

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at March Hall Park, County of Midlothian, in Lat. _____, Long. _____, Height above Sea _____ feet.

Distance from Sea _____ miles.

During the MONTH of May 1859.

Days of Week.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS under Ground.		Temperature of SPRING or WELL.	Temperature of SEA.	OZONE.	ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.
		h. A.M.		h. P.M.		Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.						
		Barometer.	Attach- ed Ther- mometer.	Barometer.	Attach- ed Ther- mometer.					Direction.	Mean Force 1-6.	Direction.	Mean Force 1-6.	3 inches.	12 inches.													
																inches.	"					inches.	"					
<i>Su</i>	1					47	36	36		42	39	41	39					31	70									
<i>Mo</i>	2					48	30	30		45	41	42	39															
<i>Tue</i>	3					47	35	35		44	41	40	37															
<i>We</i>	4					51		35		47	43	43	40															
<i>Thu</i>	5					52		32		46	43	47	44															
<i>Fr</i>	6					58		37		53	49	50	48															
<i>Sat</i>	7					61		42		57	52	51	49															
<i>Su</i>	8					62		37		51	48	52	52															
<i>Mo</i>	9					59		35		58	51	51	46															
<i>Tue</i>	10					61		39		58	55	53	51															
<i>We</i>	11					55		41		55	51	47	46															
<i>Thu</i>	12					61		40		59	59	51	50															
<i>Fr</i>	13					67		43		64	56	53	52															
<i>Sat</i>	14					64		39		61	52	52	46															
<i>Su</i>	15					61		39		56	52	50	46															
<i>Mo</i>	16					62		40		55	51	53	49															
<i>Tue</i>	17					66		40		63	56	53	53															
<i>We</i>	18					59		42		58	52	52	49															
<i>Thu</i>	19					52		45		50	49	51	50															
<i>Fr</i>	20					53		45		53	51	51	50															
<i>Sat</i>	21					58		43		55	53	52	50															
<i>Su</i>	22					60		40		54	53	51	49															
<i>Mo</i>	23					62		43		59	53	51	49															
<i>Tue</i>	24					61		42		55	51	55	52															
<i>We</i>	25					62		42		59	54	57	50															
<i>Thu</i>	26					64		43		57	48	56	48															
<i>Fr</i>	27					68		47		57	48	59	54															
<i>Sat</i>	28					64		50		59	57	53	51															
<i>Su</i>	29					65		50		53	52	54	53															
<i>Mo</i>	30					64		50		62	58	58	54															
<i>Tue</i>	31					67		51		65	59	54	53															
Sums.						12		10		169		157																
Means.						59.0		41.1		54.7		50.9																
Index Errors.																												
Correc- tion for Diurnal Range.																												
Corrected Means.																												
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	

Barometer, mean corrected reading of Column No. 1 (A.M.),.....= _____ Column No. 3 (P.M.),.....= _____ Barometer, Highest observed reading of Month,.....= _____
Diameter of tube _____ inch; correction for capillarity to be added,.....+ _____ Capillarity,.....= + _____ Lowest do. do.,.....= _____
Sum,..... Sum,..... Difference, or Monthly Range,.....= _____
Correction for Temperature from Column No. 2 to be deducted,.....= - _____ Temp. from Col. 4,.....= - _____
Sum,..... Sum,.....
Correction for Height above Sea-level, _____ feet, to add,.....= + _____ Height,.....= + _____
Barometer corrected and reduced to 32° and Sea-level,.....= _____ At 32° and Sea-level,.....= _____

SUMMARY OF THE WINDS.											
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	
A.M.											
P.M.											

Dry bulb Thermometer (mean of Cols. 9 and 11),*.....= _____ Highest Reading Self-Registering Thermometer,..... on the _____
Wet bulb Thermometer (mean of Cols. 10 and 12),*.....= _____ Lowest do. do.,..... on the _____
† Dew-point Temperature,.....= _____ Difference, being Monthly Range,.....= _____
† Elastic Force of Vapour,.....= _____ Mean of Self-Registering Thermometers,.....= _____
† Weight of Vapour in a Cubic Foot of Air,.....= _____ Mean Daily Range,.....= _____
† Additional Weight required to Saturate a Cubic Foot,.....= _____ Greatest Daily Range,.....= _____
† Degree of Humidity (Saturation 100),.....= _____

* If the readings are taken at 9^h and 3^h, the 9^h readings to be alone taken to account, as the correction for Diurnal Range in Scotland is unknown.
† All these calculated from Glaisher's Hygrometric Tables, Second Edition only.
‡ The Diurnal Range for Scotland is as yet unknown.

(Signed) _____

(Designation) _____

N.B.—This Schedule should be returned (post-paid) as early as possible after the completion of the Month, with the Sums correctly added, and the Means deduced. No Wax or Wafers ever to be employed in closing the Schedule—the Gunmed Corner to be alone used.

INSTRUCTIONS FOR MAKING METEOROLOGICAL OBSERVATIONS.

Those persons who kindly furnish Monthly Tables of the Weather to the Scottish Meteorological Society are requested to attend to the following Instructions, seeing that one of the most important ends of Meteorological Observations is their being comparable with one another; and for this purpose it is requisite that all should, if possible, observe at a like hour, and in a like manner, and have their instruments placed, in so far as circumstances allow, in a like position:

Hour of Observation.—All instruments which are observed twice a-day should be read at the same hour morning and evening, in order to furnish mean results. The Society recommends a *quarter before nine o'clock, morning and evening*, as the most convenient hour; but should this be inconvenient for the observer, another hour may be chosen, attending, however, to the above rule, that the evening and morning readings be taken at the same hour, and this hour entered on the schedule.

Barometer.—Barometers of Messrs. Adie and Son's construction are recommended; but any instruments may be used which have adjustable surfaces, and have been compared. Before this instrument is suspended for use it should be examined, in order to ascertain whether the space above the mercury is free from air. This is done by inclining the instrument somewhat from the vertical position, when, if free from air, the mercury will strike against the upper end of the tube with a sharp tap. The mercury should then completely fill the tube. If any air has got admittance, it should be driven into the cistern by reversing the instrument, and tapping it gently with the hand. If it cannot be thus expelled, the instrument is useless till repaired.

The Barometer should be hung in a good light, and perfectly perpendicular, as ascertained by the plumb line; and it ought always to be gently tapped before taking the reading, to prevent adhesion of the mercury to the tube. In reading, the eye ought to be placed on the exact level of the top of the column of mercury. The reading of the attached Thermometer ought always to be the first taken, as the heat of the breath, or the proximity of the person, are apt to influence its readings.

The corrections necessary to be applied to the Barometric readings depend on the form of the instrument. The mode of making these corrections, and the tables employed for the purpose, will be found in the "Report of the Committee of the Royal Society on Physics and Meteorology," 1840, price 1s. The daily readings of the Barometer ought to be entered on the Schedule *as read off*, and the corrections only applied to the mean for the month.

Self-Registering Thermometers and Hygrometers.—These should be placed alongside of each other, in a place freely exposed to the air, but protected from sunning, and from reflected heat, as well as from radiation and from rain, and as near as may be *four feet* from the general surface of the ground. Different contrivances are used for this purpose, either a double ventilated box with louver-boarded sides, fixed at a north window, and projecting 12 inches from the wall, so as to allow a free current of air to pass between the box and the wall; or in a double near-side ventilated box with louver-boarded sides, fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed (without due notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The **Self-Registering Thermometers** should be placed exactly horizontal. In the case of the ordinary *maximum* Thermometer, with clay, glass, or steel index, the bulb may be *very slightly* elevated, in order that the mercurial column may be somewhat aided by the force of gravity in pushing forward the float or index; and in the case of the *minimum* Thermometer, the bulb must be slightly depressed, to prevent a draining of the spirit to the top of the tube, and also that any part raised in vapour may return to the column. These Thermometers, if read once a-day, should *always be read on the evenings*, so that the temperatures marked by the floats indicate the minimum and the maximum of the day on which the reading is taken. N.B.—The readings of these instruments are taken from that extremity of the float which is nearest the *lead of the column of mercury or of spirit*.

The **maximum** Registering Thermometer, for taking the extreme heat of the sun's rays, should have its bulb blackened, and the surface rendered dull, and it should be mounted in a blackened box, whose sides should be so high as to protect the bulb from wind. It should be so placed that the sun's rays have free access to it during the heat of the day.

The **minimum** Registering Thermometer, for ascertaining the lowest temperature during the night from radiation, should have its bulb similarly blackened and rendered dull, and be similarly mounted. It should be laid out, about sunset, over grass, in a place freely exposed to the sky, but raised on wooden supports a few inches above the surface, and removed during the day.

Hygrometer.—The *wet* bulb requires the muslin covering it to be often changed. In towns once a month, or oftener, if the weather is dusty, and the muslin gets foul; in the country whenever the muslin seems to be foul. The bulb should be covered with thin tissue or blotting paper below the muslin, and the muslin should always be thoroughly wetted, and freed from starch, before being used; and the cotton wick which conducts moisture to it should be previously soaked in a solution of washing soda, and then in pure water, before being attached, in order that

it may be thoroughly wetted, else it will conduct the moisture imperfectly, and yield false results. In frosty weather, water must be poured over the wet bulb, so as to form a thin film of ice on the muslin, the evaporation from the ice going on as from the simply wetted bulb.

Rain Gauge.—As "Planning's Rain Gauges" seem to possess several advantages over others, the Society gives the preference to them; but whatever form be employed, in order that all the stations may yield comparable results, it is recommended that the Gauge be sunk in the ground, so that the top of the receiver is nearly on a level with the top blades of close cut grass, in a place as distant as possible from trees, houses, high walls, and irregular or broken ground. When more than one Rain Gauge is kept, they ought to be placed near each other, but at different heights about the ground, and their indications noted in the *general remarks*, mentioning their height above ground—the regular column in the Schedule being reserved for the ground Rain Gauge alone.

Winds.—Isolated wind-vanes or weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, etc. Where low clouds are seen drifting along, their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular mirror fixed over the centre of a pocket compass, will, in general, give the true direction of the current of air near the earth's surface. The notion of the higher strata of clouds gives no such indication. Failing the clouds, the general direction of the smoke of a hamlet or village, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction by reflection or otherwise. It is generally agreed to reckon the force of the wind from 0 to 6; the latter being the severest hurricane in this island.

Clouds.—The Society recommends observers to adopt the Howard nomenclature of clouds. The scale of cloud in the visible sky is reckoned from 0 to 10. Thus, a sky quite free from cloud is 0; a sky half covered with cloud is 5; and the whole visible sky covered with cloud is 10. Clouds often cover three-fourths or even more of the visible sky without obstructing the sunshine, so that the indications noted in the column for clouds would not necessarily express, or agree with, the column for sunshine. As the full moon, *so long as it is above the horizon*, is thought by some eminent astronomers to have a powerful effect in dispelling clouds, it would be well to note in the general observations any facts bearing on this point, for a few days (or nights, as the case may be) before and after every full moon; and the same observations ought to be made at the periods of new moon.

Sunshine.—The amount of sunshine may be represented by figures in the fractional form, of which the *denominator* indicates the number of hours from sunrise to sunset, and the *numerator* the number of hours the sun shines. Thus, if the sun rose at 6, and set at 6, and during that period shone for 3 hours, it would be registered as $\frac{3}{12}$.

Thermometers under Ground.—Though the temperature and hygrometric conditions of the air are those which chiefly influence the growth of crops, it is important for the health of the crops, and for the germination of the seed, that the soil itself should have a certain temperature. To collect facts which may illustrate this, it is recommended to have Thermometers sunk 3 inches and 12 inches below the surface of the ground, to ascertain the temperature of what may be termed the agricultural soil.

Temperature of the Sea.—As the meteorology of the island is quite incomplete without a knowledge of the mean temperature of the ocean which surrounds it, the Society strongly recommends taking the temperature of the sea at a depth of 6 feet or 1 fathom from the end of all piers or rocks round the coast, where free from the influence of river water, and as near as may be about the time of high water. A Thermometer, with its bulb fixed in a small tin pitcher, covered with a sloping lid, and with a weight attached, is sunk to the required depth, and in ten minutes drawn up and read. Convenient and cheap instruments are furnished by Messrs. Adie and Son, and Mr. Bryson, Edinburgh.

The temperature of springs or deep wells is recommended to be taken whenever practicable, mentioning whether spring or well, and its depth from the surface.

Meteors, Aurora Borealis, Remarkable Depression or Elevation of Barometer, Remarkable Falls of Rain, Hail or Snow, Thunder and Lightning, etc., should be specially noticed, together with the exact hour at which they were first seen, their continuance, and direction.

Budding, Leafing, and Flowering of Trees.—It is necessary to bear in mind that varieties of the same species of tree differ widely in their times of leafing and flowering. *Individual* trees or shrubs of each kind should therefore be chosen (if possible early kinds), and their indications should be alone noted—always the same plant from year to year being noticed.

Ozone.—Mention whether Schönbien's or Moffat's scale and papers are used. They may be had at Messrs. Adie and Son's, 50, Princes Street; and at Mr. Bryson's, 60, Princes Street, Edinburgh.

Electricity.—Pith balls suspended by a silk thread in connection with a metallic conductor, and under cover, and the degrees of a circle being used to express the degree of repulsion, form a cheap and convenient electrometer. Exsiccated glass or sealing-wax ascertains the nature of the electricity.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	First in Blossom.	FRUITS.	Dissected of Leaves.	CROPS mentioning variety.	Sorting or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Barberry,	Apple, .....	.....	Barley, .....	.....	.....	.....	.....
Bountree or Elder,	Black Currant, .....	.....	Beer or Big, .....	.....	.....	.....	.....
Broom,	Cherry, .....	.....	Oats, .....	.....	.....	.....	.....
Hazel,	Gooseberry, .....	.....	Pease, .....	.....	.....	.....	.....
Hawthorn,	Pear, .....	.....	Barley, .....	.....	.....	.....	.....
Holly,	Plum, .....	.....	Beer or Big, .....	.....	.....	.....	.....
Laburnum,	Strawberry, .....	.....	Oats, .....	.....	.....	.....	.....
Lilac,	Pease, .....	.....	.....	.....	.....
Mezerion,	Barley, .....	.....	.....	.....	.....
Mountain Ash or Rowan,	Beer or Big, .....	.....	.....	.....	.....
Red Flowering Currant,	Oats, .....	.....	.....	.....	.....
Rhododendron Ponticum,	Pease, .....	.....	.....	.....	.....
Whin,	Barley, .....	.....	.....	.....	.....

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, Fruits, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc. Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

To

DR STARK,

Sec., Meteorological Society,

21, Rutland Street,

EDINBURGH.

METEOROLOGICAL RETURNS.

MAY
1859

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at March Hall Park, Edinburgh, County of Midlothian, in Lat. _____, Long. _____, Height above Sea _____ feet.
Distance from Sea _____ miles. During the MONTH of June 1859.

Phases of Moon.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS. under Ground.			TEMPERATURE OF SPRING AT WELL.	SEA.		ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.	
		h. A.M.		h. P.M.		PROTECTED.		EXPOSED.		h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.				Temperature.	Density.				OZONE.
		Barometer.	Attach- ed Ther- mometer	Barometer.	Attach- ed Ther- mometer	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ↑↑	Direction.	Force ↑↑					3 inches.	12 inches.	22 inches.							
		inches.	"	inches.	"	"	"	"	"	"	"	"					days.	inches.	1 to 10	Hours.	"	"	"	"	"	0 to 10	"				
	1					60	50			53	52	51	51															1			
	2					54	50			52	51	52	50															2			
	3					51	48			49	46	51	50															3			
	4					58	49			55	54	55	54					0										4			
	5					64	49			62	56	55	53															5			
	6					69	52			55½	54	60	57															6			
	7					66	52			64	61	57	52															7			
	8					65	51			54	52	52	49															8			
	9					54	49			52	51	53½	49															9			
	10					55	47			49	45	48	46															10			
	11					54	43			48	46	52	50					0										11			
	12					63	53			48	45	57½	55															12			
	13					68½	50			54½	52	52	47															13			
	14					65½	44			60½	54	56	49															14			
	15					66	48			58	56	55	49															15			
	16					63	44			59½	56½	51	46½															16			
	17					73	42½			57½	54	60	52															17			
	18					65	53			59½	57	60	56					0½										18			
	19					64	56			60	54½	59	57															19			
	20					61	50			60	58½	52	49															20			
	21					59	49			58	52	56	54															21			
	22					63	50			55½	49	57	55															22			
	23					60	48			58	53	50	46															23			
	24					60	50½			55½	51	54	50															24			
	25					75½	50			56	54	63½	56					½0										25			
	26					68½	59			64½	58	63½	60															26			
	27					66	55½			63	62	63	59															27			
	28					59	49			66½	60½	52½	52															28			
	29					62	51			57	53	55	51															29			
	30					64	46			57	53	52	50															30			
	31																											31			
	Sums.					1874	1488½			1703	596½	1650	1554½																		
	Means.					62.5	49.6			56.8	53.2	55.3	51.8																		
	Index Errors.																														
	Correc- tion for Diurnal Range.†																														
	Corrected Means.																														
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27			

Barometer, mean corrected reading of Column No. 1 (A.M.),.....=..... Column No. 3 (P.M.),.....=..... Barometer, Highest observed reading of Month,.....=..... on the
Diameter of tube inch; correction for capillarity to be added,.....+..... Capillarity,.....=+..... Lowest do. do.,.....=..... on the
Sum,..... Sum,..... Difference, or Monthly Range,=.....
Correction for Temperature from Column No. 2 to be deducted,.....=..... Temp. from Col. 4,.....=.....
Sum,..... Sum,.....
Mean of the above
Correction for Height above Sea-level, feet, to add,.....
Barometer corrected and reduced to 32° and Sea-level,

SUMMARY OF THE WINDS.											Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
Direction.	N	NE	E	SE	S	SW	W	NW					
A.M.													
P.M.													
Mean.													

62.5
49.6
2112.1
56.1

Dry bulb Thermometer (mean of Cols. 9 and 11),*.....
Wet bulb Thermometer (mean of Cols. 10 and 12),*.....
† Dew-point Temperature,.....
† Elastic Force of Vapour,.....
† Weight of Vapour in a Cubic Foot of Air,.....
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),.....
Highest Reading Self-Registering Thermometer in Air and Protected, on the
Lowest do. do. do., on the
Difference, being Monthly Range,.....
Mean of Self-Registering Thermometers in Air and Protected,
Mean Daily Range in Air and Protected,
Greatest Daily Range, do., on the
Highest Reading Self-Registering Black Bulb Thermometer in Sun, on the
Lowest do. do. from Radiation during Night, on the

(Signed) A. H. Johnston
(Designation)

INSTRUCTIONS FOR MAKING METEOROLOGICAL OBSERVATIONS.

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Hour of Observation.—All instruments which are observed twice a-day, should be read at the same hour morning and evening, in order to furnish mean results. The Society recommends a quarter before nine o'clock morning and evening, as the most convenient hour; but should this be inconvenient for the observer, another hour may be chosen, attending, however, to the above rule, that the evening and morning readings be taken at the same hour, and this hour entered on the Schedule.

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The Barometer should be hung in a good light, and perfectly perpendicular, as ascertained by the plumb line; and it ought always to be gently tapped before taking the reading, to prevent adhesion of the mercury to the tube. In reading the eye ought to be placed on the exact level of the top of the column of mercury. The reading of the attached Thermometer ought always to be the first taken, as the heat of the breath, or the proximity of the person, are apt to influence its readings.

The corrections necessary to be applied to the Barometric readings depend on the form of the instrument. The mode of making these corrections, and the tables employed for the purpose, will be found in the "Report of the Committee of the Royal Society on Physics and Meteorology," 1840, price 1s. The daily readings of the Barometer ought to be entered on the Schedule as *read off*, and the corrections only applied to the mean for the month. *Self-Registering Thermometers and Hygrometers.*—These should be placed alongside of each other, in a place freely exposed to the air, but protected from sunshine, and from reflected heat, as well as from radiation and from rain, and as near as may be *four feet* from the general surface of the ground. Different contrivances are used for this purpose, either a double ventilated box with louver-boarded sides, fixed at a north window, and projecting 12 inches from the wall, so as to allow a free current of air to pass between the box and the wall; or in a double meat-slate ventilated box with louver-boarded sides, fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be given to the Secretary, in order that the results of one month's observations may be strictly comparable with those of another.

The *Self-Registering Thermometers* should be placed exactly horizontal. In the case of the ordinary maximum Thermometer, with clay, glass, or steel index, the bulb may be *very slightly* elevated, in order that the mercurial column may be somewhat aided by the force of gravity in pushing forward the float or index; and in the case of the *minimum* Thermometer, the bulb must be slightly depressed, to prevent a draining of the spirit to the top of the tube, and also that any part raised in vapour may return to the column. These Thermometers, if read once a-day, should *always be read on the evening*, so that the temperatures marked by the floats indicate the minimum and the maximum of the day on which the reading is taken. N.B.—The readings of these instruments are taken from that extremity of the float which is nearest the *head of the column of mercury or of spirit*.

The *maximum* Registering Thermometer, for taking the extreme heat of the sun's rays, should have its bulb blackened and the surface rendered dull, and it should be mounted in a blackened box, whose sides should be so high as to protect the bulb from wind. It should be so placed that the sun's rays have free access to it during the heat of the day.

The *minimum* Registering Thermometer, for ascertaining the lowest temperature during the night from radiation, should have its bulb similarly blackened and rendered dull, and be similarly mounted. It should be laid out, about sunset, over grass, in a place freely exposed to the sky, but raised on wooden supports a few inches above the surface, and removed during the day.

Hygrometer.—The *wet bulb* requires the muslin covering, it to be often changed. In towns once a month, or oftener, if the weather is dusty, and the muslin gets foul; in the country whenever the muslin seems to be foul. The muslin should always be thoroughly wetted, and freed from starch, before being used; and the cotton wick which conducts moisture to it should be thoroughly wetted, else it will conduct the moisture imperfectly, and yield false results. The cotton wick is best attached by passing its extremity through an aperture in the centre of the muslin, spreading that portion out so as to apply equally round the bulb, and then tying the muslin over the wet bulb. In frosty weather, water must be poured over the wet bulb, so as to form a thin film of ice on the muslin, the evaporation from the ice going on as from the simply wetted bulb.

Rain Gauge.—As "Fleming's Rain Gauge" seems to possess several advantages over others, the Society gives the preference to them; but whatever form be employed, in order that all the stations may yield comparable results, it is recommended that the Gauge be sunk in the ground, so that the top of the receiver is nearly on a level with the top blades of *close cut grass*, in a place heavy on a level with the top blades of *close cut grass*, in a place or broken ground, and the *quality of Rain Gauge* is kept, they *registered daily*. When more than one Rain Gauge is kept, they ought to be placed near each other, but at different heights above the ground, and their indications noted in the *general remarks*, mentioning their height above ground—the regular column in the Schedule being reserved for the ground Rain Gauge alone.

Winds.—Isolated Wind-vanes or Weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, etc. Where low clouds are seen drifting along, their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular mirror fixed over the centre of a pocket compass, will, in general, give the true direction of the current of air near the earth's surface if these clouds are near and immediately over head, that is, in or near the zenith of the observer. The notion of the higher strata of clouds gives no such indication. Failing the clouds, the general direction of the smokes of a hospital or village, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction by reflection or otherwise. For mode of estimating the force of the wind, see "Directions for Reading Instruments." Lind's Anemometer is commonly used for this purpose, but the best Anemometer of moderate price yet invented is Professor Robinson's Cup Wind Gauge, which registers the velocity of the wind—540 revolutions of the cups, as registered by the instrument, being equal to one statute mile.

Clouds.—The Society recommends observers to adopt the Howard nomenclature of clouds. The scale of cloud in the visible sky is reckoned from 0 to 10. Thus, a sky quite free from cloud is 0; a sky half covered with cloud is 5; and the whole visible sky covered with cloud is 10. Clouds often cover three-fourths or even more of the visible sky without obscuring the sunshining, so that the indications noted in the column for clouds would not necessarily express, or agree with, the column for sunshining. As the full moon, so long as it is above the horizon, is thought by some eminent astronomers to have a powerful effect in dispersing clouds, it would be well to note in the General Remarks any facts bearing on this point, for a few days (or nights, as the case may be) before and after every full moon; and the same observations ought to be made at the periods of new moon.

Sunshine.—The number of hours the sun shines during the day should be entered in the proper column. *Thermometers under Ground.*—Though the temperature and hygrometric conditions of the air are those which chiefly influence the growth of crops, it is important for the health of the crop, and for the germination of the seed, that the soil itself should have a certain temperature. To collect facts which may illustrate this, it is recommended to have Thermometers sunk 3, 12, and 22 inches below the surface of the ground, to ascertain the temperature of what may be termed the agricultural soil; and the observer should enter in the Schedule the *kind of soil*; whether drained or undrained; and whether naturally wet or dry.

Temperature of the Sea.—As the meteorology of the island is incomplete without a knowledge of the mean temperature of the Ocean which surrounds it, the Society strongly recommends taking the temperature of the Sea at a depth of 6 feet or 1 fathom from the end of all piers or rocks round the coast, where free from the influence of river water, and as near as may be about the time of high water. A Thermometer, with its bulb fixed in a small tin pichet covered with a sloping lid, and with a weight attached, is sunk to the required depth, and in ten minutes drawn up and read. The density of the sea water should, if possible, be taken at the same time. Convenient instruments are furnished by Messrs. A. D. and Son.

Temperature of Springs.—The temperature of Springs or Deep Wells is recommended to be taken whenever practicable, mentioning whether Spring or Well, and its depth from the surface. *Meteors, Aurora Borealis, Remarkable Depression or Elevation of Barometer, Remarkable Falls of Rain, Frost or Snow, Thunder and Lightning*, etc., should be specially noticed, together with the exact hour at which they were first seen, their continuance, and direction.

Budding, Leafing, and Flowering of Trees.—It is necessary to bear in mind that varieties of the same species of tree differ widely in their times of leafing and flowering. *Individual Trees or Shrubs* of each kind should therefore be chosen (if possible early kinds), and their indications should be alone noted—always the same plant from year to year being noticed.

Ozone.—Methods whether Schönbein's or Mörkt's scale and papers are used. Schönbein's are preferred. They may be had at Messrs. A. D. and Son's, 50, Princes Street, and at Mr. Bryson's, 60, Princes Street, Edinburgh. *Electricity.*—Pith balls suspended by a linen thread, in connection with a metallic conductor, and under cover, and the degrees of a circle being used to express the degree of repulsion, form a cheap and convenient Electrometer. Excited glass or sealing-wax ascertains the nature of the electricity.

SHRUBS, ETC.		FRUIT.		MIGRATORY BIRDS.		First Departure.	
First in Blossom.		First in Blossom.		First in Blossom.		First in Blossom.	
Barberry.....		Apple.....		Cuckoo.....			
Broom.....		Black Currant.....		Curlew.....			
Bur-tree or Elder.....		Cherry.....		House-Swallow.....			
Hazel.....		Cean.....		Lapwing.....			
Hawthorn.....		Gooseberry.....		Plover.....			
Holly.....		Peach.....		Sand-Martin.....			
Laburnum.....		Pear.....		Swain.....			
Lilac.....		Plum.....		Starling.....			
Mezereum.....		Strawberry.....		Rail or Corn Crake.....			
Mountain Ash or Rowan.....				Other Birds, naming them.....			
Red Flowering Currant.....							
Rhododendron Ponticum.....							
Whin.....							

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc. Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Leaf first appears.	In Leaf.	Diseased or withered.	CROPS.	Soiling or above ground.	In Ear.	First Cut.
Alder.....					Barley.....			
Ash.....					Bare or Blight.....			
Beech.....					Oats.....			
Birch.....					Wheat.....			
Elm.....					Beans.....			
Larch.....					Pease.....			
Lime.....					Potatoes.....			
Oak.....					Turnips.....			
Sycamore or Plane.....					Rye Grass.....			

EDINBURGH.

21, Rutland Street,

Sec., Meteorological Society,

DR STARK,

To

METEOROLOGICAL RETURNS.

JUN

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at March Hall Park, County of Midlothian, in Lat. _____, Long. _____, Height above Sea _____ feet.

Distance from Sea _____ miles.

During the MONTH of July 1859.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS. under Ground.			SEA.		ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.	
	h. A.M.		h. P.M.		PROTECTED.		EXPOSED.		h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.			Temperature.	Density.				OZONE. 0 to 10
	Barometer.	Attach- ed Ther- mometer	Barometer.	Attach- ed Ther- mometer	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ††	Direction.	Force ††					3	12	22						
																					inches.	"	inches.						
1					61½	46			60	54½	52	50																1	
2					59½	50			52½	50	54	51						13/10										2	
3					57½	50			52	50	55	53																3	
4					61	52			56½	54¾	57	55½																4	
5					71	52			64½	57½	64½	53½																5	
6					69	57			64	59	61½	56																6	
7					69	59			62	59	60	55																7	
8					66	55			62½	58	56½	52½																8	
9					71½	51			61	57	61½	57						3/10										9	
10					73½	51			63	58	65	60																10	
11					78	56			61	65	71	62																11	
12					71	57½			64½	53	58	53																12	
13					64½	49½			58	54	58½	54																13	
14					64	49½			60½	57	58	54½																14	
15					67	54			62	57	57½	55																15	
16					62	53			68½	64	57½	55½						2/10										16	
17					69	56			65½	61½	62	51																17	
18					57	49½			52	51	57½	57																18	
19					58½	56			65½	55	57	55½																19	
20					59	56½			59½	59	55	53½																20	
21					60½	55½			60	58½	53	51																21	
22					66	52½			52	51	60½	56																22	
23					59	49			60	59	62	58						1/2										23	
24					68	56			63	58	60	59½																24	
25					68	54			63	58½	59	55																25	
26					69	56			65	59	59	55½																26	
X 27					65½	53½			62	57	56½	52																27	
28					65½	56			60	54	58½	54																28	
29					62½	51			59½	55	66	53½																29	
30					55	49			65	60½	67	64						2/10										30	
31					66	44			64	59½	66	62																31	
Sums.					1444½	766½																							
Means.					64½	52½																							
Corr. for Index Errors.																													
Correction for Diurnal Range.†																													
Corrected Means.																													
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		

Barometer, mean corrected reading of Column No. 1 (A.M.), = Column No. 3 (P.M.), =
Diameter of tube _____ inch; correction for capillarity to be added, + Capillarity, = +
Sum, Sum,
Correction for Temperature from Column No. 2 to be deducted, = - Temp. from Col. 4, = -
Sum, Sum,
Mean of the above
Correction for Height above Sea-level, _____ feet, to add,
Barometer corrected and reduced to 32° and Sea-level,

SUMMARY OF THE WINDS.											
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.											
P.M.											
Mean.											

Dry bulb Thermometer (mean of Cols. 9 and 11),
Wet bulb Thermometer (mean of Cols. 10 and 12),
† Dew-point Temperature,
† Elastic Force of Vapour,
† Weight of Vapour in a Cubic Foot of Air,
† Additional Weight required to Saturate a Cubic Foot,
† Degree of Humidity (Saturation 100),

Highest Reading Self-Registering Thermometer in Air and Protected, on the
Lowest do. do. do. do. do. do. on the
Difference, being Monthly Range,
Mean of Self-Registering Thermometers in Air and Protected,
Mean Daily Range in Air and Protected,
Greatest Daily Range, do. do. do. do. do. do. on the
Highest Reading Self-Registering Black Bulb Thermometer in Sun, on the
Lowest do. do. do. do. do. do. from Radiation during Night, on the

(Signed) A. R. R. R. R.

(Designation) _____

N.B.—This Schedule should be returned (post-paid) as early as possible after the completion of the Month, with the Sums correctly added, and the Means deduced. No Waz or Wajers ever to be employed in closing the Schedule—the Gummed Corner to be alone used.

INSTRUCTIONS FOR MAKING METEOROLOGICAL OBSERVATIONS.

Those persons who kindly furnish Monthly Tables of the Weather to the Scottish Meteorological Society are requested to attend to the following Instructions, seeing that one of the most important ends of Meteorological Observations is their being comparable with one another; and for this purpose it is requisite that all should, if possible, observe at a like hour, and in a like manner, and have their instruments placed, in so far as circumstances allow, in a like position:

Hour of Observation.—All instruments which are observed twice a day, should be read at the same hour morning and evening, in order to furnish mean results. The Society recommends a quarter before nine o'clock morning and evening, as the most convenient hour; but should this be inconvenient for the observer, another hour may be chosen, attending, however, to the above rule, that the evening and morning readings be taken at the same hour, and this hour entered on the Schedule.

Barometer.—Barometers of Messrs. Adie and Son's construction are recommended; but any instruments may be used which have adjustable surfaces, and have been compared. Before this instrument is suspended for use it should be examined, in order to ascertain whether the space above the mercury is free from air. This is done by inclining the instrument somewhat from the vertical position, when, if free from air, the mercury will strike against the upper end of the tube with a sharp tap. The mercury should then completely fill the tube. If any air has got admittance, it should be driven into the cistern by reversing the instrument, and tapping it gently with the hand. If it cannot be thus expelled, the instrument is useless till repaired.

The Barometer should be hung in a good light, and perfectly perpendicular, as ascertained by the plumb line; and it ought always to be gently tapped before taking the reading, to prevent adhesion of the mercury to the tube. In reading, the eye ought to be placed on the exact level of the top of the column of mercury. The reading of the attached Thermometer ought always to be the first taken, as the heat of the breath, or the proximity of the person, are apt to influence its readings.

The corrections necessary to be applied to the Barometric readings depend on the form of the instrument. The mode of making these corrections, and the tables employed for the purpose, will be found in the "Report of the Committee of the Royal Society on Physics and Meteorology," 1846, price 1s. The daily readings of the Barometer ought to be entered on the Schedule as read off, and the corrections only applied to the mean for the month. *Self-Registering Thermometers and Hygrometers.*—These should be placed alongside of each other, in a place freely exposed to the air, but protected from sunshine, and from reflected heat, as well as from radiation and from rain, and as near as may be four feet from the general surface of the ground. Different contrivances are used for this purpose, either a double ventilated box with moveable sides, fixed at a north window, and projecting 12 inches from the wall, so as to allow a free current of air to pass between the box and the wall; or in a double met-sate ventilated box with moveable sides, fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed (without due notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The *Self-Registering Thermometers* should be placed exactly horizontal. In the case of the ordinary maximum Thermometer, with clay, glass, or steel index, the bulb may be very slightly elevated, in order that the mercurial column may be somewhat aided by the force of gravity in pushing forward the float or index; and in the case of the minimum Thermometer, the bulb must be slightly depressed, to prevent a draining of the spirit to the top of the tube, and also that any part raised in vapour may return to the column. These Thermometers, so that the temperatures marked *along the rod on the evenings*, so that the temperatures marked by the floats indicate the minimum and the maximum of the day on which the reading is taken. N.B.—The readings of these instruments are taken from that extremity of the float which is nearest the head of the column of mercury or of spirit.

The maximum Registering Thermometer, for taking the extreme heat of the sun's rays, should have its bulb blackened and the surface rendered dull, and it should be mounted in blackened box, whose sides should be so high as to protect the bulb from wind. It should be so placed that the sun's rays have free access to it during the heat of the day.

The minimum Registering Thermometer, for ascertaining the lowest temperature during the night from radiation, should have its bulb similarly blackened and rendered dull, and be similarly mounted. It should be laid out, about sunset, over grass, in a place freely exposed to the sky, but raised on wooden supports a few inches above the surface, and removed during the day.

Hygrometer.—The wet bulb requires the muslin covering it to be often changed. In towns once a month, or oftener, if the weather is dusty, and the muslin gets foul; in the country always be thoroughly wetted, and freed from starch, before being used; and the cotton wick which conducts moisture to it should be thoroughly wetted, else it will conduct the moisture imperfectly, and yield false results. The cotton wick is best attached by passing its extremity through an aperture in the centre of the muslin, spreading that portion out so as to apply equally round the bulb, and then tying the muslin over the bulb. In frosty weather, water must be poured over the wet bulb, so as to form a thin film of ice on the muslin, the evaporation from the ice going on as from the simply wetted bulb.

Rain Gauge.—As "Fleming's Rain Gauges" seem to possess several advantages over others, the Society gives the preference to them; but whatever form be employed, in order that all the stations may yield comparable results, it is recommended that the Gauge be sunk in the ground, so that the top of the receiver is nearly on a level with the top blades of close cut grass, in a place as distant as possible from trees, houses, high walls, and irregular or broken ground, and the quantity of Rain should, if possible, be registered daily. When more than one Rain Gauge is kept, they ought to be placed near each other, but at different heights above the ground, and their indications noted in the general remarks, mentioning their height above ground—the regular column in the Schedule being reserved for the ground Rain Gauge alone.

Winds.—Isolated Wind-vanes or Weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, etc. Where low clouds are seen drifting along, their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular mirror fixed over the centre of a pocket compass, will, in general, give the true direction of the current of air near the earth's surface if these clouds are near and immediately over head, that is, in or near the zenith of the observer. The motion of the higher strata of clouds gives no such indication. Failing the clouds the general direction of the smoke of a hamlet or village, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction by reflection or otherwise. For mode of estimating the force of the wind, see "Directions for Reading Instruments." Lind's Anemometer of moderate price yet invented is Professor Robinson's Cup Wind Gauge, which registers the velocity of the wind—540 revolutions of the cups as registered by the instrument, being equal to one statute mile.

Clouds.—The Society recommends observers to adopt the Howard nomenclature of clouds. The scale of cloud in the visible sky is reckoned from 0 to 10. Thus, a sky quite free from cloud is 0; a sky half covered with cloud is 5; and the whole visible sky covered with cloud is 10. Clouds often cover three-fourths or even more of the visible sky without obstructing the sunshine, so that the indications noted in the column for clouds would not necessarily express, or agree with, the column for sunshine. As the full moon, so long as it is above the horizon, is thought by some eminent astronomers to have a powerful effect in dispelling clouds, it would be well to note in the General Remarks any facts bearing on this point, for a few days (or nights, as the case may be) before and after every full moon; and the same observations ought to be made at the periods of new moon.

Sunshine.—The number of hours the sun shines during the day should be entered in the proper column. *Thermometers under Ground.*—Though the temperature and hygrometric conditions of the air are those which chiefly influence the growth of crops, it is important for the health of the crop, and for the germination of the seed, that the soil itself should have a certain temperature. To collect facts which may illustrate this, it is recommended to have Thermometers sunk 3, 12, and 22 inches below the surface of the ground, to ascertain the temperature of what may be termed the agricultural soil; and the observer should enter in the Schedule the kind of soil, whether drained or undrained; and whether naturally wet or dry.

Temperature of the Sea.—As the meteorology of the island is incomplete without a knowledge of the mean temperature of the Ocean which surrounds it, the Society strongly recommends taking the temperature of the Sea at a depth of 6 feet or 1 fathom from the end of all piers or rocks round the coast, where free from the influence of river waters, and as near as may be about the time of high water. A Thermometer, with its bulb fixed in a small tin pike-rod covered with a sloping lid and with a weight attached, is sunk to the required depth, and in ten minutes drawn up and read. The density of the sea water should, if possible, be taken at the same time. Convenient instruments are furnished by Messrs. Adie and Son.

Temperature of Springs.—The temperature of Springs or Deep Wells is recommended to be taken whenever practicable, mentioning whether Spring or Well, and its depth from the surface. *Moons, Aurora Borealis, Remarkable Disturbances or Ejections of Volcanoes, Remarkable Falls of Rain, Hail or Snow, Thunder and Lightning, etc.*, should be specially noticed, together with the exact hour at which they were first seen, their continuance, and direction.

Building, Leafing, and Flowering of Trees.—It is necessary to bear in mind that varieties of the same species of tree differ widely in their times of leafing and flowering. *Individual Trees or Shrubs* of each kind should therefore be chosen (if possible early kinds), and their indications should be alone noted—always the same plant from year to year being noticed. *Ozone.*—Mention whether Schonbein's or Moffat's scale and payers are used. Schonbein's are preferred. They may be had at Messrs. Adie and Son's, 50, Princes Street, Edinburgh. *Electricity.*—Pith balls suspended by a linen thread, in connection with a metallic conductor, and under cover, and the degrees of a circle being used to express the degree of repulsion, form a cheap and convenient Electrometer. Excited glass or sealing-wax ascertains the nature of the electricity.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	Leaf buds first appear.	In leaf.	Dressed leaves.	CROPS, mentioning variety.	Sowing or planting.	Harvest or above ground.	In ear or flower.	First cut.
Alder,					Barley,				
Asp.					Bare or Bigg,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Peas,				
Line,					Potatoes,				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass,				

SHRUBS, ETC.	First in blossom.	FRUITS.	First in blossom.	First ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,		Apple,		Cuckoo,			
Bourtree or Elder,		Black Currant,		House-Swallow,			
Broom,		Cherry,		Lapwing,			
Hazel,		Gean,		Plover,			
Hawthorn,		Gooseberry,		Sand-Martin,			
Holly,		Peach,		Starling,			
Laburnum,		Pear,		Swan,			
Lilac,		Plum,		Rail or Corn Crane,			
Mezerion,		Strawberry,		Other Birds, naming them—			
Mountain Ash or Rowan,							
Red Flowering Currant,							
Rhododendron Ponticum,							
Whin,							

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, Fruits, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc., Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

EDINBURGH.

Sec., Meteorological Society,

10 St. Andrew Sq.
22, R. N. S. S. S.

METEOROLOGICAL RETURNS.

To

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at March Hall Park, County of Midlothian, in Lat. _____, Long. _____, Height above Sea _____ feet.

Distance from Sea _____ miles. During the MONTH of August 1859.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS. under Ground.			SEA.	OZONE.	ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.
	h. A.M.		h. P.M.		PROTECTED.		EXPOSED.		h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.							
	Barometer.	Attach- ed Ther- mometer	Barometer.	Attach- ed Ther- mometer	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ††	Direction.	Force ††					3 inches.	12 inches.	22 inches.					
	inches.	"	inches.	"	"	"	"	"	"	"	"	"	"	"	"	"					"	"	"		"	"		
1					60	51			59½	53	54	50																1
2					67	51			61	54½	58	55																2
3					68½	56			66	57½	57	54																3
4					64½	52½			61	57	55	51½																4
5					62	51			56½	53	52	50																5
6					61	47			56½	53½	54	51					1/10	1/10										6
7					61	47½			59½	55	54	53																7
8					62	50			58	54	56	53																8
9					60	48			60	56	55	52½																9
10					64	48			57	56½	57½	55																10
11					62	51			62	57	62	57																11
12					68½	53			66	60½	62½	60																12
13					68	58			66½	63	62	59					1/10											13
14					67	53½			61½	58	56	53																14
15					64½	58½			60	54½	56	52½																15
16					62	52			60	55½	60	57																16
17					70½	58			64	61½	66	63																17
18					67	60			64½	60½	61	57																18
19					66½	60			62	57	64	63																19
20					67	60			63	55½	57½	53					1/10											20
21					71	53			60½	56½	58½	55																21
22					78½	52			57	55	60½	57																22
23					61½	56			59½	57	60	58																23
24					73	54			64½	61½	62	58																24
25					74	54			64	60	57	55																25
26					57	52			55½	53½	54	53																26
27					62	51			56	52	57	54					1/10											27
28					62	47			58	53	52½	49½																28
29					63	47½			60	56	55	50																29
30					57	48			56	51½	51	47½																30
31					57½	47½			56	52	52	47½																31
Sums.					1304	123																						
Means.					64.0	52.5																						
Index Errors.																												
Correc- tion for Diurnal Range.†																												
Corrected Means.																												
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

Barometer, mean corrected reading of Column No. 1 (A.M.),.....= _____ Column No. 3 (P.M.),.....= _____
Diameter of tube _____ inch; correction for capillarity to be added,.....+ _____ Capillarity,.....= + _____
Sum,..... Sum,.....
Correction for Temperature from Column No. 2 to be deducted,.....= - _____ Temp. from Col. 4,.....= - _____
Sum,..... Sum,.....
Mean of the above
Correction for Height above Sea-level, _____ feet, to add,.....
Barometer corrected and reduced to 32° and Sea-level,

SUMMARY OF THE WINDS.										
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.										
P.M.										
Mean.										

Dry bulb Thermometer (mean of Cols. 9 and 11),*.....
Wet bulb Thermometer (mean of Cols. 10 and 12),*.....
† Dew-point Temperature,.....
† Elastic Force of Vapour,.....
† Weight of Vapour in a Cubic Foot of Air,.....
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),.....
Highest Reading Self-Registering Thermometer in Air and Protected, on the
Lowest do. do. do., on the
Difference, being Monthly Range,.....
Mean of Self-Registering Thermometers in Air and Protected,
Mean Daily Range in Air and Protected,
Greatest Daily Range, do., on the
Highest Reading Self-Registering Black Bulb Thermometer in Sun, on the
Lowest do. do. from Radiation during Night, on the

†† In the above columns for the registration of the Force of the Wind, may be entered the number of revolutions, by Professor Robinson's Cup Wind Gauge, which registers the velocity of the Wind—540 revolutions being equal to one statute mile.
* If the readings are taken at 9h and 3h, the 9h readings to be alone taken to account, as the correction for Diurnal Range in Scotland is unknown.
† All these calculated from Glaisher's Hygrometric Tables, Second Edition only.
‡ The Diurnal Range for Scotland is as yet unknown.

INSTRUCTIONS FOR MAKING METEOROLOGICAL OBSERVATIONS.

Those persons who kindly furnish Monthly Tables of the Weather to the Scottish Meteorological Society are requested to attend to the following Instructions, seeing that one of the most important ends of Meteorological Observations is their being comparable with one another; and for this purpose it is requisite that all should, if possible, observe at a like hour, and in a like manner, and have their instruments placed, in so far as circumstances allow, in a like position:

Hour of Observation.—All instruments which are observed twice a-day should be read at the same hour morning and evening in order to furnish mean results. The Society recommends a quarter before nine o'clock morning and evening as the most convenient hour; but should this be inconvenient for the observer, another hour may be chosen, attending, however, to the above rule, that the evening and morning readings be taken at the same hour, and this hour entered on the Schedule.

Barometer.—Barometers of Messrs. Adie and Son's construction are recommended; but any instruments may be used which have adjustable surfaces, and have been compared. Before this instrument is suspended for use it should be examined in order to ascertain whether the space above the mercury is free from air. This is done by inclining the instrument somewhat from the vertical position, when, if free from air, the mercury will strike against the upper end of the tube with a sharp tap. The mercury should then completely fill the tube. If any air has got admittance, it should be driven into the cistern by reversing the instrument, and tapping it gently with the hand. If it cannot be thus expelled, the instrument is useless till repaired.

The barometer should be hung in a good light, and perfectly perpendicular, as ascertained by the plumb line; and it ought always to be gently tapped before taking the reading to prevent adhesion of the mercury to the tube. In reading, the eye ought to be placed on the exact level of the top of the column of mercury. The reading of the attached thermometer ought always to be the first taken, as the heat of the breath, or the proximity of the person, are apt to influence its readings.

The corrections necessary to be applied to the barometric readings depend on the form of the instrument. The mode of making these corrections, and the tables employed for the purpose, will be found in the "Report of the Committee of the Royal Society on Physics and Meteorology," 1840, price 1s. The daily readings of the barometer ought to be entered on the Schedule as read off, and the corrections only applied to the mean for the month. **Self-Registering Thermometers and Hygrometers.**—These should be placed alongside of each other, in a place freely exposed to the air, but protected from sunshine, and from reflected heat, as well as from radiation and from rain, and as near as may be four feet from the general surface of the ground. Different contrivances are used for this purpose, either a double ventilated box with louver-boarded sides, fixed at a north window, and projecting 12 inches from the wall, so as to allow a free current of air to pass between the box and the wall; or in a double neat-case ventilated box with louver-boarded sides, fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed (without due notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The **Self-Registering Thermometers** should be placed exactly horizontal. In the case of the ordinary maximum thermometer, with clay, glass, or steel index, the bulb may be very slightly elevated, in order that the mercurial column may be somewhat aided by the force of gravity in pushing forward the float or index; and in the case of the **minimum thermometer**, the bulb must be slightly depressed to prevent a draining of the spirit to the top of the tube, and also that any part raised in vapour may return to the column. These thermometers, if read once a-day, should always be read on the evening, so that the temperatures marked by the floats indicate the minimum and the maximum of the day on which the reading is taken. N.B.—The readings of these instruments are taken from that extremity of the float which is nearest the head of the column of mercury or of spirit.

The **maximum Registering Thermometer**, for taking the extreme heat of the sun's rays, should have its bulb blackened and the surface rendered dull, and it should be mounted in a blackened box, whose sides should be so high, as to protect the bulb from wind. It should be so placed that the sun's rays have free access to it during the heat of the day. The **minimum Registering Thermometer**, for ascertaining the lowest temperature during the night from radiation, should have its bulb similarly blackened and rendered dull, and be similarly mounted. It should be laid out, about sunset, over grass, in a place freely exposed to the sky, but raised on wooden supports a few inches above the surface, and removed during the day.

Hygrometer.—The wet bulb requires the muslin covering it to be often changed. In towns once a month, or oftener, if the weather is dusty, and the muslin gets foul; in the country whenever the muslin seems to be foul. The muslin should always be thoroughly wetted, and freed from starch, before being used; and the cotton wick which conducts moisture to it should be thoroughly wetted, else it will conduct the moisture imperfectly, and yield false results. The cotton wick is best attached by passing its extremity through an aperture in the centre of the bulb, spreading that portion out so as to apply equally round the bulb, and then tying the muslin over the wet bulb. In frosty weather, water must be poured over the wet bulb, so as to form a thin film of ice on the muslin, the evaporation from the ice going on as from the simply wetted bulb.

Rain Gauge.—As "Fleming's Rain Gauge" seem to possess several advantages over others, the Society gives the preference to them; but whatever form be employed, in order that all the stations may yield comparable results, it is recommended that the Gauge be sunk in the ground, so that the top of the receiver is nearly on a level with the top blades of close cut grass, in a place distant as possible from trees, houses, high walls, and irregular or broken ground, and the quantity of Rain should, if possible, be registered daily. When more than one Rain Gauge is kept, they ought to be placed near each other, but at different heights above the ground, and their indications noted in the general remarks, mentioning their height above ground—the regular column in the Schedule being reserved for the ground Rain Gauge alone.

Winds.—Isolated Wind-vanes or Weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, etc. Where low clouds are seen drifting along their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular mirror fixed over the centre of a pocket compass, will, in general, give the true direction of the current of air near the earth's surface if these clouds are near and immediately over head, that is, in or near the zenith of the observer. The motion of the higher strata of clouds gives no such indication. Failing the clouds, the general direction of the smoke of a hamlet or village, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction by reflection or otherwise. For mode of estimating the force of the wind, see "Directions for Reading Instruments." Lind's Anemometer is commonly used for this purpose, but the best Anemometer of moderate price yet invented is Professor Robinson's Cup Wind Gauge, which registers the velocity of the wind—360 revolutions of the cups, as registered by the instrument, being equal to one statute mile.

Clouds.—The Society recommends observers to adopt the Howard nomenclature of clouds. The scale of cloud in the visible sky is reckoned from 0 to 10. Thus, a sky quite free from cloud is 0; a sky half covered with cloud is 5; and the whole visible sky covered with cloud is 10. Clouds often cover three-fourths or even more of the visible sky without obstructing the sunshining, so that the indications noted in the column for clouds would not necessarily express, or agree with, the column for sunshining. As the full moon, so long as it is above the horizon is thought by some eminent astronomers to have a powerful effect in dispersing clouds, it would be well to note in the General Remarks any facts bearing on this point, for a few days (or nights, as the case may be) before and after every full moon; and the same observations ought to be made at the periods of new moon.

Sunshine.—The number of hours the sun shines during the day should be entered in the proper column. **Thermometers under Ground.**—Though the temperature and hygrometric conditions of the air are those which chiefly influence the growth of crops, it is important for the health of the crop, and for the germination of the seed, that the soil itself should have a certain temperature. To collect facts which may illustrate this, it is recommended to have Thermometers sunk 2, 12, and 22 inches below the surface of the ground, to ascertain the temperature of what may be termed the agricultural soil; and the observer should enter in the Schedule the kind of soil; whether drained or undrained; and whether naturally wet or dry.

Temperature of the Sea.—As the meteorology of the island is incomplete without a knowledge of the mean temperature of the Ocean which surrounds it, the Society strongly recommends taking the temperature of the Sea at a depth of 6 feet or 1 fathom from the edge of all piers or rocks round the coast, where free from the influence of river water, and as near as may be about the time of high water. A thermometer, with its bulb fixed in a small tin pichet covered with a sloping lid, and with a weight attached, is sent to the required depth, and in ten minutes drawn up and read. The density of the sea water should, if possible, be taken at the same time. Convenient instruments are furnished by Messrs. Adie and Son.

Temperature of Springs.—The temperature of Springs or Deep Wells is recommended to be taken whenever practicable, mentioning whether Spring or Well, and its depth from the surface. **Meteors.** *Aurora Borealis, Remarkable Depression or Elevation of Barometer, Remarkable Falls of Rain, Hail or Snow, Thunder and Lightning*, etc., should be specially noticed, together with the exact hour at which they were first seen, their continuance, and direction.

Budding, Leafing, and Flowering of Trees.—It is necessary to bear in mind that varieties of the same species of tree differ widely in their times of leafing and flowering. *Individual Trees or Shrubs of each kind* should therefore be chosen (if possible early kinds), and their indications should be alone noted—always the same plant from year to year, whether Scotchbairns or Moffat's scots and papers are used. Scotchbairns are preferred. They may be had at Messrs. Adie and Son's, 50, Princes Street, and at Mr. Bryson's, 60, Princes Street, Edinburgh. **Electricity.**—Firm brass suspended by a linen thread in connection with a metallic conductor, and under cover, the degrees of a circle being used to express the degree of repulsion, form a cheap and convenient Electrometer. Exposed glass or sealing-wax ascertains the nature of the electricity.

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, Fruits, etc., whether plentifully, or in perfection; whether any have suffered from blight, disease, etc. Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

SHRUBS, ETC.	FRUITS.	MIGRATORY BIRDS.	First in Fruit Ripen generally.	Blossom.	Cuckoo, generally.	First in Fruit Ripen generally.	Departure.
Barberry,	Apple,	Curlew,					
Bourtree or Elder,	Black Currant,	House-Swallow,					
Broom,	Cherry,	Lapwing,					
Hazel,	Gooseberry,	Plover,					
Hawthorn,	Peach,	Sand-Martin,					
Holly,	Pear,	Starling,					
Laburnum,	Plum,	Swan,					
Lilac,	Strawberry,	Rail or Corn Crane,					
Mezerion,	Other Birds, naming them—						
Mountain Ash or Rowan,							
Red Flowering Currant,							
Rhododendron Ponticum,							
Whin,							

FOREST TREES.	In Flower.	Last buds first appear.	In Leaf.	Divided of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearance above Ground.	In Ear.	First Cut
Alder,									
Beech,									
Birch,									
Elm,									
Larch,									
Lime,									
Oak,									
Sycamore or Plane,									
Barley,									
Bere or Bigg,									
Oats,									
Wheat,									
Beans,									
Peas,									
Potatoes,									
Turnips,									
Rye Grass,									

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

EDINBURGH.

21, Rutland Street,

Sec., Meteorological Society,

DR STARK,

METEOROLOGICAL RETURNS.

Edin. March Hall

AUG 1859

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Marich Hall park County of _____, in Lat. _____, Long. _____, Height above Sea _____ feet.

Distance from Sea _____ miles.

During the MONTH of October1859

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS. under Ground.			SEA.	OZONE.	ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.
	h. A.M.		h. P.M.		PROTECTED.		EXPOSED.		h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.							
	Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ↑↑.	Direction.	Force ↑↑.					3 inches.	12 inches.	22 inches.					
	inches.	.	inches.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	days.	inches.	1 to 10	Hours.	.	.	.	A.M.	P.M.	.
1					66	57			54½	53	58	56						2									1	
2					62½	48			51½	49½	52½	52½															2	
3					64½	52			61½	59	61	59															3	
4					67	58			62½	60	60	58															4	
5					59	49			57	53	54	51															5	
6					51	46½			55	52	51	50															6	
7					61½	46½			57	54½	56	55															7	
8					59	53			56	55	56	55						3									8	
9					67	53			55½	54½	56½	55½															9	
10					56	50½			53½	51	51	48½															10	
11					53	48½			53½	42	51	50															11	
12					56½	47			61½	58½	47½	49½															12	
13					54	40½			60½	49	48½	48															13	
14					56	48			53	52	56½	55															14	
15					52½	44			51½	50	46	44½						2									15	
16					53	44			50½	50	54	53															16	
17					54	42½			58	44½	51½	50															17	
18					51	44			49	46½	46	45															18	
19					51½	39			46	44½	44	43															19	
20					44	34½			42½	39½	36	34															20	
21					88	27½			31	28	33	29															21	
22					39	28			34	27½	33	31						2									22	
23					39½	26½			31½	30	35	33															23	
24					42	26			30½	29½	32½	31															24	
25					42	25			32½	31	33	31½															25	
26					41	31½			38	36	40	36½															26	
27					44	36½			39	37	42	38															27	
28					43½	36½			37½	35½	37½	38½															28	
29					46	34			41	39	35	31						5									29	
30					46	31½			39½	34	33½	33½						2									30	
31					36½	26			31	30	36½	36															31	
Sums.					154	116																						
Means.					51½	41½																						
Index Errors.																												
Correction for Diurnal Range.†																												
Corrected Means.																												
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	

Barometer, mean corrected reading of Column No. 1 (A.M.), = Column No. 3 (P.M.), = Barometer, Highest observed reading of Month, = on the
Diameter of tube inch; correction for capillarity to be added, + Capillarity, = + Lowest do. do. = on the
Sum, Sum, Difference, or Monthly Range, =

Correction for Temperature from Column No. 2 to be deducted, = Temp. from Col. 4, =
Sum, Sum,

Mean of the above

Correction for Height above Sea-level, feet, to add,

Barometer corrected and reduced to 32° and Sea-level,

Dry bulb Thermometer (mean of Cols. 9 and 11),*
Wet bulb Thermometer (mean of Cols. 10 and 12),*
† Dew-point Temperature,
† Elastic Force of Vapour,
† Weight of Vapour in a Cubic Foot of Air,
† Additional Weight required to Saturate a Cubic Foot,
† Degree of Humidity (Saturation 100),

Highest Reading Self-Registering Thermometer in Air and Protected, on the
Lowest do. do. do. on the
Difference, being Monthly Range,
Mean of Self-Registering Thermometers in Air and Protected,
Mean Daily Range in Air and Protected,
Greatest Daily Range, do., on the
Highest Reading Self-Registering Black Bulb Thermometer in Sun, on the
Lowest do. do. from Radiation during Night, on the

(Signed)

(Designation)

N.B.—This Schedule should be returned (post-paid) as early as possible after the completion of the Month, with the Sums correctly added, and the Means deduced. No Wax or Wafers ever to be employed in closing the Schedule—the Gummed Corner to be alone used.

Those persons who furnish monthly tables of observations to the Scottish Meteorological Society are requested to attend to the following instructions, seeing that one of the most important aids of Meteorological Observations is that being comparable with one another; and for this purpose it is requisite that all should, if possible, observe at a like hour, and in a like manner, and have their instruments placed in so far as circumstances allow, in a like position:

Hour of Observation.—All instruments which are observed twice a-day, should be read at the same hour morning and evening, in order to furnish mean results. The Society recommends a quarter before sun *obscure morning* and *evening*, as the most convenient hour; but should this be inconvenient for the observer, another hour may be chosen, attending, however to the above rule, that the evening and morning readings be taken at the same hour, and this hour entered on the *Solitude*.

Brometer.—Brometers of Messrs. Adie and Son's construction are recommended; but any instruments may be used which have adjustable surfaces, and have been compared. Before this instrument is suspended for use it should be examined, in order to ascertain whether the space above the mercury is free from air. This is done by inclining the instrument somewhat from the vertical position, when, if free from air, the mercury will strike against the upper end of the tube with a sharp tap. The mercury should then completely fill the tube. If any air has got entrance, it should be driven into the cistern by reversing the instrument, and tapping it gently with the hand. If it cannot be thus expelled, the instrument is useless till repaired.

The Bromometer should be hung in a good light, and perfectly perpendicular, as ascertained by the plumb line; and it ought always to be gently tapped before taking the reading to prevent adhesion of the mercury to the tube. In reading the eye ought to be placed on the exact level of the top of the column of mercury. The reading of the attached Thermometer ought always to be the first taken, as the heat of the breath, or the proximity of the person, are apt to influence its readings.

The corrections necessary to be applied to the Bromometric readings depend on the form of the instrument. The mode of making these corrections, and the tables employed for the purpose, will be found in the "Report of the Committee on the Royal Society on Physics and Meteorology," 1840, price 1s. The daily readings of the Brometer ought to be entered on the *Solitude* as *read off*, and the corrections only applied to the mean for the month.

Self-Righting Thermometers and Hygrometers.—These should be placed alongside of each other, in a place freely exposed to the air, but protected from sunbining, and from reflected heat, as well as from radiation and from rain, and as near as may be *four feet* from the general surface of the ground. Different contrivances are used for this purpose, either a double ventilated box with louver-boarded sides, fixed at a north window and projecting 12 inches from the wall, so as to allow a free current of air to pass between the box and the wall; or in a double meta-site ventilated box with louver-boarded sides, fixed in an east-west place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed, (without the notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The *Self-Righting Thermometers* should be placed exactly horizontal. In the case of the ordinary *maximum* Thermometer, with clay, glass, or steel index, the bulb may be very slightly elevated in order, that the neutral column may be somewhat aided by the force of gravity in pushing forward the float or index; and in the case of the *minimum* Thermometer, the bulb must be slightly depressed, to prevent a draining of the spirit to the top of the tube, and also that any part raised in export may return to the column. These Thermometers, if read once a-day, should be *cleansed by washing the casings*, so that the imperfections marked by the floats indicate the minimum and the maximum of the day on which the reading is taken. N.B.—The readings of these instruments are taken from that extremity of the float which is nearest the *head of the column* of mercury or of spirit.

The *maximum*.—Regarding Thermometers for taking the extreme heat of the sun, rays should have its bulb blackened and the surface painted dull, and it should be mounted in a blackened box, whose sides should be so high as to prevent the bulb from wind. It should be so placed that the sun's rays have free access to it during the heat of the day.

The *minimum*.—Regarding Thermometers for ascertaining the lowest temperature during the night from radiation, should have its bulb minutely blackened and rendered dull, and be similarly mounted. It should be laid out about grass, over grass, in a place freely exposed to the sky, but raised on woodwork supports a few inches above the surface, and removed during the day.

Hygrometer.—The wet bulb requires the mesh covering it to be often changed. In towns once a month, or oftener, if the weather is dusty, and the mesh gets foul; in the country always be thoroughly wetted, and freed from starch, before being used; and the cotton wick which conducts moisture to it should be thoroughly wetted, else it will conduct the moisture imperfectly, and yield false results. The cotton wick is best attracted by passing its extremity through an aperture in the centre of the mesh, spreading that portion out so as to apply equally round the bulb, and then tying the mesh over the wick. In frosty weather, water must be poured over the wick until, so as to form a thin film of ice on the mesh, the evaporation, from the ice going on as fast as the simply wetted bulb.

Winds.—Isolated Wind-vanes or Weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, &c. Where low clouds are seen drifting along their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular surface fixed over the centre of a pocket compass, will, in general, give the true direction of the current of air near the earth's surface; if these clouds are near and immediately over head, that is, in or near the zenith of the observer. The motion of the lighter genera of clouds gives no such indication. Taking the clouds, the general direction of the smoke of a hamlet or village, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction by reflection or otherwise. For mode of estimating the force of the wind, see "Directions for Reading Instruments." Lind's Anemometer is commonly used for this purpose, but the best Anemometer of moderate price yet invented is Professor Robinson's Cup Wind Gauge, which registers the velocity of the wind—540 revolutions of the cups, as registered by the instrument, being equal to one statute mile.

Clouds.—The Society recommends observers to adopt the Howard nomenclature of clouds. The scale of cloud in the visible sky is reckoned from 0 to 10. Thus a sky quite free from cloud is 0; a sky half covered with cloud is 5; and the whole visible sky covered with cloud is 10. Clouds often cover three-fourths or even more of the visible sky without obstructing the sunshining, so that the indications noted in the column for clouds would not necessarily express, or agree with, the column for sunshine. As the full moon, *so long as it is above the horizon*, is thought by some eminent astronomers to have a powerful effect in dispelling clouds, it would be well to note in the General Remarks any facts bearing on this point, for a few days (or nights, as the case may be) before and after every full moon; and the same observations ought to be made at the periods of new moon.

Sunshine.—The number of hours the sun shines during the day should be entered in the proper column.

Thermometers under Ground.—Though the temperature and hygrometric conditions of the air are those which chiefly influence the growth of crops, it is important for the health of the crop, and for the germination of the seed, that the soil itself should have a certain temperature. To collect facts which may illustrate this, it is recommended to have Thermometers sunk 3, 12, and 22 inches below the surface of the ground, to ascertain the temperatures of what may be termed the agricultural soil; and the observer should enter in the Schedule the kind of soil; whether drained or undrained; and whether naturally wet or dry.

Temperature of the Sea.—As the meteorology of the island is incomplete without a knowledge of the mean temperature of the Ocean which surrounds it, the Society strongly recommends watching the temperature of the sea at a depth of 6 feet, or 1 fathom from the end of all piers or rocks round the coast, where free from the influence of fresh water, and as near as may be about the middle of high water. A thermometer, with its bulb fixed in a small tin pincel, covered with a sopping lid, and with a weight attached, is unsuitable to be carried deep, and in ten minutes drawn up and read. The density of the sea water, should, if possible, be taken at the same time. Convenient instruments are furnished by Messrs Adie and Son.

Temperatures of Springs.—The temperatures of Springs or Deep Wells is recommended to be taken whenever practicable, mentioning whether Spring or Well, and its depth from the surface.

Meteors, Aurora Borealis, Remarkable Depression or Elevation of Barometer, Remarkable Folds of Ice, Hail or Snow, Thunder and Lightning, &c., should be specially noticed, together with the exact hour at which they were first seen, their continuance, and extent.

Budding, Leafing, and Flowering of Trees.—It is necessary to bear in mind that varieties of the same species of tree differ widely in their times of leafing and flowering. Individual Trees or Shrubs of each kind should therefore be chosen (if possible early kinds), and their indications should be alone noted—always the same plant from year to year being noticed.

Omnia.—Mention whether Schonbrunn or Moritz's scale and barometers are used. Schonbrunn's are preferred. They may be had at Messrs Adie and Son's, 20, Princess Street, and at Mr. Bryson's, 60, Prince Street, Edinburgh.

Dilatometry.—Pith balls suspended by a linen thread, in connection with a metallic conductor, and under cover, and the degrees of a circle being used to express the degree of repulsion, form a simple and convenient Dilatometer. Existed guss or sealing-wax ascendants are nature of the dilatometer.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Black Hall Park, County of Midlothian, in Lat. _____, Long. _____, Height above Sea _____ feet.

Distance from Sea _____ miles.

During the MONTH of November 1859.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS. under Ground.			SEA.		OZONE.	ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.			
	h. A.M.		h. P.M.		PROTECTED.		EXPOSED.		h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.			Temperature of Spring or Well.	Temperature.					Density.	0 to 10	
	Barometer.	Attach- ed Ther- mometer.	Barometer.	Attach- ed Ther- mometer.	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ↑↑	Direction.	Force ↑↑					3 inches.	12 inches.	22 inches.								A.M.	
																															inches.	°
1					46	35			42	41 1/4	41	38																	1			
2					45	31 1/2			35 1/2	34 1/2	42	41																	2			
3					46	37			44	41 1/2	42 1/2	41																		3		
4					45	35			41	40	44 1/2	44																	4			
5					45	38 1/2			42 1/2	40	47 1/2	45						4											5			
6					52	45			57	47	52	48																	6			
7					45	35			41	38 1/2	41	37 1/2																		7		
8					43	36			40	39	39	36																	8			
9					42	31			35	32	37 1/2	31																	9			
10					38	26			31	30	32	31 1/2																	10			
11					40	34			35	34 1/2	37	37																	11			
12					47	31			33 1/2	31	47	44						10											12			
13					47	37			45 1/2	44	44	39																	13			
14					42 1/2	32			35	34 1/2	35	34 1/2																	14			
15					42	28			31 1/2	31	28 1/2	28																	15			
16					39	31			24 1/2	34	24	34																	16			
17					39	27			23	22 1/2	29	37 1/2																	17			
18					50	44			47	45	46	44 1/2																	18			
19					45	38 1/2			42	41 1/2	41	40						10											19			
20					40	36			44	43	48	46																	20			
21					49	30 1/4			34	33	47	47																	21			
22					47	22 1/2			47 1/2	46	46	44 1/2																	22			
23					46	35			42	41	39 1/2	38 1/2																	23			
24					48 1/2	37			48	46	44	43																	24			
25					45 1/2	39			45 1/2	43	42	40 1/2																	25			
26					46	36			46	39 1/2	46	45						10											26			
27					46	37			43	40	39	38																	27			
28					41	32			36 1/2	35	39	37																	28			
29					38 1/2	31			36	35	34	32																	29			
30					37	28			31 1/2	30 1/2	37	35																	30			

Mean Max 44.3
Mean Min 34.7

INSTRUCTIONS FOR MAKING METEOROLOGICAL OBSERVATIONS.

Those persons who kindly furnish Monthly Tables of the Weather to the Scottish Meteorological Society are requested to attend to the following Instructions, seeing that one of the most important ends of Meteorological Observations is their being comparable with one another; and for this purpose it is requisite that all should, if possible, observe at a like hour, and in a like manner, and have their instruments placed, in so far as circumstances allow, in a like position:

Hour of Observation.—All instruments which are observed twice a-day, should be read at the same hour morning and evening, in order to furnish mean results. The Society recommends a quarter before nine o'clock, morning and evening, as the most convenient hour; but should this be inconvenient for the observer, another hour may be chosen, attending, however, to the above rule, that the evening and morning readings be taken at the same hour, and this hour entered on the Schedule.

Barometer.—Barometers of Messrs Aile and Son's construction are recommended; but any instruments may be used which have adjustable surfaces, and have been compared. Before this instrument is suspended for use it should be examined, in order to ascertain whether the space above the mercury is free from air. This is done by inclining the instrument somewhat from the vertical position, when, if free from air, the mercury will settle against the upper end of the tube with a sharp top. The mercury should then completely fill the tube. If any air has got admittance, it should be driven into the cistern by reversing the instrument, and tapping it gently with the hand. If it cannot be thus expelled, the instrument is useless till repaired.

The Barometer should be hung in a good light, and perfectly perpendicular, as ascertained by the plumb line; and it ought always to be gently tapped before taking the reading, to prevent adhesion of the mercury to the tube. In reading, the eye ought to be placed on the exact level of the top of the column of mercury. The reading of the attached Thermometer ought always to be the first taken, as the heat of the breath, or the proximity of the person, are apt to influence its readings.

The corrections necessary to be applied to the Barometric readings depend on the form of the instrument. The mode of making these corrections, and the tables employed for the purpose, will be found in the "Report of the Committee of the Royal Society on Physics and Meteorology," 1840, price 1s. The daily readings of the Barometer ought to be entered on the Schedule as read off, and the corrections only applied to the mean for the month. *Self-Registering Thermometers and Hygrometers.*—These should be placed alongside of each other, in a place freely exposed to the air, but protected from sunbaking, and from reflected heat, as well as from radiation and from rain, and as near as may be placed from the general surface of the ground. Different contrivances are used for this purpose, either a double ventilated box with louver-boarded sides, fixed at a north window, and projecting 12 inches from the wall, so as to allow a free current of air to pass between the box and the wall; or in a double meat-side ventilated box with louver-boarded sides, fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed (without due notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The *Self-Registering Thermometers* should be placed exactly horizontal. In the case of the ordinary *maximum* Thermometers, with clay, glass, or steel index, the bulb may be very slightly elevated, in order that the mercurial column may be somewhat aided by the force of gravity in pushing forward the float or index; and in the case of the *minimum* Thermometer, the bulb must be slightly depressed, to prevent a draining of the spirit to the top of the tube, and also that any part raised in vapour may return to the column. These Thermometers, if read once a-day, should always be read on the evening, so that the temperatures marked by the floats indicate the minimum and the maximum of the day on which the reading is taken. N.B.—The readings of these instruments are taken from that extremity of the float which is nearest the head of the column of mercury or of spirit.

The *maximum* Registering Thermometer, for taking the extreme heat of the sun's rays, should have its bulb blackened and the surface rendered dull, and it should be mounted in a blackened box, whose sides should be so high as to protect the bulb from wind. It should be so placed that the sun's rays have free access to it during the heat of the day.

The *minimum* Registering Thermometer, for ascertaining the lowest temperature during the night from radiation, should have its bulb similarly blackened and rendered dull, and be similarly mounted. It should be laid out, about sunset, over grass, in a place freely exposed to the sky, but raised on wooden supports a few inches above the surface, and removed during the day.

Hygrometer.—The wet bulb requires the muslin covering it to be often changed. In towns once a month, or oftener, if the weather is dusty, and the muslin gets foul; in the country whenever the muslin seems to be foul. The muslin should always be thoroughly wetted and freed from starch, before being used; and the cotton wick which conducts moisture to it should be thoroughly wetted, else it will conduct the moisture imperfectly, and yield false results. The cotton wick is best attached by passing its extremity through an aperture in the centre of the muslin, spreading that portion out so as to apply equally round the bulb, and then tying the muslin over the bulb. In frosty weather, water must be poured over the wet bulb, so as to form a thin film of ice on the muslin, the evaporation from the ice going on as from the simply wetted bulb.

Rain Gauge.—As "Fleming's Rain Gauge" seem to possess several advantages over others, the Society gives the preference to them; but whatever form be employed, in order that all the stations may yield comparable results, it is recommended that the Gauge be sunk in the ground, so that the top of the receiver is nearly on a level with the top blades of *clever cut grass*, in a place as distant as possible from trees, houses, high walls, and irregular or broken ground, and the quantity of Rain, should, if possible, be registered daily. When more than one Rain Gauge is kept, they ought to be placed near each other, but at different heights above the ground, and their indications noted in the general remarks, mentioning their height above ground—the regular column in the Schedule being reserved for the ground Rain Gauge alone.

Winds.—Isolated Wind-vanes or Weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, etc. Where low clouds are seen drifting along, their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular mirror fixed over the centre of the current of air near the earth's surface, give the true direction of the current of air. In general, give the true direction of the current of air near the earth's surface if these clouds are near and immediately over head, that is, in or near the zenith of the observer. The motion of the higher strata of clouds gives no such indication. Feeling the clouds the general direction of the smoke of a chimney or village, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction by reflection or otherwise. For mode of estimating the force of the wind, see "Directions for Reading Instruments." Lind's Anemometer is commonly used for this purpose, but the best Anemometer of moderate price yet invented is Professor Robinson's Cup Wind Gauge, which registers the velocity of the wind,—540 revolutions of the cups, as registered by the instrument, being equal to one statute mile.

Clouds.—The Society recommends observers to adopt the Howard nomenclature of clouds. The scale of cloud in the visible sky is reckoned from 0 to 10. Thus, a sky quite free from cloud is 0; a sky half covered with cloud is 5; and the whole visible sky covered with cloud is 10. Clouds often cover three-fourths or even more of the visible sky without obstructing the sunbaking, so that the indications noted in the column for clouds would not necessarily express, or agree with, the column for sunbaking. As the full moon, so long as it is above the horizon, is thought by some eminent astronomers to have a powerful effect in dissipating clouds, it would be well to note in the General Remarks any facts bearing on this point, for a few days (or nights, as the case may be) before and after every full moon; and the same observations ought to be made at the periods of new moon.

Sunshine.—The number of hours the sun shines during the day should be entered in the pencil column.

Thermometers under Ground.—Though the temperature and hygrometric conditions of the air are those which chiefly influence the growth of crops, it is important for the health of the crop, and for the germination of the seed, that the soil itself should have a certain temperature. To collect facts which may illustrate this, it is recommended to have Thermometers sunk 3, 12, and 22 inches below the surface of the ground, to ascertain the temperature of what may be termed the agricultural soil; and the observer should enter in the Schedule the kind of soil; whether drained or undrained; and whether naturally wet or dry.

Temperature of the Sea.—As the meteorology of the island is incomplete without a knowledge of the mean temperature of the Ocean which surrounds it, the Society strongly recommends taking the temperature of the Sea at a depth of 6 feet or 1 fathom from the end of all piers or rocks round the coast, where free from the influence of river water, and as near as may be about the time of high water. A Thermometer, with its bulb fixed in a small tin plate covered with a sloping lid and with a weight attached, is sunk to the required depth, and ten minutes drawn up and read. The density of the sea water should, if possible, be taken at the same time. Convenient instruments are furnished by Messrs Aile and Son.

Temperature of Springs.—The temperature of Springs or Deep Wells is recommended to be taken whenever practicable, mentioning whether Spring or Well, and its depth from the surface.

Meteors, Aurora Borealis, Remarkable Depression or Elevation of Barometer, Remarkable Falls of Rain, Hail or Snow, Thunder and Lightning, etc., should be specially noticed, together with the exact hour at which they were first seen, their continuance, and direction.

Budding, Lagging, and Flowering of Trees.—It is necessary to bear in mind that varieties of the same species of tree differ widely in their times of budding and flowering. *Individual* Trees or Shrubs of each kind should therefore be chosen (if possible early kinds), and their indications should be alone noted—always the same plant from year to year being noticed.

Other.—Mention whether Schonbein's or Moffat's scale and papers are used. Schonbein's are preferred. They may be had of Messrs Aile and Son's, 50, Princes Street, and at Mr Bryson's, 60, Princes Street, Edinburgh. *Electricity.*—Tribal balls suspended by a linen thread, in connection with a metallic conductor, and under cover, and the degrees of a circle being used to express the degree of repulsion, form a cheap and convenient Electrometer. Juxated glass or sealing-wax ascertains the nature of the electricity.