SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Park, County of Midlothian, in Lat. ____, Long. ____, Height above Sea 183 feet.

Distance from Sea 3 miles. During the MONTH of January 1857.

Days of Week.	Days of Month.	BAROMETER. 8 h. A.M. Barometer.	Attached Thermometer.	6 h. P.M. Barometer.	Attached Thermometer.	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 8 h. A.M. Dry bulb.	Wet bulb.	___ h. P.M. Dry bulb.	Wet bulb.	WIND. ___ h. A.M. Direction.	Mean Force 1–6.	___ h. P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ___ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°			
	1	29.50		29.40		54	44			44	44																	Fine Mild day
	2	29.15		29.05		50	38	12		38	38																	Cold wind & showers
	3	29.04		28.96		45	36			37	37																	Dull cold & showery
	4	29.25		29.38		32	31			30	30																	Snow & Drift very cold
	5	29.78		30.15		30	26			30	30																	do do do
	6	30.15		30.15		32	27			31	31																	Snow on the ground
	7	30.—		30.—		33	29			30	33																	do do
	8	29.95		29.96		40	30			36	36																	Thaw
	9	29.50		29.36		50	36			46	46																	Snow all Melted
	10	29.—		29.—		53	44			45	43																	Fine & mild
	11	29.20		29.22		46	34			37	37																	Fine dry day
	12	29.40		29.45		36	29			30	30																	fine & frost
	13	29.40		29.50		39	26			29	29																	do do
	14	29.70		29.75		32	27			28	28																	do do
	15	29.70		29.70		45	27			29	29																	Fine Day Clear
	16	29.85		29.90		40	29			30	30																	Fine bright day
	17	29.85		29.85		49	35			36	36																	Damp dull day
	18	29.90		29.80		54	45			46	46																	Fine but windy
	19	29.92		29.85		54	38			40	40																	Fine day
	20	29.05		29.15		45	35			36	36																	Cold & bleake
	21	29.20		29.45		41	27			32	32																	Cold wind
	22	29.—		29.80		39	30			30	30																	Dull & cold wind
	23	29.—		29.25		39	31			31	31																	cold windy dull
	24	29.65		29.30		42	35			36	36																	Heat raw & cold
	25	29.35		29.38		46	32			36	36																	cold wet & showers
	26	29.85		29.85		39	30			29	29																	Cold & frosty & showery snow
	27	29.85		29.76		37	27			30	30																	heavy fall of snow & cold
	28	29.70		29.70		36	26			29	29																	Tis snow on Yet
	29	29.68		29.67		35	17	18		18	18																	do do
	30	29.35		29.20		39	27			30	30																	do do
	31	29.30		29.50		38	29			30	30								1.16in									do do
	Sums.	91538		91670		1289	977			1039	1042																	
		49		41		13	16			17																		
	Means.	29.528		29.570		41.5	31.5			33.5	33.5																	
	Index Errors.									Useless																		
	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	

Barometer, mean corrected reading of Column No. 1 (A.M.),..... = 29.528
Column No. 3 (P.M.),..... = 29.570
Barometer, Highest observed reading of Month,..... = 30.15

Diameter of tube ____ inch; correction for capillarity to be added,..... + 60
Capillarity,..... = + 60
Lowest do. do.,..... = 28.80

Sum,..... 29.588
Sum,..... 29.630
Difference, or Monthly Range,..... = 1.35

Correction for Temperature from Column No. 2 to be deducted,..... = − 20
Temp. from Col. 4,..... = − 20

Mean 29.589 210 29.799

Sum,..... 29.568
Sum,..... 29.610

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),* .....
Wet bulb Thermometer (mean of Cols. 10 and 12),* ..... Observed by
† Dew-point Temperature,..... Assistant to Mr
† Elastic Force of Vapour,..... Dr. Wet bulb
† Weight of Vapour in a Cubic Foot of Air,..... Mean
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... H.

Highest Reading Self-Registering Thermometer,..... 54 on the 24th. 18–19
Lowest do. do.,..... 17 on the 29
Difference, being Monthly Range,..... 37
Mean of Self-Registering Thermometers,..... 36.5
Mean Daily Range,..... 10.0
Greatest Daily Range,..... 18 on 29.

(Signed) Wm Monroe
(Designation) Gardener

* 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.

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.

Dalkeith

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.

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 Hygrometer.—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 louvre-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-safe ventilated box with louvre-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 *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 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 "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. 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 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. 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 sunshine 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 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 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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder,............					Barley,............				
Ash,............					Beer or Big,............				
Beech,............					Oats,............				
Birch,............					Wheat,............				
Elm,............					Beans,............				
Larch,............					Pease,............				
Lime,............					Potatoes,............				
Oak,............					Turnips,............				
Sycamore or Plane,.....					Rye Grass,............				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,............		Apple,............			Cuckoo,............		
Bourtree or Elder,............		Black Currant,............			Curlew,............		
Broom,............		Cherry,............			House-Swallow,............		
Hazel,............		Gean,............			Lapwing,............		
Hawthorn,............		Gooseberry,............			Plover,............		
Holly,............		Peach,............			Sand-Martin,............		
Laburnum,............		Pear,............			Starling,............		
Lilac,............		Plum,............			Swan,............		
Mezereon,............		Strawberry,............			Rail,............		
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, 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.

METEOROLOGICAL RETURNS.

Dalkeith

To

DR STARK,

Sec., Meteorological Society,

21, Rutland Street,

EDINBURGH.

FEB 7 1857

2

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. ____, Long. ____, Height above Sea 183 feet.

Distance from Sea three miles. During the MONTH of February 1857.

Days of Week.	Days of Month.	BAROMETER. 8 h. A.M. Barometer.	Attached Thermometer.	6 h. P.M. Barometer.	Attached Thermometer.	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 8 h. A.M. Dry bulb.	Wet bulb.	____ h. P.M. Dry bulb.	Wet bulb.	WIND. ____ h. A.M. Direction.	Mean Force 1-6.	____ h. P.M. Direction.	Mean Force 1-6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1-10	SUNSHINE.	THERMOMETERS under Ground. ____ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0-10	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.*
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°		°	
	1	29.50		29.55		35	26			37	36																	clear & frosty throughout
	2	29.60		29.60		36	27			33	33																	Dull with Snow & Showers
	3	29.75		29.70		37	28			34	33																	" " "
	4	29.90	52	29.82		36	22			31	30																	clear & cloudy
	5	29.45		29.40		48	31			40½	40																	Dull like rain
	6	29.42		29.30		47	35			42	41																	Mild clear day
	7	29.15		29.05		49	35			43	41½																	A M Dull P.M Rain
	8	29.30		29.20		44	31			40	39																	clear & cloudy
	9	29.15		29.10		46	36			41	40																	Showers & cold wind
	10	29.15		29.20		47	36			43	42																	clear & cloud & cold wind
	11	29.36		29.43		46	30			42	40																	clear & cloudy
	12	29.80		29.86						38	37																	" "
	13	29.95		29.80		50	42			49	47																	" "
	14	29.90		29.90		51	46			48	46																	" "
	15	29.95		30.—		50	31			41	40																	" "
	16	29.90		29.80		46	35			41	39																	Dull all day
	17	29.70		29.65		50	34			46	45																	Clear cloudy & mild
	18	29.80		29.82		50	36			41	40																	" " "
	19	29.90		30.—		51	36			40	38½																	Dull all day
	20	29.92		29.90		49	34			39	37																	" "
	21	29.80		29.63		50	32			38	38																	Dull & rain most of the day
	22	29.60		29.58		52	46			42	41																	clear & high wind
	23	30.—		30.05		51	32			43	41																	clear throughout
	24	29.85		29.80		51	30			41	39½																	clear cloudy & mild
	25	29.92		29.88		52	35			43	42																	" " "
	26	30.15		30.05		52	41			40	38½																	" " "
	27	29.90		30.05		54	44			44	44																	" " "
	28	30.10		30.22		52	41			43	42																	Dull all day
	29																											
	30																											
	31																											
	Sums.	8317	52.	8314		1224	962			1143	1135							5 days	1 inch									
	Means.	29.699	.52.	29.696		43.7	34.3			40.8	39.7							Rain										
	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	

Barometer, mean corrected reading of Column No. 1 (A.M.),.....= 29.699

Diameter of tube____inch; correction for capillarity to be added,.....+ 60

Sum,..... 29.759

Correction for Temperature from Column No. 2 to be deducted,.....= − 62

Sum,..... 29.697

Correction for Height above Sea-level,____feet, to add,.....= +

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

Column No. 3 (P.M.),.....= 29.696

Capillarity,.....= + 60

Sum,..... 29.756

Temp. from Col. 4,.....= − 62

7/11 Sum,..... 29.694

Height,.....= +

At 32° and Sea-level,.....=

Mean 29.695 210 29.905

Barometer, Highest observed reading of Month,.....= 30.22 on 28th

Lowest do. do.,.....= 29.05

Difference, or Monthly Range,.....= 1.170

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),*..... 40.8

Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 39.7

† Dew-point Temperature,..... 38.3

† Elastic Force of Vapour,..... 232

† Weight of Vapour in a Cubic Foot of Air,..... 2.73

† Additional Weight required to Saturate a Cubic Foot,.....

† Degree of Humidity (Saturation 100),..... 91

Highest Reading Self-Registering Thermometer,..... 54° on the 27th

Lowest do. do.,..... 22° on the 2nd

Difference, being Monthly Range,..... 32°

Mean of Self-Registering Thermometers,..... 39°.10

Mean Daily Range,..... 9°.4

Greatest Daily Range,.....

(Signed) Wm Thomson

(Designation) Gardener

* 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.

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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.

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Self-Registering Thermometers and Hygrometer.—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 louvre-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-safe ventilated box with louvre-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 *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 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 "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. 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 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. 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.

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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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

METEOROLOGICAL RETURNS.

To DR STARK,

Sec., Meteorological Society,

21, Rutland Street,

EDINBURGH.

(81) Dalkeith February

4

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder, ...					Barley, ...				
Ash, ...					Bear or Big, ...				
Beech, ...					Oats, ...				
Birch, ...					Wheat, ...				
Elm, ...					Beans, ...				
Larch, ...					Pease, ...				
Lime, ...					Potatoes, ...				
Oak, ...					Turnips, ...				
Sycamore or Plane, ...					Rye Grass, ...				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry, ...		Apple, ...			Cuckoo, ...		
Bourtree or Elder, ...		Black Currant, ...			Curlew, ...		
Broom, ...		Cherry, ...			House-Swallow, ...		
Hazel, ...		Gean, ...			Lapwing, ...		
Hawthorn, ...		Gooseberry, ...			Plover, ...		
Holly, ...		Peach, ...			Sand-Martin, ...		
Laburnum, ...		Pear, ...			Starling, ...		
Lilac, ...		Plum, ...			Swan, ...		
Mezereon, ...		Strawberry, ...			Rail, ...		
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, 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.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. ______, Long. ______, Height above Sea 183 feet.

Distance from Sea 3 miles. During the MONTH of March 1857.

Days of Week.	Days of Month.	BAROMETER. 8 h. A.M. Barometer.	Attached Thermometer	6 h. P.M. Barometer.	Attached Thermometer	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 8 h. A.M. Dry bulb.	Wet bulb.	___ h. P.M. Dry bulb.	Wet bulb.	WIND. 8 h. A.M. Direction.	Mean Force 1–6.	___ h. P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ___ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°		°	
	1	30.30	51	30.42		55°	37°			47°	46°			W	-													Clear & Cloudy & mild
	2	30.30		30.26		53	37			44½	43½			W	-													dull & mild
	3	30.15		30.—		51	45			46½	45½			W	-													do do
	4	29.70		29.78		50	37			45	43			W	-													Showers of rain & Cold wind
	5	30.02		29.36		44	30			38	36			W	-													do do do
	6	29.60		29.60		50	40			45	42			W	-													6 Clear & cold
	7	29.40		29.30		44	39			38	36			S.W	-													Showers & cold wind
	8	29.18	50	29.20		40	39			31	31			N.W	-													Clear & Cloudy
	9	29.90		29.98		49	30			33	32			NE	-													9 Showers of hail
	10	29.85		29.90		42	24			29	28			S	-													10 Clear throughout & cold
	11	29.78		29.75		40	26			31	31			E	-													Showers of hail
	12	29.15		29.50		45	24			30	29			E	-													Clear throughout
	13	29.30		29.05		45	35			40½	38			W	-													dull high cold wind
	14	28.60		28.50		35	30			38	36			S.W	-													Showers of rain & hail
	15	28.60		28.84		39	32			39	37			S.E	-													Showers of hail
	16	29.40		29.50		40	35			41	39			W	-													Clear & cold throughout
	17	29.50	53	29.50		50	31			46	42			E	-													dull windy & mild
	18	29.55		29.55		55	40			39	39			NE	-													Cold wind & dull
	19	29.70		29.70		55	36			39	39			E	-													Cloudy all day
	20	29.74		29.80		50	39			43	42			E	-													dull all day
	21	30.07		30.15		45	35			39	36			E	-													21 High wind like rain
	22	30.—		29.90		40	32			40	35			E	-													22 heavy snow showers,
	23	29.76		29.50		42	31			35	33			E	-													do do
	24	29.46		29.48		40	25			34	32			E	-													24 heavy fall of snow
	25	29.50	51	29.62		40	33			35	35			E	-													dull snow gone
	26	29.65		29.70		40	36			39	39			E	-													~~dull~~ do do
	27	29.80		29.85		44	36			38	38			E	-													a m dull p m Rain
	28	29.86	53	29.85		47	36			41	40			E	-													a m Dull do
	29	29.80		29.80		49	35			40	40			E	-													Dull throughout & showers
	30	29.73		29.60		45	34			42	41			E	-													31 very damp & dull weather
	31	29.10		29.10		44	36			41	40			E	-				1.39									
Sums.		157 91948	52	167 91871		9 1408	13 1055			14 12085	13 1165							13	1.39 Rain									
Means.		29.660		29.636		45.4	34.0			39.0	~~34.7~~ 37.5																	
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	

Barometer, mean corrected reading of Column No. 1 (A.M.) = 29.660 | Column No. 3 (P.M.) = 29.636

Diameter of tube ______ inch; correction for capillarity to be added + 60 | Capillarity = + 60

Sum 29.720 | Sum 29.696

Correction for Temperature from Column No. 2 to be deducted = − 62 | Temp. from Col. 4 = − 62 | Mean

Sum 29.658 | 192 / 46 Sum 29.634 | 29.646

Correction for Height above Sea-level, ______ feet, to add = + 201 | Height = + 201 | 201

Barometer corrected and reduced to 32° and Sea-level = ______ | At 32° and Sea-level = 29.835 | 29.847

Barometer, Highest observed reading of Month = 30.42 on 1st

Lowest do. do. = 28.50 on 14th

Difference, or Monthly Range = 1.92

SUMMARY OF THE WINDS.										
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	0	2	16	1	1	2	8	1	0	—
P.M.										

Dry bulb Thermometer (mean of Cols. 9 and 11),*	39.0	39.0
Wet bulb Thermometer (mean of Cols. 10 and 12),*	37.5	34.3
† Dew-point Temperature,	35.5	28.1
† Elastic Force of Vapour,	·208 inch	·153 inches
† Weight of Vapour in a Cubic Foot of Air,	2.40	1.76 gr
† Additional Weight required to Saturate a Cubic Foot,		
† Degree of Humidity (Saturation 100),	88	65

Highest Reading Self-Registering Thermometer,	55°	on the	1st
Lowest do. do.,	24°	on the	10th
Difference, being Monthly Range,	31°		
Mean of Self-Registering Thermometers,	39°.7		
Mean Daily Range,	11°.4		
Greatest Daily Range,			

(Signed) Wm Thomson

(Designation) Gardener

* 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.

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.

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.

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Alder,					Barley,				
Ash,					Bear or Big,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Pease,				
Lime,					Potatoes,				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass,				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,		Apple,			Cuckoo,		
Bourtree or Elder,		Black Currant,			Curlew,		
Broom,		Cherry,			House-Swallow,		
Hazel,		Gean,			Lapwing,		
Hawthorn,		Gooseberry,			Plover,		
Holly,		Peach,			Sand-Martin,		
Laburnum,		Pear,			Starling,		
Lilac,		Plum,			Swan,		
Mezereon,		Strawberry,			Rail,		
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, 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.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens County of Midlothian, in Lat. ____, Long. ____, Height above Sea 183 feet.

Distance from Sea ____ miles. During the MONTH of May 1857.

Days of Month	BAROMETER. 9 h. A.M. Barometer.	Attached Thermometer.	6 h. P.M. Barometer.	Attached Thermometer.	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 9 h. A.M. Dry bulb.	Wet bulb.	6 h. P.M. Dry bulb.	Wet bulb.	WIND. 9 h. A.M. Direction.	Mean Force 1–6.	6 h. P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ___ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
	inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°			
1	29.95	44	29.93	52	56	42			50	46	54	48	NW	1	S.E.		0										Fine and Mild A.M. Chiefly fine P.M.
2	30.02	48	30.03	49	50	44			50	44	50	46	N.E.		E.		1										Dull. Small rain A.M. Fine and pleasant P.M.
3	30.10	46	30.12	48	49	42			44	40	49	45	N.E.		N.E.		0										Cold and Cloudy A.M. Cold throughout P.M.
4	30.15	46	30.13	49	52	42			45	42	50	45	NW		E.		1										Cold. Slight Shower A.M. Fair and pleasant
5	30.12	47	30.11	51	56	43			49	46	54	47	N.		N.E.		0										Fine and warm A.M. Seasonable P.M.
6	30.12	50	30.10	53	56	47			51	47	53	49	N.E.		N.W.		0										Densely Clouded A.M. Colder yet Fine P.M.
7	30.10	50	30.06	54	58	46			53	48	53	47	N.W.		N.E.		0										Passing Clouds with fine intervals A.M. Fine
8	29.99	51	29.98	52	53	45			49	44	48	43	N.E.		E.		0										Cold and Cloudy A.M. Passing Clouds P.M.
9	29.89	49	29.80	50	57	45			48	42	50	47	N.E.		S.E.		1										Passing Showers A.M. Fine throughout P.M.
10	29.79	48	29.78	48	55	46			53	49	53	46	S.E.		S.E.		0										Seasonable A.M. Dusty White Clouds passing
11	29.75	49	29.76	52	57	46			51	47	49	45	S.E.		E.		0										Densely Clouded A.M. Cloudy for rain P.M.
12	29.74	50	29.79	52	62	49			48	46	51	49	S.E.		S.E.		1										Cool and Cloudy. Showers A.M. Pleasant P.M.
13	29.79	51	29.83	55	63	53			53	51	60	58	S.E.		N.W.		1										Heavy Showers. Sometimes A.M. Fair
14	29.85	54	29.82	56	64	53			54	54	57	55	S.E.		S.		1										Cloudy and Windy A.M. Slight Showers
15	29.84	53	29.90	58	65	53			52	51	64	56	S.W.		W.		1										Dull. Sometimes A.M. Fine and warm
16	29.98	56	29.94	59	60	55			59	55	61	57	S.W.		S.W.		0										Fine and Seasonable A.M. Cloudy
17	29.84	58	29.83	60	61	54			57	53	64	59	S.W.		S.W.		0										Cloudy and Windy A.M. Chiefly fine
18	29.72	57	29.58	58	63	52			62	57	59	54	S.W.		N.W.		0										Very fine A.M. Cloudy and Windy
19	29.58	58	29.50	68	64	53			58	52	65	59	W.		W.		0										Passing Clouds with hot Intervals A.M. Fine
20	29.42	59	29.43	60	62	58			60	55	56	54	W.		N.W.		12										Chiefly fine. Sometimes A.M. Sometimes
21	29.45	57	29.40	59	60	52			58	54	55	53	W.		S.W.		1										Cloudy and dull A.M. Rain throughout
22	29.59	56	29.67	58	60	53			56	52	59	54	S.W.		S.W.		0										Fine A.M. Very fine throughout P.M.
23	29.67	57	29.62	55	55	51			54	51	48	49	N.W.		N.E.		1										Cloudy. Light Rain A.M. Cooler. Rain
24	29.30	55	29.29	65	59	48			50	49	60	58	N.		S.W.		1										Cool and Cloudy. Showers A.M. Mild
25	29.42	57	29.38	61	65	52			58	53	57	54	N.W.		N.W.		0										Fine and Seasonable A.M. Very fine
26	29.39	56	29.60	59	64	50			52	51	58	55	N.E.		N.W.		1										Showery A.M. Fine and pleasant
27	29.65	57	29.70	58	55	52			54	53	52	50	N.		E.		7										Cloudy for rain A.M. Wet throughout P.M.
28	29.78	54	29.80	55	51	48			47	46	54	51	N.E.		N.		1										Cold and Showery A.M. Cloudy P.M.
29	29.88	53	29.90	57	54	50			51	49	57	50	N.E.		N.E.		0										Cloudy A.M. Clear and hot P.M.
30	29.95	54	29.98	57	54	48			55	51	53	49	N.E.		N.E.		4										Densely Clouded A.M. Bright throughout
31	29.99	56	29.98	60	68	53			60	55	65	61	E.		S.E.		0										Passing Clouds with hot Intervals A.M.
Sums.	923.84	1657	922.51	1728	1811	1527			1640	1533	1718	1590					15										
Means.	29.804	53.4	29.758	55.23	58.42	49.6			52.90	49.45	55.41	51.29															
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	

Barometer, mean corrected reading of Column No. 1 (A.M.),..... = 29.804 — Column No. 3 (P.M.),..... = 29.758 — Barometer, Highest observed reading of Month,..... = 30.15

Diameter of tube ____ inch; correction for capillarity to be added,..... + 060 — Capillarity,..... = + 060 — Lowest do. do.,..... = 29.29

Sum,..... 29.864 — Sum,..... 29.818 — Difference, or Monthly Range,..... = 0.86

Correction for Temperature from Column No. 2 to be deducted,..... = − 65 — Temp. from Col. 4,..... = − 70

Sum,..... 29.799 — Sum,..... 29.748

Correction for Height above Sea-level, ____ feet, to add,..... = + — Height,..... = +

Barometer corrected and reduced to 32° and Sea-level,..... = — At 32° and Sea-level,..... =

Mean 29.773 / 210 / 29.983

SUMMARY OF THE WINDS.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	3	8	8	5	0	5	3	5	0	
P.M.	1	6	5	5	1	4	3	6	0	

Dry bulb Thermometer (mean of Cols. 9 and 11),*..... 53.6

Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 50.5

† Dew-point Temperature,..... 45.4

† Elastic Force of Vapour,..... 0.327 inch

† Weight of Vapour in a Cubic Foot of Air,..... 3.269 grs

† Additional Weight required to Saturate a Cubic Foot,.....

† Degree of Humidity (Saturation 100),..... 79.

Highest Reading Self-Registering Thermometer,..... 68 on the 31st

Lowest do. do.,..... 42 on the 1st & 4th

Difference, being Monthly Range,..... 26°

Mean of Self-Registering Thermometers,..... 53.8

Mean Daily Range,..... 8.5

Greatest Daily Range,.....

(*Signed*) Wm Thomson

(*Designation*) Gardener

* 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.

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.

52.2 / 55.1 / 2)107.3 / 53.6 — 49.1 / 51.9 / 2)101.0 / 50.5 — 58.1 / 49.6 / 2)107.7 / 53.8 — 8.5

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 Hygrometer.—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 louvre-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-safe ventilated box with louvre-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 *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 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 "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. 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 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. 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 sunshine 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 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 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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

Dalkeith May

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder,					Barley,				
Ash,					Bere or Big,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Pease,				
Lime,					Potatoes,				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass,				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,		Apple,			Cuckoo,		
Bourtree or Elder,		Black Currant,			Curlew,		
Broom,		Cherry,			House-Swallow,		
Hazel,		Gean,			Lapwing,		
Hawthorn,		Gooseberry,			Plover,		
Holly,		Peach,			Sand-Martin,		
Laburnum,		Pear,			Starling,		
Lilac,		Plum,			Swan,		
Mezereon,		Strawberry,			Rail,		
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, 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.

METEOROLOGICAL RETURNS.

To
DR STARK,
Sec., Meteorological Society,
21, Rutland Street,
EDINBURGH.

May
Dalkeith

8

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. _____, Long. _____, Height above Sea 183 feet.

Distance from Sea _____ miles. During the MONTH of June 185 4.

Days of Week	Days of Month	BAROMETER. 9 h. A.M. Barometer.	Attached Thermometer	6 h. P.M. Barometer.	Attached Thermometer	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 9 h. A.M. Dry bulb.	Wet bulb.	6 h. P.M. Dry bulb.	Wet bulb.	WIND. 9 h. A.M. Direction.	Mean Force 1–6.	6 h. P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ___ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°			
	1	29.94	54	29.81	62	65	53			54	58	59	54	S. E.	–	E.	–											Fine Some Virga A.M. Very fine P.M.
	2	29.71	58	29.66	61	66	52			54	54	60	57	N. E.	–	N. E.	–											Very fine A.M. Densely clouded
	3	29.67	58	29.70	60	62	54			53	52	61	59	N. W.	–	N. E.	–											Dulcina Showery A.M. Showery throughout
	4	29.71	59	29.80	64	65	55			63	60	66	60	S. W.	–	S. W.	–											Heavy Showers. Virga A.M. Cloudy
	5	29.88	62	29.87	66	73	54			65	61	69	64	S. W.	–	S. W.	–											Fine A.M. Exceedingly fine throughout
	6	29.90	64	29.91	68	69	59			66	60	64	60	S. W.	–	W.	–											Passing clouds A.M. Very pleasant
	7	29.80	68	29.67	65	62	59			64	62	54	55	S. E.	–	E.	–											Cloudy and dulc A.M. Heavy rain
	8	29.20	60	29.22	59	54	51			49	49	54	53	N. E.	–	N. E.	–											Cold and Showery A.M. Showery throughout
	9	29.47	57	29.41	60	62	52			56	53	59	55	N. E.	–	N. E.	–											Passing clouds with fine intervals A.M. Showery
	10	29.26	56	29.30	57	59	54			48	47	50	49	N. E.	–	N. E.	–											Heavy rain A.M. Cold and Showery
	11	29.66	57	29.89	55	52	47			47	46	48	46	N. E.	–	N. E.	–											Cold and Cloudy A.M. Showery throughout
	12	30.08	54	30.08	54	55	49			52	48	54	52	N. W.	–	S. W.	–											Fine and pleasant A.M. Fine throughout
	13	30.07	54	30.01	64	61	54			59	55	58	54	N. W.	–	S. W.	–											Cloudy Sun Shine occasionally A.M. Showery
	14	29.99	58	29.95	62	69	58			63	57	66	61	S. E.	–	S. E.	–											Fine and Seasonable A.M. Fine throughout
	15	29.94	59	29.99	62	64	55			54	53	62	59	N. E.	–	N. E.	–											Fine and Mild A.M. Cold and hoarse
	16	30.04	58	30.04	63	62	54			54	54	63	56	N. W.	–	N. E.	–											Very fine A.M. Exceedingly fine P.M.
	17	30.09	60	30.05	65	68	54			65	54	62	56	N. W.	–	N. E.	–											Fine and pleasant A.M. Very fine
	18	30.20	61	30.15	66	69	54			60	56	68	61	N. E.	–	N. E.	–											Hot and dry A.M. Fine throughout
	19	30.19	63	30.19	65	68	59			60	54	65	60	N. W.	–	N. E.	–											Hazy A.M. Exceedingly fine P.M. Overcast
	20	30.05	62	30.18	66	67	55			61	56	64	61	N. W.	–	N. E.	–											Very fine A.M. Exceedingly fine
	21	29.99	63	29.01	65	68	56			66	54	59	56	N. W.	–	N. E.	–											Fine throughout A.M. Very fine P.M.
	22	30.02	61	30.99	66	68	55			60	58	68	64	N. W.	–	N. E.	–											Fine A.M. Fine throughout P.M. Cloudy
	23	30.09	65	30.99	71	74	68			69	63	75	69	N. W.	–	S. W.	–											Very fine A.M. Exceedingly fine
	24	30.17	70	30.11	74	81	66			72	64	74	71	N. W.	–	S. W.	–											Hot and dry A.M. Hazy clouded very fine
	25	30.29	71	30.18	74	78	64			69	64	75	69	S. W.	–	S. W.	–											Dry slight haze A.M. Hazy very warm
	26	31.24	70	30.30	76	82	62			75	69	79	71	S. W.	–	S. W.	–											Hot and dry A.M. Excessively hot
	27	30.13	73	29.10	72	75	64			68	63	69	64	N. W.	–	N. E.	–											Fine A.M. Hazy clouds P.M. Dull and hazy
	28	29.78	71	29.95	67	72	65			70	64	62	58	N. W.	–	N. E.	–											Very fine A.M. Densely clouded P.M.
	29	29.59	68	29.58	60	54	52			50	49	54	50	N. E.	–	N. E.	–											Overcast rain A.M. Showery throughout
	30	29.60	54	29.67	59	58	53			51	49	54	53	N. E.	–	N. E.	–											Showery A.M. Passing Clouds fine
	31																											
Sums.		891.68	1843	891.77	1934	1989	1693			1816	1693	1895	1754															
Means.		29.888	61.43	29.892	64.47	66.3	56.43			60.53	56.43	63.17	58.47					Rain Hazy										
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	

Barometer, mean corrected reading of Column No. 1 (A.M.),..... = 29.888
Diameter of tube _____ inch; correction for capillarity to be added,..... + 060
Sum,..... 29.948
Correction for Temperature from Column No. 2 to be deducted,..... = – 87
Sum,..... 29.861
Correction for Height above Sea-level, _____ feet, to add,..... = +
Barometer corrected and reduced to 32° and Sea-level,..... =

Column No. 3 (P.M.),..... = 29.892
Capillarity,..... = + 060
Sum,..... 29.952
Temp. from Col. 4,..... = – 95
118 Sum,..... 29.857
Height,..... = +
At 32° and Sea-level,..... =

Mean = 29.859
210
30.069

Barometer, Highest observed reading of Month,..... = 30.29
Lowest do. do.,..... = 29.22
Difference, or Monthly Range,..... = 1.07

SUMMARY OF THE WINDS.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	0	8	0	3	0	2	3	14	0	—
P.M.	1	9	5	1	1	1	3	6	0	—

Dry bulb Thermometer (mean of Cols. 9 and 11),* 62.0
Wet bulb Thermometer (mean of Cols. 10 and 12),* 57.1
† Dew-point Temperature,..... 52.8
† Elastic Force of Vapour,..... 0.301 inch
† Weight of Vapour in a Cubic Foot of Air,..... 4.43 grs.
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... 72

Highest Reading Self-Registering Thermometer,..... 82 on the 26th
Lowest do. do.,..... 47 on the 11th
Difference, being Monthly Range,..... 35°
Mean of Self-Registering Thermometers,..... 61.5
Mean Daily Range,..... 10.8
Greatest Daily Range,.....

(Signed) Wm Thomson
(Designation) Gardener

* 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.

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.

60.1 / 63.5 / 2 | 124.1 / 62.0 — 56.1 / 58.2 / 2 | 114.3 / 57.1 — 66.8 / 56.1 / 2 | 123.0 / 61.5 — 10.8

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.

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 Hygrometer.—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 louvre-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-safe ventilated box with louvre-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 *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 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 "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. 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 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. 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 sunshine 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 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 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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder,					Barley,				
Ash,					Beer or Big,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Peas,				
Lime,					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,	June 5th	Apple,			Cuckoo,		
Bourtree or Elder,		Black Currant,			Curlew,		
Broom,		Cherry,			House-Swallow,		
Hazel,		Gean,			Lapwing,		
Hawthorn,	June 4th	Gooseberry,			Plover,		
Holly,	June 6th	Peach,			Sand-Martin,		
Laburnum,	June 8th	Pear,			Starling,		
Lilac,	June 8th	Plum,			Swan,		
Mezereon,	June 8th	Strawberry,			Rail,		
Mountain Ash or Rowan,	June 8th				Other Birds, naming them—		
Red Flowering Currant,							
Rhododendron Ponticum,	June 4th						
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.

METEOROLOGICAL RETURNS.

To

Lewis (K.) DR STARK,

Sec., Meteorological Society,

21, Rutland Street,

EDINBURGH.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. ____, Long. ____, Height above Sea 188 feet.

Distance from Sea 3 miles. During the MONTH of July 185 4.

Days of Month	BAROMETER. 9h A.M. Barometer.	Attached Thermometer	4h P.M. Barometer.	Attached Thermometer	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 9h A.M. Dry bulb.	Wet bulb.	4h P.M. Dry bulb.	Wet bulb.	WIND. 9h A.M. Direction.	Mean Force 1–6.	4h P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ___h A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
	inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°		°	
1	29.81	54	29.83	64	68	51			54	49	59	55	N.W.		W.												Passing clouds a.m. Fine throughout
2	29.90	60	29.83	68	67	52			61	52	65	58	N.		W.												Fine and pleasant a.m. Very fine
3	29.70	61	29.64	62	68	53			60	55	59	54	N.		W.												Cutting a.m. Heavy showers throughout
4	29.54	62	29.62	64	78	58			66	62	62	59	S.W.		W.												Cloudy with hot intervals a.m. Thunder
5	29.51	64	29.48	66	68	59			65	61	66	58	N.W.		W.												Dashing showers a.m. Slight showers throughout
6	29.45	62	29.58	61	59	55			57	56	57	52	N.		N.W.												Edge and showery a.m. Showery throughout
7	29.69	58	29.74	60	60	52			57	52	64	55	S.W.		N.W.												Cloudy and showery a.m. Cloudy throughout
8	29.74	57	29.70	61	68	54			59	54	63	57	N.W.		N.W.												Passing clouds with fine intervals a.m. Fine
9	29.69	58	29.68	63	67	53			57	51	60	57	N.		N.												Hazy clouds passing a.m. Fine throughout
10	29.68	58	29.70	61	64	52			56	52	67	51	N.		N.												Heavily clouded a.m. Showery throughout
11	29.72	60	29.80	65	68	56			64	60	69	64	S.		S.												Cloudy and showery a.m. Fine and pleasant
12	29.95	64	29.99	67	74	60			68	63	69	62	S.		S.												Cloudy with fine intervals a.m. Very fine
13	29.94	66	29.98	70	72	68			68	68	78	65	S.		S.												Passing clouds with fine intervals a.m.
14	29.92	65	30.09	71	76	61			66	59	62	59	S.		S.												Very fine a.m. Exceedingly fine throughout
15	30.12	67	30.02	69	74	62			64	58	64	58	S.		S.												Fine and pleasant a.m. Cloudy
16	29.65	65	29.75	69	69	58			68	57	59	54	S.		S.												Very fine a.m. Exceedingly fine throughout
17	29.80	64	29.68	65	66	56			59	54	68	62	S.		S.												Passing clouds with fine intervals a.m.
18	29.98	63	29.89	69	72	58			62	59	68	63	N.		S.												Cloudy with hot intervals a.m. Very
19	29.94	66	29.99	68	78	64			69	62	65	54	N.		S.												Partially overcast a.m. Densely overcast
20	29.96	65	29.92	68	76	62			68	62	66	58	N.		N.W.												Excessively hot a.m. Cooler hot fine
21	29.84	65	29.79	69	68	59			64	58	64	57	N.		S.												Passing clouds a.m. Exceedingly fine
22	29.99	63	29.98	68	69	59			62	56	66	64	N.		S.												Densely clouded a.m. Very fine
23	29.90	65	29.98	68	69	61			68	62	62	57	N.		S.												Passing clouds with hot intervals a.m.
24	29.48	67	29.52	65	68	58			55	54	63	58	S.		S.												Windy and showery a.m. Windy throughout
25	29.30	62	29.49	65	69	55			62	55	66	61	S.		S.												Very high winds a.m. Windy throughout
26	29.76	64	29.49	65	68	56			64	57	65	60	S.		S.												Cloudy and windy a.m. Showery throughout
27	29.49	63	29.61	64	69	57			65	60	64	58	N.		S.												Slight showers a.m. Fine p.m. Cloudy at
28	29.72	62	29.69	64	69	56			64	56	63	59	N.		S.												Passing clouds a.m. Cloudy throughout
29	29.90	63	29.83	64	71	57			64	58	66	62	N.		S.												Very fine a.m. Exceedingly fine
30	29.68	64	29.88	66	69	59			62	59	63	58	S.		S.												Partially overcast a.m. Hazy clouds
31	29.74	63	29.75	66	69	58			61	57	65	61	S.		S.												Passing clouds a.m. Fine throughout
Sums.	922.07	1946	952.70	2033	2131	1774			1937	1756	1992	1812						1.55									
Means.	29.744	62.7	29.764	65.5	68.7	57.2			62.4	56.6	64.8	58.4						Rain 1.33									
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	

Barometer, mean corrected reading of Column No. 1 (A.M.),.....= 29.744
Diameter of tube____inch; correction for capillarity to be added,.....+ 060
Sum,..... 29.804
Correction for Temperature from Column No. 2 to be deducted,.....= − 088
Sum,..... 29.716
Correction for Height above Sea-level,____feet, to add,.....= +
Barometer corrected and reduced to 32° and Sea-level,.....=

Column No. 3 (P.M.),.....= 29.764
Capillarity,.....= + 060
Sum,..... 29.824
Temp. from Col. 4,.....= − 096
44 Sum,..... 29.728
Height,.....= +
At 32° and Sea-level,.....=

Mean 29.722 210 29.932

Barometer, Highest observed reading of Month,.....= 30.12
Lowest do. do.,.....= 29.45 on 6th
Difference, or Monthly Range,.....= 0.67

SUMMARY OF THE WINDS.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	0	0	0	0	1	11	14	5	0	
P.M.	0	0	0	0	0	11	15	5	0	

Dry bulb Thermometer (mean of Cols. 9 and 11),*..... 63.6
Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 57.5
† Dew-point Temperature,..... 52.4
† Elastic Force of Vapour,..... .393 inch
† Weight of Vapour in a Cubic Foot of Air,..... 4.42 grs
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... 67.

Highest Reading Self-Registering Thermometer,..... 78 on the 4th
Lowest do. do.,..... 51 on the ____
Difference, being Monthly Range,..... 27
Mean of Self-Registering Thermometers,..... 62.9
Mean Daily Range,..... 11.5
Greatest Daily Range,.....

(Signed) Wm Thomson
(Designation) Gardener

* 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.

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62.4 + 64.8 = 127.2 ÷ 2 = 63.6
56.6 + 58.4 = 115.0 ÷ 2 = 57.5
68.7 + 57.2 = 125.9 ÷ 2 = 62.9 (115)

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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.

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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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Dressed of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder,					Barley,				
Ash,					Beer or Big,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Peas,				
Lime,					Potatoes,				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass,				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,		Apple,			Cuckoo,		
Bourtree or Elder,		Black Currant,			Curlew,		
Broom,		Cherry,			House-Swallow,		
Hazel,		Gean,			Lapwing,		
Hawthorn,		Gooseberry,			Plover,		
Holly,		Peach,			Sand-Martin,		
Laburnum,		Pear,			Starling,		
Lilac,		Plum,			Swan,		
Mezereon,		Strawberry,			Rail,		
Mountain Ash or Rowan,					Other Birds, name of each—		
Red Flowering Currant,							
Rhododendron Pontieum,							
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.

METEOROLOGICAL RETURNS.

21, *Rutland Street*,

EDINBURGH.

To

DR STARK,

Sec., Meteorological Society,

July

August

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. ____, Long. ____, Height above Sea 183 feet.

Distance from Sea ____ miles. During the MONTH of August 185 4.

	BAROMETER. 9 h. A.M. Barometer.	BAROMETER. 9 h. A.M. Attached Thermometer	BAROMETER. 6 h. P.M. Barometer.	BAROMETER. 6 h. P.M. Attached Thermometer	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 9 h. A.M. Dry bulb.	Wet bulb.	6 h. P.M. Dry bulb.	Wet bulb.	WIND. 9 h. A.M. Direction.	Mean Force 1–6.	6 h. P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ____ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
	inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°		°	
1	29.88	64	29.85	67	78	59			65	62	66	61	S.W.		W.												Densely clouded a.m. cloudy throughout p.m.
2	29.90	65	29.88	69	72	58			64	61	66	61	S.W.		S.												very fine a.m. Exceedingly fine p.m. Rain at night
3	29.74	67	29.61	69	77	61			70	66	70	65	S.W.		S.												Cloudy and windy a.m. Excessively hot
4	29.68	66	29.81	68	69	59			63	58	64	60	S.W.		S.W.												Cloudy and windy a.m. Cloudy throughout
5	29.81	65	29.79	67	65	55			61	59	62	59	S.W.		N.W.												Lower rain a.m. Cloudy throughout
6	29.80	61	29.83	62	64	52			59	54	61	59	N.W.		N.W.												Cloudy and dull a.m. Small rain
7	29.80	59	29.70	59	63	51			55	53	54	52	N.W.		N.E.												Constant rain a.m. Showery throughout
8	29.66	57	29.78	58	57	52			53	53	54	53	N.W.		N.W.												Small rain a.m. Passing Showers
9	29.78	57	29.80	60	63	53			55	49	60	58	N.W.		S.W.												Showery a.m. Fine and pleasant
10	29.89	62	29.87	63	68	51			62	59	66	64	N.W.		S.W.												Small rain fine at intervals a.m. Pleasant
11	29.82	64	29.91	66	75	62			64	64	65	63	W.		W.												Cloudy, hot intervals a.m. Thunder Showers
12	29.98	62	29.95	67	74	55			64	61	67	65	W.		W.												Cloudy, very warm a.m. Densely clouded
13	29.81	65	29.78	67	73	60			69	65	67	64	S.W.		S.W.												Passing clouds a.m. Showery but fine
14	29.69	64	29.68	63	63	59			61	59	59	58	W.		W.												Cloudy for rain a.m. Constant rain
15	29.78	62	29.91	64	64	60			60	59	61	60	N.W.		N.W.												Cloudy a.m. Small rain throughout
16	30.03	63	30.11	66	71	59			63	61	64	61	W.		W.												Dosky a.m. Exceedingly fine p.m.
17	29.99	62	29.98	66	70	56			68	64	69	66	N.E.		N.E.												Small rain early a.m. Very fine
18	29.99	63	30.11	67	71	54			64	60	65	62	N.W.		N.W.												Cloudy with fine intervals a.m. fine
19	30.05	66	30.10	71	81	62			70	66	74	70	S.W.		S.W.												Partially overcast a.m. Exceedingly
20	30.15	71	30.17	71	76	69			69	67	68	64	N.W.		N.W.												Densely clouded a.m. Cloudy, fine
21	30.14	69	30.08	69	75	63			68	64	63	59	N.W.		W.												Cloudy but fine a.m. Exceedingly fine
22	29.99	65	29.92	69	76	59			68	64	67	64	N.W.		S.W.												very fine a.m. Exceedingly fine throughout
23	29.88	66	29.80	70	81	60			65	61	69	66	N.		W.												Exceedingly fine a.m. Exceedingly hot
24	29.79	67	29.81	70	79	62			64	60	67	63	N.W.		W.												Passing clouds fine a.m. Windy boisterous
25	29.80	66	29.85	69	80	57			62	56	64	62	S.W.		S.												Cloudy and warm. Thunder a.m. Showers
26	30.15	66	30.11	65	72	59			59	56	61	57	W.		S.W.												Fine and pleasant a.m. Fine throughout
27	30.19	62	30.17	68	69	55			59	55	63	57	S.W.		S.W.												Cloudy but fine a.m. Fine throughout
28	31.21	63	30.21	67	68	56			61	58	66	59	N.W.		N.W.												Fine and pleasant a.m. Exceedingly
29	30.20	61	30.14	68	69	55			60	57	60	56	W.		W.												Cloudy, with fine intervals a.m. Rain
30	30.08	62	29.98	63	68	56			59	56	61	58	N.W.		N.W.												Densely clouded a.m. Rain and hazy
31	29.90	60	29.89	63	69	54			59	55	64	60	N.E.		S.E.												Fine and pleasant a.m. Very fine
Sums.	923.51	1875	934.20	2134	2191	1482			1946	1845	2007	1880						1.5									
Means.	29.916	60.5	29.909	65.7	70.6	57.6			62.7	59.5	64.0	60.6						Rain									
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	

Barometer, mean corrected reading of Column No. 1 (A.M.),.....= 29.916
Column No. 3 (P.M.),.....= 29.909
Barometer, Highest observed reading of Month,.....= 30.21

Diameter of tube ____ inch; correction for capillarity to be added,.....+ .060
Capillarity,.....= + .060
Lowest do. do.,.....= 29.60

Sum,..... 29.976
Sum,..... 29.969
Difference, or Monthly Range,.....= 0.61

Correction for Temperature from Column No. 2 to be deducted,.....= − .71
Temp. from Col. 4,.....= − 83
Mean 29.895 210 30.105

Sum,..... 29.905
1791 Sum,..... 29.886

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.	1	4	1	1	0	8	5	11	0	
P.M.	0	2	2	2	3	7	7	8	0	

Dry bulb Thermometer (mean of Cols. 9 and 11),*..... 63.4
Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 60.0
† Dew-point Temperature,..... 57.1
† Elastic Force of Vapour,..... .469
† Weight of Vapour in a Cubic Foot of Air,..... 5.16
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... 80

Highest Reading Self-Registering Thermometer,..... 81 on the 23d
Lowest do. do.,..... 51 on the ____
Difference, being Monthly Range,..... 30°
Mean of Self-Registering Thermometers,..... 64.1
Mean Daily Range,..... 13.0
Greatest Daily Range,.....

(Signed) Wm Morrison
(Designation) Gardener

* 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.

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.

62.7 + 64.0 = 126.7 ÷ 2 = 63.4
59.5 + 60.6 = 120.1 ÷ 2 = 60.0
70.6 + 57.6 = 128 ÷ 2 = 64.1
130

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.

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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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

METEOROLOGICAL RETURNS.

To

DR STARK,

Sec., Meteorological Society,

21, Rutland Street,

EDINBURGH.

Dalkeith

August (49)

14

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder,............					Barley,............				
Ash,............					Beer or Big,............				
Beech,............					Oats,............				
Birch,............					Wheat,............				
Elm,............					Beans,............				
Larch,............					Pease,............				
Lime,............					Potatoes,............				
Oak,............					Turnips,............				
Sycamore or Plane,..					Rye Grass,............				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,............		Apple,............			Cuckoo,............		
Bourtree or Elder,............		Black Currant,............			Curlew,............		
Broom,............		Cherry,............			House-Swallow,............		
Hazel,............		Gean,............			Lapwing,............		
Hawthorn,............		Gooseberry,............			Plover,............		
Holly,............		Peach,............			Sand-Martin,............		
Laburnum,............		Pear,............			Starling,............		
Lilac,............		Plum,............			Swan,............		
Mezereon,............		Strawberry,............			Rail,............		
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, 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.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. ____, Long. ____, Height above Sea 185 feet.

Distance from Sea 3 miles. During the MONTH of September 185 4.

Days of Week	Days of Month	BAROMETER. 9 h. A.M. Barometer.	BAROMETER. 9 h. A.M. Attached Thermometer	BAROMETER. 6 h. P.M. Barometer.	BAROMETER. 6 h. P.M. Attached Thermometer	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 9 h. A.M. Dry bulb.	Wet bulb.	6 h. P.M. Dry bulb.	Wet bulb.	WIND. 9 h. A.M. Direction.	Mean Force 1–6.	6 h. P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ___ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°			
	1	29.48	59	29.59	58	66	53			58	53	59	56	N.E.		N.												Passing clouds fine A.M. Cloudy some time
	2	29.52	56	29.59	59	64	50			51	49	58	56	N.W.		N.W.											—	Cloudy and Showery A.M. Cloudy throughout
	3	29.63	61	29.62	62	65	54			58	58	60	58	N.W.		W.											—	Constant rain A.M. Fine and pleasant
	4	29.59	59	29.50	60	64	55			60	59	59	58	N.W.		N.E.											—	Changeable A.M. Dashing Showers
	5	29.49	58	29.55	61	67	51			54	56	60	58	S.W.		S.E.											—	Cloudy with bright intervals A.M. Showers
	6	29.54	59	29.60	61	65	55			60	54	60	54	S.W.		S.W.											—	Unsettled A.M. Passing showers throughout P.M.
	7	29.62	59	29.63	61	66	54			63	59	60	56	S.W.		W.											—	Passing clouds with fine intervals A.M.
	8	29.58	54	29.45	62	64	44			55	53	56	56	N.W.		N.E.											—	Densely clouded A.M. Heavy rain
	9	29.25	59	29.44	61	65	56			60	59	60	54	S.E.		S.												Cloudy and windy A.M. Cloudy throughout
	10	29.53	59	29.60	61	64	55			60	60	61	59	E.		N.E.											—	Passing Clouds. Showery A.M.
	11	29.62	60	29.58	59	62	58			59	58	55	53	N.E.		N.E.											—	Dashing Showers A.M. Showery throughout
	12	29.53	54	29.51	59	60	53			54	53	58	58	S.W.		W.												Fine and pleasant A.M. Cloudy afternoon
	13	29.60	59	29.81	59	66	58			64	61	54	51	S.W.		S.W.												Remarkably fine A.M. Cloudy and wet
	14	29.82	58	29.89	61	70	50			58	56	63	61	S.		S.												Cloudy and dull A.M. Clouds Clearing
	15	29.92	59	29.91	64	71	56			65	63	65	62	S.W.		S.												Very fine A.M. Exceedingly fine
	16	29.91	62	29.93	66	72	60			65	61	64	61	S.W.		S.W.											—	Partially overcast A.M. Showery but fine
	17	29.90	65	29.95	65	66	61			64	61	62	61	S.W.		S.W.												Very fine A.M. Exceedingly fine
	18	29.99	63	30.15	66	68	59			55	53	64	61	N.W.		S.W.												Fine and pleasant A.M. Showery throughout
	19	30.30	64	31.31	64	65	54			48	44	54	51	N.E.		N.W.												Passing clouds fine all intervals A.M. Very fine
	20	30.10	63	30.15	65	66	54			49	48	58	55	N.W.		N.E.												Cloudy and dull early A.M. Very fine
	21	30.20	62	30.20	63	65	51			52	50	61	54	S.W.		N.W.												Partially overcast A.M. Fine and pleasant
	22	30.18	59	30.11	61	66	58			59	54	60	58	S.		S.E.												Cloudy and dull A.M. Densely Clouded
	23	30.11	61	30.01	60	64	59			59	54	54	55	S.E.		S.											—	Cloudy and Showery A.M. Heavy Showers
	24	29.58	54	29.52	68	70	53			54	53	60	53	S.E.		S.E.												Passing clouds with fine intervals A.M.
	25	29.58	60	29.68	60	63	56			59	58	59	54	S.		E.												Cloudy with fine intervals A.M. Cloudy
	26	29.62	55	29.44	59	63	54			55	53	62	57	S.W.		S.W.												Fine and pleasant A.M. Cloudy some time
	27	29.40	59	29.43	61	66	55			61	59	59	56	S.E.		S.W.												Fine and pleasant A.M. Very fine throughout
	28	29.53	54	29.60	58	62	48			55	51	54	52	S.		S.W.												Greyish white clouds passing A.M. Fine
	29	29.85	54	29.90	54	64	44			54	50	54	51	S.E.		S.W.											—	Densely clouded A.M. Showers rain
	30	29.85	55	29.80	58	61	49			55	53	56	55	S.W.		W.											—	Densely overcast A.M. Some rain
	31																											
	Sums.	892.09	177.4	892.41	1837	1760	1626			1748	1667	1775	1697					13	4.6									
	Means.	29.736	59.	29.747	61.	65.3	54.2			57.6	55.5	59.1	56.5					Rain										
	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	

Barometer, mean corrected reading of Column No. 1 (A.M.),.....= 29.736
Diameter of tube ____ inch; correction for capillarity to be added,.....+ .060
Sum,..... 29.796
Correction for Temperature from Column No. 2 to be deducted,.....= − .78
Sum,..... 29.718
Correction for Height above Sea-level, ____ feet, to add,.....= +
Barometer corrected and reduced to 32° and Sea-level,.....=

Column No. 3 (P.M.),.....= 29.747
Capillarity,.....= + .060
Sum,..... 29.807
Temp. from Col. 4,.....= − .81
Sum,..... 29.726
Height,.....= +
At 32° and Sea-level,.....=

Barometer, Highest observed reading of Month,.....= 30.30
Lowest do. do.,.....= 29.40
Difference, or Monthly Range,.....= 0.91

Mean 29.722
216
29.932

SUMMARY OF THE WINDS.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	0	3	1	5	4	11	0	6	0	—
P.M.	0	5	1	3	4	9	5	3	0	3

Dry bulb Thermometer (mean of Cols. 9 and 11),*..... 58.3
Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 56.0
† Dew-point Temperature,..... 53.9
† Elastic Force of Vapour,..... .416 inch
† Weight of Vapour in a Cubic Foot of Air,.....
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... 85.

Highest Reading Self-Registering Thermometer,..... 72° on the 16th
Lowest do. do.,..... 47° on the 29th
Difference, being Monthly Range,..... 25°
Mean of Self-Registering Thermometers,..... 59.7
Mean Daily Range,..... 11.1
Greatest Daily Range,.....

(Signed) Wm Thomson
(Designation) Gardener

* 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.

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.

57.6 + 59.1 = 116.7 ÷ 2 = 58.3
55.5 + 56.5 = 112.0 ÷ 2 = 56.0
65.3 + 54.2 = 119.5 ÷ 2 = 59.7 ; 11.1

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 Hygrometer.—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 louvre-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-safe ventilated box with louvre-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 *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 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 "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. 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 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. 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 sunshine 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 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 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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder, ...					Barley, ...				
Ash, ...					Bear or Big, ...				
Beech, ...					Oats, ...				
Birch, ...					Wheat, ...				
Elm, ...					Beans, ...				
Larch, ...					Pease, ...				
Lime, ...					Potatoes, ...				
Oak, ...					Turnips, ...				
Sycamore or Plane, ...					Rye Grass, ...				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry, ...		Apple, ...			Cuckoo, ...		
Bourtree or Elder, ...		Black Currant, ...			Curlew, ...		
Broom, ...		Cherry, ...			House-Swallow, ...		
Hazel, ...		Gean, ...			Lapwing, ...		
Hawthorn, ...		Gooseberry, ...			Plover, ...		
Holly, ...		Peach, ...			Sand-Martin, ...		
Laburnum, ...		Pear, ...			Starling, ...		
Lilac, ...		Plum, ...			Swan, ...		
Mezereon, ...		Strawberry, ...			Rail, ...		
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, 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.

METEOROLOGICAL RETURNS.

Sept

Dalkeith

To

DR STARK,

Sec., Meteorological Society,

21, Rutland Street,

EDINBURGH.

EDINBURGH B X OC 30 1857

DALKEITH OC 30 1857

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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens County of Midlothian, in Lat. _____, Long. _____, Height above Sea 183 feet.

Distance from Sea 3 miles. During the MONTH of October 1857.

Days of Week	Days of Month	BAROMETER. 9h A.M. Barometer.	BAROMETER. 9h A.M. Attached Thermometer	BAROMETER. 6h P.M. Barometer.	BAROMETER. 6h P.M. Attached Thermometer	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 9h A.M. Dry bulb.	Wet bulb.	6h P.M. Dry bulb.	Wet bulb.	WIND. 9h A.M. Direction.	Mean Force 1–6.	6h P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°		°	
	1	29.82	57	29.75	60	65	54			58	57	54	55	S.		S.W.												Passing clouds with fine intervals
	2	29.81	55	29.55	58	62	49			54	51	56	55	S.W.		S.												Cloudy with rain A.M. Cloudy rain
	3	29.63	56	29.61	55	57	51			54	50	52	49	S.W.		S.W.												Exceedingly fine throughout
	4	29.55	50	29.50	51	55	44			49	46	47	45	S.W.		S.W.												Fine and pleasant A.M. Do P.M.
	5	29.48	47	29.80	48	56	39			45	43	48	46	S.W.		S.W.												Cloudy with fine intervals A.M. &
	6	29.85	46	29.90	48	54	42			46	44	45	43	S.		S.E.												Cloudy and showery throughout
	7	29.33	46	29.10	50	55	36			48	45	51	49	S.W.		N.E.												Cloudy A.M. Densely clouded
	8	29.98	52	29.99	53	56	51			53	52	53	52	N.E.		N.												Cloudy and showery throughout
	9	29.12	51	29.30	53	54	44			51	50	52	52	N.W.		S.W.												Densely clouded A.M. Showery
	10	29.51	52	29.59	53	60	49			51	49	53	50	S.W.		S.W.												Dull A.M. Showery with fine intervals
	11	29.65	55	29.82	57	62	50			53	52	53	52	S.W.		S.W.												Fine and pleasant A.M. Do
	12	29.87	54	29.84	49	68	51			52	50	60	58	S.W.		S.W.												Densely clouded A.M. Fine
	13	29.99	56	30.02	56	62	53			54	52	56	56	N.E.		E.												Passing clouds throughout
	14	29.99	58	30.10	60	64	56			52	50	60	58	S.E.		S.W.												Cloudy and dull A.M. Do
	15	29.98	57	29.82	58	63	55			56	55	56	54	S.E.		S.E.												Densely clouded A.M. Fine P.M.
	16	29.86	56	29.80	57	59	54			52	50	55	53	N.W.		N.E.												Showery A.M. Densely clouded
	17	29.72	56	29.65	58	62	55			53	53	54	53	S.W.		S.W.												Densely A.M. Densely clouded Fine
	18	29.49	58	29.48	56	60	55			54	53	54	53	S.W.		S.W.												Passing clouds with fine intervals
	19	29.63	54	29.69	54	56	49			49	47	45	43	N.W.		N.E.												Light showers throughout the day
	20	29.78	55	29.72	56	58	53			52	50	47	44	N.		N.E.		1	14									Densely clouded throughout
	21	29.61	52	29.56	48	52	49			44	41	47	44	N.W.		N.W.												Passing clouds A.M. Very fine P.M.
	22	29.68	43	29.81	47	50	31			49	48	46	45	N.E.		N.E.												Fine and pleasant A.M. Showery
	23	30.09	46	30.15	48	51	39			51	49	50	48	S.W.		W.												Passing clouds A.M. Densely Do
	24	30.20	48	30.21	49	55	42			52	51	52	51	N.W.		N.W.												Fine and pleasant A.M. Cloudy
	25	31.08	50	29.91	51	56	46			51	50	54	53	N.E.		N.E.												Densely clouded throughout
	26	29.49	52	29.41	54	57	51	51	49	[illegible]	[illegible]	50	47	50	49	N.W.												Cloudy and wintry A.M. Rain
	27	29.60	53	29.61	55	58	50			51	51	55	53	S.E.		S.E.												Fine day throughout
	28	29.72	52	29.69	50	54	51			50	49	47	46	S.E.		S.E.												Cloudy A.M. Fine and pleasant
	29	29.58	49	29.49	50	55	46			48	47	47	46	S.E.		S.E.												Cloudy and wintry throughout
	30	29.42	48	29.59	47	50	45			47	46	47	46	S.W.		W.												Showery A.M. Cold throughout
	31	29.78	47	29.70	50	55	40			49	46	48	47	W.		S.W.												Passing clouds with fine intervals
	Sums.	14 14 2155		15 10 2120		13 937	13 240			16 61	14 293	14 54	13 208						1.4									
	Means.	29.695		29.683		57.6	47.8			51.9	49.4	51.8	49.9						Rain									
	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	

Barometer, mean corrected reading of Column No. 1 (A.M.),..... = 29.695
Diameter of tube _____ inch; correction for capillarity to be added,..... + 060
Sum,..... 29.755
Correction for Temperature from Column No. 2 to be deducted,..... = − 57
Sum,..... 29.698
Correction for Height above Sea-level, _____ feet, to add,..... = +
Barometer corrected and reduced to 32° and Sea-level,..... =

Column No. 3 (P.M.),..... = 29.683
Capillarity,..... = + 060
Sum,..... 29.743
Temp. from Col. 4,..... = − 57
18th Sum,..... 29.686
Height,..... = +
..... =

Mean 29.692
210
29.902

Barometer, Highest observed reading of Month,..... = 30.20 on 24th
Lowest do. do.,..... = 28.48 on 8th
Difference, or Monthly Range,..... = 1.22

SUMMARY OF THE WINDS.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	1	4	0	5	2	12	1	5	0	—
P.M.	1	6	1	5	1	11	3	3	0	—

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),..... 87.

Highest Reading Self-Registering Thermometer,..... 68° on the 12th
Lowest do. do.,..... 31° on the 22nd
Difference, being Monthly Range,..... 37°
Mean of Self-Registering Thermometers,..... 52.7
Mean Daily Range,..... 9.8
Greatest Daily Range,.....

* 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.

(*Signed*) Wm Thomson
(*Designation*) Gardener

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.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.
Alder,				
Ash,				
Beech,				
Birch,				
Elm,				
Larch,				
Lime,				
Oak,				
Sycamore or Plane,				

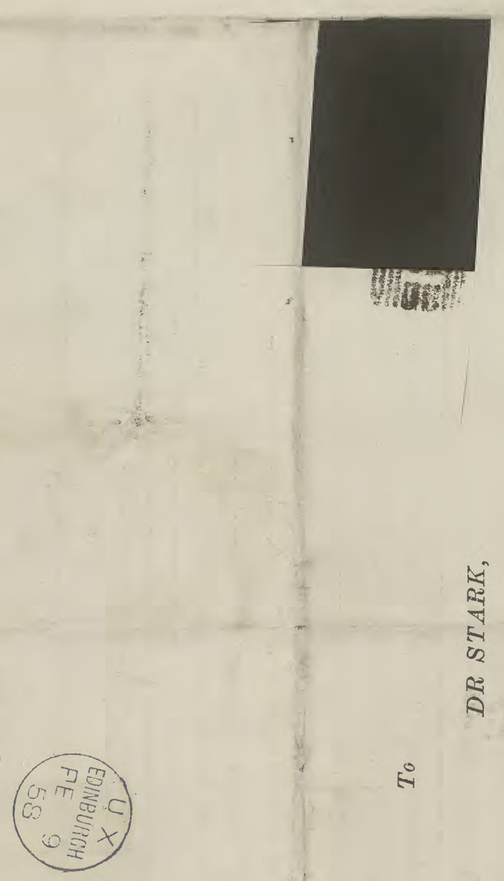
CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Barley,				
Beer or Big,				
Oats,				
Wheat,				
Beans,				
Pease,				
Potatoes,				
Turnips,				
Rye Grass,				

SHRUBS, ETC.	First in Blossom.
Barberry,	
Bourtree or Elder,	
Broom,	
Hazel,	
Hawthorn,	
Holly,	
Laburnum,	
Lilac,	
Mezereon,	
Mountain Ash or Rowan,	
Red Flowering Currant,	
Rhododendron Ponticum,	
Whin,	

FRUITS.	First in Blossom.	Fruit Ripe generally.
Apple,		
Black Currant,		
Cherry,		
Gean,		
Gooseberry,		
Peach,		
Pear,		
Plum,		
Strawberry,		

MIGRATORY BIRDS.	First Arrival.	Departure.
Cuckoo,		
Curlew,		
House-Swallow,		
Lapwing,		
Plover,		
Sand-Martin,		
Starling,		
Swan,		
Rail,		
Other Birds, naming them—		

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.

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 Hygrometer.—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 louvre-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-safe ventilated box with louvre-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 *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 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 "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. 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 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. 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 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 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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens County of Midlothian, in Lat. _____, Long. _____, Height above Sea 183 feet.

Distance from Sea 3 miles. During the MONTH of November 1854.

Days of Week.	Days of Month.	BAROMETER. 9 h. A.M. Barometer.	Attached Thermometer	6 h. P.M. Barometer.	Attached Thermometer	SELF-REGISTERING THERMOMETERS. Max. in Air.	Min. in Air.	Max. Black bulb in Sun.	Min. Black bulb over Grass.	HYGROMETER. 9 h. A.M. Dry bulb.	Wet bulb.	6 h. P.M. Dry bulb.	Wet bulb.	WIND. 9 h. A.M. Direction.	Mean Force 1–6.	6 h. P.M. Direction.	Mean Force 1–6.	RAIN. Days on which it fell.	Amount.	CLOUD. 1–10	SUNSHINE.	THERMOMETERS under Ground. ___ h. A.M. 3 inches.	12 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0–10	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.*
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°			
	1	29.56	53	29.54	51	58	49			55	53	55	51	S. E		S. E												Clouds with fine intervals a.m. Dull
	2	29.47	48	29.41	51	56	42			44	43	50	48	S. –		S. E												Passing clouds a.m. Densely clouded
	3	29.64	49	29.88	46	47	44			44	44	42	40	N. E		N. E												Do Do Do Do
	4	29.90	43	29.82	48	48	30			40	40	44	42	N. E.		S. –												Rain a.m. Fine and pleasant
	5	29.99	44	29.85	47	47	39			43	42	46	44	S. E.		S. E												Clouds some rain a.m. Rain p.m.
	6	29.75	47	30.12	47	48	47			49	47	46	44	S. E.		N. E.												Densely clouded a.m. Do P. m
	7	30.03	46	30.14	46	41	31			40	39	43	42	S. E		S. E												Small rain dull a.m. Clouds
	8	30.13	45	30.30	47	50	43			46	45	47	46	S. E.		S. E.												Densely clouded a.m. Fine P. m
	9	30.19	47	30.30	50	50	45			46	46	48	47	N. –		N. –												Chiefly fine. Rain at night
	10	30.48	50	29.51	51	52	47			49	49	49	47	N. –		N. E.												Densely clouded throughout
	11	30.55	48	30.82	50	51	44			47	45	47	46	N. E		E												Partially overcast a.m. Densely do
	12	30.55	44	30.80	46	49	36			39	37	40	38	S. E.		E												Exceedingly fine throughout
	13	30.38	46	30.80	49	54	38			49	47	51	50	S. E.		S. E.												Densely Clouded throughout
	14	30.81	50	30.78	52	49	48			51	50	51	51	S. E.		S. E.												Dull, foggy, rain
	15	30.78	52	30.64	51	52	47			49	48	48	48	S. E.		S. E.												Passing clouds a.m. Small rain
	16	30.79	50	30.68	50	51	46			49	48	49	49	N. E		N. E												Densely clouded a.m. Rain
	17	30.68	49	30.64	49	50	45			45	43	49	47	N. E		E.												Clouds a.m. Shower P. m
	18	30.65	50	30.67	49	53	46			44	43	47	46	E –		E.												Exceedingly fine throughout
	19	29.97	47	30.03	48	50	46			46	45	49	47	E.		S. E												Reasonable a.m. Very fine
	20	29.97	47	30.03	47	49	43			48	48	46	43	S. E		S. E												Fair and pleasant
	21	30.05	50	29.95	50	52	41			49	48	49	48	S. –		S. E.												Passing clouds a.m. Densely do
	22	29.93	52	29.60	52	55	45			34	31	53	51	S. E.		E.												Showery a.m Constant rain
	23	29.88	47	29.99	47	47	46			29	29	41	41	S. E.		N. E.												High winds occasional showers
	24	29.20	37	29.45	37	37	31			26	26	30	30	S. E.		S. E.												Cloudy and windy a.m. Down fall
	25	29.58	34	29.50	36	38	25			33	33	30	29	N. E		N. E												Fine clear Miles clear
	26	29.59	32	29.41	38	44	42			26	26	40	39	N. E.		N. E.												Cold and dull with sleet
	27	30.05	37	30.10	37	42	31			33	33	32	32	S. E.		N. E.												Fine and Miles for the season
	28	30.01	35	29.99	38	45	30			32	32	36	36	S. E.		S. E.												Do Do Do Do
	29	29.90	45	30.04	41	42	35			40	40	38	37	S. E		S. E												Cold and cloudy a.m Foggy
	30	29.60	42	29.95	47	46	38			41	40	44	43	S. E		S. E.												Passing clouds a.m Densely do
	31																											
Sums.						17 251													2.56									
Means.		30.05	46.16	30.01	50.11	48.13	41 =			42.23	40.19	41.19	43.10					Rain										
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	

Barometer, mean corrected reading of Column No. 1 (A.M.),..... = 30.050

Diameter of tube _____ inch; correction for capillarity to be added,..... + .060

Sum,..... 30.110

Correction for Temperature from Column No. 2 to be deducted,..... = – .042

Sum,..... 30.068

Correction for Height above Sea-level, _____ feet, to add,..... = +

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

Column No. 3 (P.M.),..... = 30.010

Capillarity,..... = + .060

Sum,..... 30.070

Temp. from Col. 4,..... = – 52

Sum,..... 30.018

Height,..... = +

At 32° and Sea-level,..... =

Mean 30.042 / 210 / 30.252

Barometer, Highest observed reading of Month,..... = 30.82 on 11th

Lowest do. do.,..... = 29.20 on 25th

Difference, or Monthly Range,..... = 1.62

SUMMARY OF THE WINDS.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	2	4	2	5	2	10	2	3	0	0
P.M.	1	4	2	7	0	7	5	4	0	0

Dry bulb Thermometer (mean of Cols. 9 and 11),*..... 43.1

Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 41.6

† Dew-point Temperature,..... 39.8

† Elastic Force of Vapour,..... .245

† Weight of Vapour in a Cubic Foot of Air,.....

† Additional Weight required to Saturate a Cubic Foot,.....

† Degree of Humidity (Saturation 100),..... 88

Highest Reading Self-Registering Thermometer,..... 58° on the 1st

Lowest do. do.,..... 25° on the 25th.

Difference, being Monthly Range,..... 33°

Mean of Self-Registering Thermometers,..... 44.5

Mean Daily Range,..... 6.9

Greatest Daily Range,.....

* 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.

(*Signed*) W Thomson

(*Designation*) Gardener

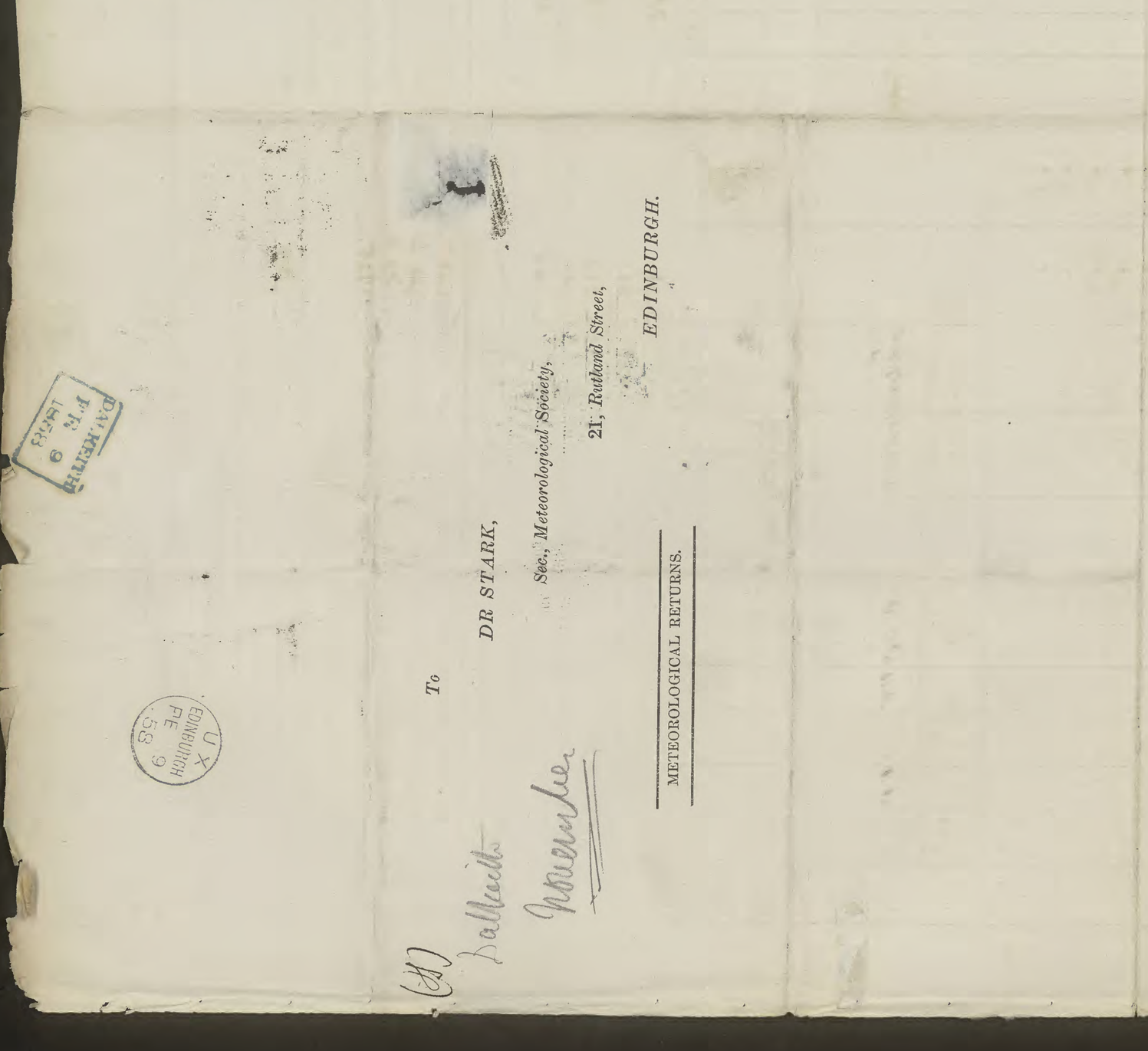
N.B.—This Schedule should be returned (post-paid) as early as possible after the completion of the Month, with the Sums correctly added, and the Means deduced. No Wax or Wafers ever to be employed in closing the Schedule—the Gummed Corner to be alone used.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder,					Barley,				
Ash,					Beer or Big,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Pease,				
Lime,					Potatoes,				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass,				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,		Apple,			Cuckoo,		
Bourtree or Elder,		Black Currant,			Curlew,		
Broom,		Cherry,			House-Swallow,		
Hazel,		Gean,			Lapwing,		
Hawthorn,		Gooseberry,			Plover,		
Holly,		Peach,			Sand-Martin,		
Laburnum,		Pear,			Starling,		
Lilac,		Plum,			Swan,		
Mezereon,		Strawberry,			Rail,		
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, 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.



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 Hygrometer.—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 louvre-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-safe ventilated box with louvre-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 *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 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 "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. 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 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. 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 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 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 Schonbein'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. Excited glass or sealing-wax ascertains the nature of the electricity.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens County of Midlothian, in Lat. ____, Long. ____, Height above Sea 183 feet.

Distance from Sea 3 miles. During the MONTH of December 1857.

Days of Week.	Days of Month.	BAROMETER. 9h A.M. Barometer.	Attached Thermometer.	6h P.M. Barometer.	Attached Thermometer.	SELF-REGISTERING THERMOMETERS. Protected. Highest in Air.	Lowest in Air.	Exposed. Max. Black bulb in Sun.	Min. Black bulb during Night.	HYGROMETER. 9h A.M. Dry bulb.	Wet bulb.	6h P.M. Dry bulb.	Wet bulb.	WIND. 9h A.M. Direction.	Force	6h P.M. Direction.	Force	RAIN. Days on which it fell.	Amount.	CLOUD. 1 to 10	SUNSHINE. Hours.	THERMOMETERS. under Ground. ___h A.M. 3 inches.	12 inches.	22 inches.	Temperature of SPRING or WELL.	Temperature of SEA.	OZONE. 0 to 10	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.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°					days.	inches.			°	°	°	°	°				
	1	29.65	43	29.62	45	44	40			41	40	42	41	S.E.		S.E.													Cloudy and dull throughout	1
	2	29.65	47	29.53	46	52	36			44	43	48	46	S.		E.													Densely Clouded - light rain - light	2
	3	29.21	49	29.15	51	56	48			53	50	52	50	E.		N.													Dreary and cloudy - some rain	3
	4	29.58	46	29.30	45	46	40			45	40	41	40	S.W.		S.W.													Fine and pleasant throughout	4
	5	29.73	44	29.84	45	46	34			41	40	41	37	S.W.		S.W.													Very fine a.m. Dull and cloudy	5
	6	29.93	47	29.82	48	54	42			47	43	50	47	S.W.		S.W.													Fine pleasant - dary - Squaley at night	6
	7	29.92	47	29.60	49	53	43			45	45	50	46	S.W.		N.													Mild early a.m. Squaley with Showers	7
	8	30.28	45	30.19	46	50	40			42	40	45	44	S.E.		S.													Chiefly fine throughout - Stormy at night	8
	9	29.81	49	29.97	49	52	46			50	47	49	46	S.W.		S.W.													Cloudy and dreary throughout	9
	10	30.23	47	30.47	46	48	41			43	42	42	41	S.W.		S.W.													do do do	10
	11	30.43	46	30.40	45	49	39			46	45	44	43	S.W.		S.W.													Dull a.m. Fine and pleasant	11
	12	30.30	47	30.20	48	50	42			47	46	44	43	S.W.		S.W.													do do do do	12
	13	29.92	47	29.92	49	52	45			48	46	50	47	N.		N.													Cloudy and Showery a.m. raining	13
	14	29.61	47	29.68	47	48	46			43	43	43	41	S.W.		S.W.													Fine and pleasant - throughout	14
	15	29.59	45	29.60	47	47	39			45	43	43	40	N.		N.													do do do	15
	16	29.53	49	29.54	50	52	42			48	47	51	50	N.W.		N.													Cloudy a.m. Showery and dry	16
	17	29.59	50	29.62	51	55	49			52	49	57	47	S.W.		S.													Fine a.m. Showery throughout	17
	19	29.90	44	29.62	43	46	36			38	37	41	39	S.W.		S.W.													Mild a.m. High winds P.m.	18
	20	29.33	45	29.38	42	48	39			46	42	38	37	N.		N.W.													Fine and pleasant - throughout	19
	21	29.51	44	29.49	48	54	35			49	47	51	50	N.		N.													Cold and Showery throughout	20
	22	29.52	50	29.60	48	52	47			51	48	46	45	S.W.		N.													Cloudy a.m. Cloudy Snow rain	21
	23	29.80	48	29.78	51	54	43			46	46	53	51	S.W.		S.W.													Cloudy and Showery throughout	22
	24	29.86	49	29.83	51	54	49			52	50	48	45	S.W.		S.W.													do do do	23
	25	30.03	48	30.12	46	45	43			45	43	40	37	S.W.		S.W.													Fine and Mild for the Season	24
	26	30.14	43	30.13	43	43	36			40	39	33	34	S.		S.E.													Exceedingly fine throughout	25
	27	30.18	39	30.20	45	39	31			32	32	39	35	S.E.		N.													Fine and pleasant throughout	26
	28	30.14	45	30.15	46	49	41			47	47	44	43	S.W.		N.W.													Fine a.m. Cloudy P.m. Rain at night	27
	29	30.11	45	30.15	47	50	42			47	44	48	46	S.W.		S.W.													Cloudy and Showery a.m. Clear	28
	30	30.20	46	30.26	47	51	46			46	44	47	45	S.W.		N.													Partially overcast - Dense Fog P.m.	29
	31	30.26	46	30.22	47	48	41			42	41	46	45	S.		N.													Cloudy and dull throughout	30
																													Cloudy bright - interbreaks a.m. Rain	31
Sums.		26 [illegible]		26 51			296	34		168	116	171	119						2.5 in										
		90 [illegible]	432	926 48	1457	1539	1284			1508	1336	1675	1359																	
Means.		29.862		29.855		49.5	41.1			45.4	43.7	45.5	43.8						Rain											
		~~29.845~~	46.6	~~29.856~~	47.2	~~49.2~~	~~41.0~~			~~48.60~~	43.03	~~48.89~~	43.26																	
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.),..... = 29.862
Column No. 3 (P.M.),..... = 29.855

Diameter of tube ____ inch; correction for capillarity to be added,..... + 060
Capillarity,..... = + 060

Sum,..... 29.922
Sum,..... 29.915

Correction for Temperature from Column No. 2 to be deducted,..... = − 042
Temp. from Col. 4,..... = − 45

Sum,..... 29.880
Sum,..... 29.870

Mean of the above 29.875

Correction for Height above Sea-level, ____ feet, to add,..... 210

Barometer corrected and reduced to 32° and Sea-level, ... [redacted]

Barometer, Highest observed reading of Month,..... = 30.47 on the 11th
Lowest do. do.,..... = 29.15 on the 3rd
Difference, or Monthly Range,..... = 1.32

SUMMARY OF THE WINDS.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	0	0	1	3	3	19	3	1	0	—
P.M.	0	0	1	2	2	14	[illegible]	[illegible]	0	—

Dry bulb Thermometer (mean of Cols. 9 and 11),*..... 45.1
Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 43.[illegible]
† Dew-point Temperature,..... 41.[illegible]
† Elastic Force of Vapour,..... .26[illegible]
† Weight of Vapour in a Cubic Foot of Air,.....
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... 87.

Reading Self-Registering Thermometer in Air and Protected,..... 56 on the 3d
do. do. do.,..... 31 on the 27
being Monthly Range,..... 25
Self-Registering Thermometers in Air and Protected,..... 45.3
ly Range in Air and Protected,..... 8.4
Greatest Daily Range, do.,.....
Highest Reading Self-Registering Black Bulb Thermometer in Sun,..... on the
Lowest do. do. from Radiation during Night, on the

(Signed) [illegible]

(Designation) Gardener

* 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.

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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 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 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.

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Ozone.—Mention whether Schonbein's or Moffat's scale and papers are used. Schonbein's 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.—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.

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 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.—Iscord 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 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;" but in all cases it is better to make use of Lind's Anemometer, as procured at Messrs Adie and Son's, and enter the greatest force of the wind during the period of observation.

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 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 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 being noticed.

Ozone.—Mention whether Schonbein's or Moffat's scale and papers are used. Schonbein's 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.—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.

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.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Leaf Buds first appear.	In Leaf.	Divested of Leaves.
Alder,				
Ash,				
Beech,				
Birch,				
Elm,				
Larch,				
Lime,				
Oak,				
Sycamore or Plane,				

CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Barley,				
Bere or Bigg,				
Oats,				
Wheat,				
Beans,				
Pease,				
Potatoes,				
Turnips,				
Rye Grass,				

SHRUBS, ETC.	First in Blossom.
Barberry,	
Bourtree or Elder,	
Broom,	
Hazel,	
Hawthorn,	
Holly,	
Laburnum,	
Lilac,	
Mezereon,	
Mountain Ash or Rowan,	
Red Flowering Currant,	
Rhododendron Ponticum,	
Whin,	

FRUITS.	First in Blossom.	Fruit Ripe generally.
Apple,		
Black Currant,		
Cherry,		
Gean,		
Gooseberry,		
Peach,		
Pear,		
Plum,		
Strawberry,		

MIGRATORY BIRDS.	First Arrival.	Departure.
Cuckoo,		
Curlew,		
House-Swallow,		
Lapwing,		
Plover,		
Sand-Martin,		
Starling,		
Swan,		
Rail or Corn Crake,		
Other Birds, naming them—		

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.

METEOROLOGICAL RETURNS.

EDINBURGH.

21, Rutland Street,

Sec., Meteorological Society,

DR STARK,

To