" on all the scales is called Zero; and the degrees graduated below this point are called *minus*, and have the minus sign (—) affixed to them.

In the Reaumur and centigrade scales, whose Zeros are at the freezing point of water, great care is necessary to be paid, to prevent the readings below Zero being mistaken for those above.

Different countries, adopting these different scales, cause a great deal of trouble; and is a fruitful source of error in comparing the temperature of different places, as registered by these differently graduated instruments. It is much to be desired, that all nations would use one and the same scale; but there is no hope of this being done.

As these different scales exist, it is desirable to have a ready means of converting a reading of one of these scales into its equivalent reading in another; and this may be done by the following rules:—

To reduce Fahrenheit's scale to Reaumur's, when the reading is above 32°.—Take 32° from the reading, multiply the difference by 4, and divide the product by 9.

To reduce Fahrenheit's scale to Reaumur's, when the reading is below 32°.—Take the reading from 32°, multiply the difference by 4, divide the product by 9, and affix the minus sign (—).

To reduce Reaumur's scale to that of Fahrenheit, when the reading is above the freezing point.—Multiply the reading by 9, divide the product by 4, and add 32° to the quotient.

To reduce Reaumur's scale to that of Fahrenheit, when the reading is below the freezing point.—Multiply the reading by 9, divide the product by 4, and take the quotient from 32°.

To reduce Fahrenheit's reading to Centigrade, when the reading is above the freezing point.—Take 32° from the reading, multiply the difference by 5, and divide the product by 9.

To reduce Fahrenheit's reading to Centigrade, when the reading is below the freezing point.—Take the reading from 32°, multiply the difference by 5, divide the product by 9, and affix the minus sign (—)

To convert the readings of the Centigrade scale into those of Fahrenheit.—Proceed exactly as in the case of Fahrenheit into Reaumur, except using 5 instead of 4.

To reduce Reaumur's scale to that of the Centigrade.—Multiply by 5, and divide the product by 4.

To reduce the Centigrade scale to that of Reaumur.—Multiply the reading by 4, and divide the product by 5.

As the French tables and observations of temperature are those which most frequently come under our notice, it is desirable that a simple mental calculation should suffice. The following rule is the one we use to convert, in a moment, all readings of the centigrade scale into their equivalent values in Fahrenheit's scale; viz. double the centigrade degrees, and deduct one-tenth of the product, adding 32° if the temperature is above the freezing point, or subtracting the product from 32° if below.