

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N., Long. 2° 6' W., Height above Sea mean level 115 feet.
Distance from Sea 1 1/2 miles. During the MONTH of January 1860.

Days of Week.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS. under Ground.			Temperature of Spring or Well.	Temperature of Sea.	OZONE.	ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.		
		8 ⁴⁵ h. A.M.		9 h. P.M.		PROTECTED.		EXPOSED.		8 ⁴⁵ h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.										
		Barometer.	Attach- ed Ther- mometer	Barometer.	Attach- ed Ther- mometer	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.					3 inches.									12 inches.	22 inches.
																						inches.	"	inches.							"	"
	1	29.092	48	29.092		46.5	32			46.5	46																		1			
	2	28.954	45	28.954		48	33			42.5	41.5																		2			
	3	29.288	44	28.702	46	45	26			37.5	37																		3			
	4	28.652	49	28.652	44					39	38.5																		4			
	5	28.700	48	28.924	42	42	29			36	35																		5			
	6	29.324	43	29.950	41	38				36.2	34																		6			
	7	29.980	43	29.826	41	38	27			35.2	34.2																		7			
	8	29.808	41	30.070	41	40	28			37.5	37																		8			
	9	30.054	39	30.092	40	39.5	23			34.5	32.5																		9			
	10	30.116	37	30.190	38	31	21			29.5	29																		10			
	11	30.198	38	30.100	40	35	23			33.5	33																		11			
	12	30.110	43	30.150	44	40.5	29			40.2	39.5																		12			
	13	30.172	43	29.950	44	41	35			41.5	41																		13			
	14	29.938	44	29.662	45	44	34			40.5	40																		14			
	15	29.418	45	29.728	44	44	35			43.5	43																		15			
	16	29.772	44	29.960	42	45.5	28			35	34																		16			
	17	30.000	43	29.854	42	34.5	25			31	30																		17			
	18	29.770	40	29.588	43	38	26			37.5	36																		18			
	19	29.550	42	29.140	44	39	30			39	38.5																		19			
	20	29.100	43	28.850	42	41.5	30.5			40	39.5																		20			
	21	28.500	40	28.500	42	41	24.5			38	36.5																		21			
	22	28.670	43	28.882	43	40	29.5			37.8	37																		22			
	23	28.948	42	28.772	43	38	28			36	35																		23			
	24	28.440	44	28.650	43	39	25			37.8	37																		24			
	25	29.190	43	29.608	41	40	29			36	35																		25			
	26	29.714	40			36	18			26.5	25																		26			
	27	29.424	40			34	18			33	32																		27			
	28	29.850	41	29.508	39	32	18			28.5																			28			
	29	29.342	40	29.364	44	34	21			33.5	33																		29			
	30	29.236	41	29.408	32	37	28			37	34.7																		30			
	31	29.528	42	29.600		38	24			34.3	33.5																		31			
	Sums.	13788	1318	12725	1090	1180	1175			1345	1179																					
	Means.	29.477	42.5	29.439	41.9	39.3	26.8			36.6	35.9																					
	Index Errors.	-0.18		-0.18		+4	+1			-1	+1																					
	Correc- tion for Diurnal Range.																															
	Corrected Means.	29.459		29.421		39.7	26.9			36.5	36.0																					
	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.).....=
Diameter of tube _____ inch; correction for capillarity to be added.....+
Sum,..... 29.428
Correction for Temperature from Column No. 2 to be deducted.....= 0.037
Sum,..... 29.389
Mean of the above 29.404
Correction for Height above Sea-level, _____ feet, to add,..... 0.126
Barometer corrected and reduced to 32° and Sea-level, 29.530

Barometer, Highest observed reading of Month,.....= 30.198 on the 11th
Lowest do. do.,.....= 28.440 on the 24th
Difference, or Monthly Range,= 1.758

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),* 36.4
Wet bulb Thermometer (mean of Cols. 10 and 12),* 36.0
† Dew-point Temperature,..... 35.4
† Elastic Force of Vapour,..... 0.208
† Weight of Vapour in a Cubic Foot of Air,..... 2.485
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... 96

Highest Reading Self-Registering Thermometer in Air and Protected, 48.0 on the 2nd
Lowest do. do. do., 18.0 on the 28th
Difference, being Monthly Range, 30.0
Mean of Self-Registering Thermometers in Air and Protected, 39.3
Mean Daily Range in Air and Protected, 12.8
Greatest Daily Range, do., 19.0 on 3rd
Highest Reading Self-Registering Black Bulb Thermometer in Sun, on the
Lowest do. do. do. from Radiation during Night, on the

(Signed) Thomas David Gray
(Designation) Student

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 deducted. No Wax or Wafers ever to be employed in closing the Schedule—the Gunned Corner to be alone used.

Correction for index error and capillarity in one sum.

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.

SHRUBS, ETC.	FRUITS.	MIGRATORY BIRDS.	First in Spring.	First in Autumn.
Barberry,	Apple,	Cuckoo,		
Boulevard 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,		
Mezerion,	Strawberry,	Rail or Corn Crane,		
Mountain Ash or Rowan,	Other Birds, naming them,			
Red Flowering Currant,				
Rhododendron Ponticum,				
Viburnum,				

FOREST TREES.	In Leaf.	First in Spring.	First in Autumn.
Alder,			
Ash,			
Beech,			
Birch,			
Elm,			
Larch,			
Lime,			
Oak,			
Sycamore or Plane,			

CROPS.	Planting.	Harvesting.	First Cut.
Barley,			
Bare or Bigg,			
Oats,			
Wheat,			
Beans,			
Peas,			
Potatoes,			
Turnips,			
Rye Grass,			

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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, so 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 *quiet* *before nine o'clock morning and evening*, as the most convenient hour; but should this be inconvenient for the observer, another hour may be chosen, attending, however, to the above rule, that the evening and morning readings be taken at the same hour, and this hour entered on the Schedule.

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

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

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

Self-registering Thermometers and Hygrometers.—These should be placed alongside of each other, in a glass freely exposed to the air, but protected from sunlight, and from reflected heat, as well as from radiation and from wind, and as near as possible to the level of the ground surface of the ground. Differing by a few inches from the general surface of the ground, they may be placed in a corner-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 window-sate ventilated box with louver-boarded sides fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed (without the notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The **Self-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 readings, so that the temperatures marked by the float 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 thickened 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 thickened 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 not of wooden supports a few inches above the surface, and removed during the day.

Hygrometer.—The wet bulb requires the same covering, it to be open during the day, and the instrument to be in the country wherever the instrument seems to be from. The bulb should be covered with thin tissue of blotting paper below the muslin, and the string should always be thoroughly wetted, and freed from steam, before being used; and the cotton wick which conducts moisture to it should be previously soaked in a solution of washing soda, any than 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 "Plum's Rain Gauge" seem to possess several advantages over others, the Society gives the preference to them; but whatever form be employed, in order that all the stations may yield comparable results, it is recommended that the Gauge be sunk in the ground, so that the top of the receiver is nearly on a level with the top of the ground, in a place as distant as possible from trees, houses, high walls, and irregular or broken ground, and the quantity of rain should, if possible, be registered daily. When more than one rain Gauge is kept, they ought to be placed near each other, but at different heights above the ground, and their indications noted in the *general remarks*, mentioning their height above ground—the regular column in the Schedule being reserved for the ground rain Gauge alone.

Winds.—Isolated Wind-vanes or Weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, etc. Where low clouds are seen drifting along, their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular mirror fixed over the centre of a pocket compass, will, in general, give the true direction of the current of air near the earth's surface if these clouds are near and immediately overhead, 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 chimney or village, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction of the wind by reflection or otherwise. For note 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 dispersing clouds, it would be well to note in the General Remarks, any facts bearing on this point, for a few days (or nights, as the case may be) before and after every full moon, and the same observations ought to be made at the periods of new moon.

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

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

Temperature of the Sea.—As the meteorology of the island is incomplete without a knowledge of the mean temperature of the Ocean which surrounds it, the Society strongly recommends taking the temperature of the Sea at a depth of 6 feet or 1 fathom from the end of all piers or rocks round the coast, where free from the influence of river water, and as near as may be about the time of high water. A thermometer, with its bulb fixed in a small tin pichet covered with asbestos, 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, noting whether Spring or Well, and its depth from the surface. *Meters, Ayrton 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. *Metalliferous 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 noted.

Ozone.—Attention whether Schönbein's or Moffat's scale and papers are used. Schönbein's are preferred. They may be used at Messrs. Adie and Son's, 50, Princess Street, and at Mr. Bryson's, 60, Princess Street, Edinburgh.

Electricity.—Thin balls suspended by a thin 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. Etched glass or sealing-wax ascertains the nature of the electricity.

SE
EDINBURGH
FEB 2

EDINBURGH
FEB 22
1860
D

DR STARK,

Sec., Meteorological Society,

St. Andrew Square

EDINBURGH.

METEOROLOGICAL RETURNS.

ES.	Flower.	In Leaf.	Diseased or Leaves.	Barley, or Biscuit.	Oats,	Wheat,	Beans,	Pease,	Turnips,	Lye Grass,
Flowers.	In Leaf.	Diseased or Leaves.	Barley, or Biscuit.	Oats,	Wheat,	Beans,	Pease,	Turnips,	Lye Grass,	Flowers.
Flowers.	In Leaf.	Diseased or Leaves.	Barley, or Biscuit.	Oats,	Wheat,	Beans,	Pease,	Turnips,	Lye Grass,	Flowers.
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Distance from Sea 400 miles. During the MONTH of January 1860.

X Smelted iron
Rain for Jan 4. 75. Holes I have now placed
a Rain gauge in my garden in the west
end of the Eden since Jan 14. The funnel
is 8 inches diam & is surface stands
3 inches above the ground. W. & D. Smith
having removed from Wester Smelt
near Aberdeen the rain observations
there are no longer available

X Observed by W. & D. Smith at Ruben
Blackfield 1 mile W. of Aberdeen on an
open spring the surface of which is
3 feet under that of ground

SUMMARY OF THE WINDS.										
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	2	1	0	2	6	10	2	7	1	2.43
P.M.	2	2	0	3	6	7	6	6	1	2.65
	2	2	0	2	6	8	3	7	1	2.53

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

(Signed) Alex R Bruckshank
(Designation) 12 Rose St Aberdeen

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.

[illegible][illegible]

SP- SP- 11
1P 25 11 3B

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.

*How q. (Observation).—*Misstatements 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.

adjustable thickness; and use it in compact. 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. The verification 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 stem by twisting the instrument, and tapping it gently with the hand. If it cannot be thus expelled, the instrument is useless and must be replaced.

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

The *Self-Recording Thermometers* should be placed exactly horizontal. In the case of the ordinary maximum Thermometer, ventilated boxes with louver-boarded sides, fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed (without the notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The *matsumi*. Registering thermometry, 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.

Hygrometer.—The wet bulb requires the muslin covering it to be often changed. In towns once a month, or oftener, if the

weather is windy and the muslin gets foul; in the country where the muslin seems to be foul. The hull should be covered with thin tissue or blotting paper below the muslin, and the muslin should always be thoroughly wetted, and freed from wax, before being used; and the cotton wick which conducts moisture on 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 paid over the ice-bergs, so as to form a thin film from the ice on the margin, the evaporation from the ice going on from the main body.—As "Plumings's Rain Ganges" seem to possess several advantages over others, the Society gives the preference to them; but whatever form be employed, in order that all the sections may yield a comparable result, it is recommended that the Ganges be sunk in the ground, so that the top of the receiver is nearly on a level with the top, besides of *close cut pipe*, in a place as distant as possible from trees, houses, high walls, and irregular or broken ground, and the quantity of Rain should, if possible, be registered daily. When more than one Rain Gange 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*, the Soluble being reserved for the ground Rain Gange alone, in the manner already directed.

Winds.—Isolated and various. Weather-cocks are apt to give false indications of the general direction of the wind, in consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, &c. Where low clouds are seen drifting along their direction in reference to known objects, or as noted by means of a mirror on which a compass may be laid, or by means of a circular instrument 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. Fixing the clouds, the *shape* of the clouds, of the number of a hamlet, or village, or of a tall building, gives a better indication of the general direction of the wind than any wind-vane. The observers should state whether he has ascertained the direction by reflection or otherwise. For mode of estimating the force of the wind, see "Phenomena for Reading Instruments," but in all cases it is better to make use of Lind's Anemometer, as pointed at Messrs Adie and Sout'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 a sky wholly visible sky covered with cloud is 10. Clouds often cover three-fourths or even more of the visible sky without obstructing the sun, so that the indications noted in the column for the sun should not necessarily express, or agree with, the column for the sunshine. As the full moon, *so long as it shows the horizon*, is distinguished by some eminent circumstances to have a powerful effect in clearing the 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.

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

Memoranda under Ganges.—Though the temperature and hygrometric conditions of the air are those which chiefly influence the growth of crops, it is important, for the detail 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 6, 12, and 22 inches below the surface of the ground, to ascertain the temperature of what may be termed the agricultural soil; and the observations 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 of 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 same place every year. A thermometer, with its bulb fixed in a small piece of pitch, covered with a sloping lid, and with a weight attached, sunk to the required depth, and in thermuses drawn up and read.

Apparent instruments are furnished by Messrs Adie and Sout.

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.

Metors.—Among *Borealls*, *Remotable Depressions or Eruptions of Borealls*, *Remotable Falls of Rain*, *Hail on Snow*, *Thunder and Lightning*, &c., should be specially noticed, together with the exact hour at which they were first seen, their continuance, and direction.

Birding, Trapping, and Phenology of Trees.—It is necessary to enter in mind the varieties of the same species of trees widely seen in their times of bearing and flowering; *Adapted*, *Trees or Shrubs* in each kind should therefore be chosen (if possible early kinds), and their indications should be given noted—always the same plant from year to year being noticed.

Ganges.—Mention whether Schomburgk's or Moffat's scale and measures are used. Schomburgk's are preferred. They may be had of Messrs Adie and Sout's, 50, Princess Street, and at Mr. Davidson's, 60, Princess Street, Edinburgh.

Electricity.—Pith balls suspended by a linen thread, in communication with a metallic conductor, and under cover, and the degrees of a circle being used to express the degree of repulsion, from a glass and convenient Electrometer. Excited glass or sealing-wax, ascertains the nature of the electricity.

ABERDEEN
22
1860
D

10 St Andrews Square

EDINBURGH

METEOROLOGICAL RETURNS.

Abundant
July 1870

9th

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Height above Sea 115 feet.
 Distance from Sea 1 1/2 miles. During the MONTH of February 1880.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		THERMOMETERS. under Ground.			SEA.		ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.			
	8 1/2 h. A.M.		4 h. P.M.		PROTECTED.		EXPOSED.		8 1/2 h. A.M.		4 h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.	CLOUD.	SUNSHINE.	h. A.M.						Temperature.	Density.	OZONE.
	Barometer.	Attached Thermometer	Barometer.	Attached Thermometer	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ††	Direction.	Force ††					1 to 10	Hours.	3 inches.						
	Inches.		Inches.														days.	Inches.											
1	29.700	39	29.968	40	36	26			34.8	33.5																			
2	30.070	39	30.336	39	36	25			35	33																			
3	30.140	39	29.876	44	36	23			31.5	31																			
4	29.840	45	29.570	45	43.5	27			39.2	37																			
5	29.460	49	29.324	43	43	30			37	35																			
6	29.454	42	29.870	39	42	23			32.5	32																			
7	29.880	39	29.476	41	36	24			36	35																			
8	29.470	41	29.740	40	35	24			29.7	29.5																			
9	29.850	37	29.936	35	34	20			27.5	27																			
10	29.936	40	29.734	34	30	16			25.5	25																			
11	29.790	32	30.224	36	31	8			23.5	23																			
12	30.468	36	30.656	36	32	0			22.5	23																			
13	30.720	34	30.700	30	31	10			22.5	22																			
14	30.608	29	30.518	30	30.5	6			16.5	16																			
15	30.450	40	30.278	38	38.5	10			38.5	37.5																			
16	30.250	43	30.258	42	40	31			38.5	37.5																			
17	30.450	47	30.370	52	42	31			42	40.5																			
18	30.174	54	29.176		44	32.5			41.5	39																			
19	29.190	47	29.278	40		29			35	33.5																			
20	29.198	40	29.536	41	37	23			33.8	33.2																			
21	29.694	43	29.850	42	36	26			31.5	31																			
22	29.800	42	29.810	41	36	18			32.8	32.5																			
23	29.850	43	29.824	43	39.5	27.5			39.5	39																			
24	29.822	43	29.836	43	42	33			40.5	38.5																			
25	29.678	43	29.330	42	43	33			42	40																			
26	29.090	42	28.644	42	43	32			40.8	40.3																			
27	28.352	42	29.122	45	46	28			38.3	36.3																			
28	29.108	44	29.508	45	44	27			36.5	34.5																			
29	29.678	48	29.890	44	42	28.5			37.1	37.1																			
30																													
31																													
Sums.	29.799	41.4	29.836	40.0	38.2	23.2			33.9	32.9																			
Means.	29.799	41.4	29.836	40.0	38.2	23.2			33.9	32.9																			
Index Errors.	-.018		-.018		+.4	+.1			-.1	+.1																			
Correction for Diurnal Range.																													
Corrected Means.	29.781		29.820		38.6	23.3			33.8	33.0																			
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		

Scottish Meteorological Society
Observations taken at ~~Abnerr~~ county of Shropshire Height above the sea 115 feet. (Distance from the sea 1 1/2 miles Lat 53° 9' N. Long 2° 6' W)
During the month of February 1860

Wind	9 A.M. direction force	Wind	4 P.M. direction force	Rain	days on which it fell	Cloud	Sunshine	Temp.	of spring well	General Remarks
1	N 4	N 4			1	7	3	42	22	Snow. Thick sun
2	N 4	N 2.25			0	8	0	42		Snow.
3	W 0.25	W 1			0	9	0	42		
4	NW 0.25	W 0.25			0	3	7	42		
5	NW 4	NW 4			0	4	4	42		
6	NW 9.25	NW 4			0	8	3	42		Snow. Hail
7	W 0.25	SW 0.25			0	10	0	42		Snow.
8	NW 4	NW 4			0	7	3	41.5		Snow. S.W. Hail
9	NW 4.25	NW 4			0	8	3	41.5		Snow.
10	NW 2.25	NW 1			0	6	3	41.5		Aurora Borealis
11	Var. 0.25	Var. 0.25			0	7	3	41.5		Snow. Hail
12	SW 2.25	N 2.25			0	3	5	41.5		Snow. Aurora Borealis
13	W 0.25	W 2.25			0	2	2	41.5		
14	W 0.25	NW 1			1	7	3	41.5		Snow.
15	NW 4	NW 4			1	8	2	41.5		
16	NW 2.25	N 4			1	9	0	41.5		
17	NW 2.25	NW 4			1	7	5	41.5		
18	W 1	Var. 0.25			1	6	6	42		Aurora Borealis
19	NW 4	NW 1.6			0	7	4	42		Dark first heard singing
20	NW 9	N 4			1	9	1	42		Snow. Aurora Borealis
21	NW 2.25	NW 1.25			0	4	8	41.5		Aurora Borealis
22	SW 2.25	SW 4			0	8	4	41.5		Aurora Borealis
23	S 2.25	SW 2.25			1	9	1	41.5		
24	SW 4	SW 4			0	9	0	41.5		Solar halo
25	SW 4	SW 9			1	9	0	41.5		
26	SW 2.25	SW 4			1	8	6	41		
27	SW 4	NW 1.6			1	7	5	41		Sht
28	W 2.25	NW 2.25			1	6	4	41		
29	NW 4.25	SW 4			0	3	8	41		Snow. Hail

N NE E SE S SW W NW V 108.5 12 198 94 120.8
AN 2 0 0 0 0 1 6 6 13 1
DU 5 0 0 0 0 7 3 12 2
4.0 0 0 0 0 1 6 4 12.2
V.M. Force 2.92 3.44 3.33 mean
P.M. 3.44 3.33 mean
mean snow 2.1 inches

108 having received a supply of 1860 and obliged to send the old in this form 12 Rose Street &c

Scottish Meteorological Society.
 Observations taken at Aberdeen, County of Aberdeen, Height above the sea 115 feet. (Distance from the sea 1 1/2 miles Lat 57° 9' N, Long 2° 6' W)
 During the month of February 1880

Day	Wind direction	Force	Wind direction	Force	Rain	Cloud	Direction	Temp.	General Remarks
1	N	4	N	4		7	3	42	Clear. Windy day
2	N	4	N	2.5	0	8	0	42	Snow.
3	W	0.25	W	1	0	9	0	42	
4	NW	0.25	W	0.25	0	3	7	42	
5	NW	4	NW	4	0	4	4	42	
6	NW	9.5	NW	4	0	8	3	42	Am. Frost
7	W	0.25	SW	0.25	0	10	0	42	Snow.
8	NW	4	NW	4	0	7	3	41.5	Snow. S. in Frost
9	NW	4.5	NW	4	0	8	3	41.5	Snow.
10	NW	2.25	NW	1	0	6	3	41.5	Aurora Borealis
11	Var.	0.25	Var.	0.25	0	7	3	41.5	Snow. Frost
12	SW	2.25	N	2.25	0	3	5	41.5	Snow. Aurora Borealis
13	W	0.25	W	2.25	0	2	8	41.5	
14	W	0.25	NW	1	1	7	3	41.5	Snow.
15	NW	4	NW	4	1	8	2	41.5	
16	NW	2.25	N	4	1	9	0	41.5	
17	NW	2.25	NW	4	1	7	3	42	Aurora Borealis
18	W	1	Var.	0.25	1	6	6	42	Dark first heard singing
19	NW	4	NW	4	0	7	4	42	Snow.
20	NW	9	N	4	1	9	1	42	Snow. Aurora Borealis
21	NW	2.25	NW	0.25	0	4	8	41.5	Aurora Borealis
22	SW	2.25	SW	4	0	8	4	41.5	Aurora Borealis
23	S	2.25	SW	2.25	1	9	1	41.5	
24	SW	4	SW	4	0	9	0	41.5	Solar halo
25	SW	4	SW	9	1	9	0	41.5	
26	SW	2.25	SW	4	1	8	6	41	
27	SW	4	NW	1.6	1	7	3	41	Sleet
28	W	2.25	NW	2.25	1	6	4	41	
29	NW	4.5	SW	4	0	3	8	41	Snow. Frost

Sum of column 12 = 108.5
 Sum of column 13 = 198
 Sum of column 14 = 97
 Sum of column 15 = 120.8
 Sum of column 16 = 41.6
 Sum of column 17 = 3.33 mean
 Sum of column 18 = 3.74
 Sum of column 19 = 3.33 mean
 Sum of column 20 = 3.74
 Sum of column 21 = 3.33 mean
 Sum of column 22 = 3.74
 Sum of column 23 = 3.33 mean
 Sum of column 24 = 3.74
 Sum of column 25 = 3.33 mean
 Sum of column 26 = 3.74
 Sum of column 27 = 3.33 mean

Barometer, mean corrected reading of Column No. 1 (A.M.), = 29.781 Column No. 3 (P.M.), = 29.820
 Diameter of tube inch; correction for capillarity to be added, + 0.018 Capillarity, = + 0.018
 Sum, = 29.799 Sum, = 29.836
 Correction for Temperature from Column No. 2 to be deducted, = 0.034 Temp. from Col. 4, = 0.031
 Sum, = 29.765 Sum, = 29.805
 Mean of the above = 29.768
 Correction for Height above Sea-level, feet, to add, = 12.6
 Barometer corrected and reduced to 32° and Sea-level, = 29.894

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

Dry bulb Thermometer (mean of Cols. 9 and 11), = 33.8 Highest Reading Self-Registering Thermometer in Air and Protected, = 46.0 on the 27th
 Wet bulb Thermometer (mean of Cols. 10 and 12), = 33.0 Lowest do. do. do., = 0.0 on the 12th
 † Dew-point Temperature, = 31.6 Difference, being Monthly Range, = 46.0
 † Elastic Force of Vapour, = 1.78 Mean of Self-Registering Thermometers in Air and Protected, = 31.0
 † Weight of Vapour in a Cubic Foot of Air, = 2.04 Mean Daily Range in Air and Protected, = 15.3
 † Additional Weight required to Saturate a Cubic Foot, = 91 Greatest Daily Range, do., = 32.0 on the 12th
 † Degree of Humidity (Saturation 100), = 91 Highest Reading Self-Registering Black Bulb Thermometer in Sun, = 32.0 on the 12th
 Lowest do. do. from Radiation during Night, = 32.0 on the 12th

(Signed) Thomas David Gray
 (Designation) Student

†† In the above columns for the registration of the Force of the Wind, may be entered the number of revolutions, by Professor Robinson's Cup
 * If the readings are taken at 9° and 3°, the 9° 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.
 * Index error and Capillarity in one sum
 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.

[illegible]

FOREST TREES.	In flower.	Leaf buds first appear.	In leaf.	Divested of leaves.	CROPS mentioning variety.	Sowing or planting.	Appearing or above ground.	In ear.	First cut.
Alder,					Barley,				
Ash,					Bare or Brier,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Pears,				
Lime,					Potatoes,				
Oak,					Tumpps,				
Sycamore or Plane,					Rye Grass,				

60
MR 4
S M
EDINBURGH

Those persons who kindly furnish Monthly Tables of 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 recommend 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. Airs and Son's construction are recommended; but any instruments may be used which are adjustable surfaces, and have been compared. Before the 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 until silver appears from the vertical position, when, if we see from air, the mercury will strike against the upper end of the tube with a sharp tap. The mercury should then be completely fill the tube. If any air has got admittance, it should be driven into the stem by turning the instrument, and then 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 Royal Society 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 *readings of*, and the corrections *only applied to the mean for the month.*

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

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

The maximum Registering Thermometer, for taking the extreme part of the sun's rays, should have its bulb blacked, and the surface protected with oil, 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 recording the lowest temperature during the night from radiation, should have its bulb similarly blacked and vented with oil, and be similarly mounted. It should be laid out, about sunrise, 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 dry, and the muslin gets foul; in the country always be thoroughly wetted, and freed from starch, before being used; and the cotton wick which conducts moisture to it should be thoroughly wetted, else it will conduct the moisture imperfectly, and yield false results. The cotton wick is best attached by passing its extremity through an aperture in the centre of the muslin, spreading that portion out so as to apply equally round the bulb, and then tying the muslin over, the wick only, so as to form a thin film of ice on the muslin, the evaporation, to the ice going on as from the simply wetted bulb.

[illegible]

Thermometers under Ground.—Along 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, 15, and 22 inches below the surface of the ground, to ascertain the temperature of what may be termed the agricultural soil, and the temperature of the *subsoil*, or the *stratum* beneath the *limb* 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 the water and as near as may be about the time of high water. A *Thermometer*, with its bulb fixed in a small tin plate, covered with a sloping lid, and with a weight attached, is adapted to be lowered to any depth, and in ten minutes drawn up and read.

The density of the sea water should, if possible, be taken at the same time. Conventional instruments are furnished by Messrs Smith and Son.

papers are used. Schenck's are preferred. They may be had of Messrs. Adie and Sott, 60, Princess Street, and at Mr. Bryson, 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. Exposed glass or sealing-wax ascertains the nature of the electricity.

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Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Height above Sea 115 feet.
Distance from Sea 1/2 miles. During the MONTH of March 1860

[illegible]

Barometer, mean corrected reading of Column No. 1 (A.M.),.....=	Column No. 3 (P.M.),.....=
Diameter of tube _____ inch; correction for capillarity to be added,.....+	Capillarity,.....= +
Sum,..... <u>29.544</u>	Sum,..... <u>29.554</u>
Correction for Temperature from Column No. 2 to be deducted,.....= -	Temp. from Col. 4,.....= -
Sum,..... <u>29.497</u>	Sum,..... <u>29.512</u>
Mean of the above	<u>29.504</u>
Correction for Height above Sea-level, _____ feet, to add,.....	<u>12.6</u>
Barometer corrected and reduced to 32° and Sea-level,	<u>29.630</u>
Dry bulb Thermometer (.....)	

[illegible]

Dry bulb Thermometer (mean of Cols. 9 and 11),*	39.5	37.4
Wet bulb Thermometer (mean of Cols. 10 and 12),*	37.0	37.0
† Dew-point Temperature,	23.8	36.4
† Elastic Force of Vapour,	194	215
† Weight of Vapour in a Cubic Foot of Air,	2.25	2.56
† Additional Weight required to Saturate a Cubic Foot,		
† Degree of Humidity (Saturation 100),	80	96

Highest Reading Self-Registering Thermometer in Air and Protected,	55.0	on the	18th
Lowest do. do. do.,	23.0	on the	10th
Difference, being Monthly Range,	32.0		
Mean of Self-Registering Thermometers in Air and Protected,	36.1		
Mean Daily Range in Air and Protected,	15.0		
Greatest Daily Range, do.,	23	on the	18th
Highest Reading Self-Registering Black Bulb Thermometer in Sun,		on the	
Lowest do. do. do. from Radiation during Night,		on the	

(Signed) Thomas David Gray
(Designation) Student

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 deducted. No Wax or Wafers ever to be employed in closing the Schedule—the Gummied Corner to be alone used.

Correction for Index error and capillarity in one sum

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

Hour of observation.—Altimeters 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.

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 instrument should then completely fill the tube. If any air has got admittance, it must be driven into the stem by reversing the instrument, and then trapping it gently with the hand. If a good test be thus applied, 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 any 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, is 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 the 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, page 18. The daily readings of the barometer ought to be entered on the *Schreibelle* as read, and the corrections only applied to the mean for the month. *Self-Registering Thermometers* and *Hygrometers*.—These should be placed alongside of each other, in a place freely exposed to the air, and protected from sunshine, and from reflected heat, as well as from radiation and from rain, and as near as may be *just* above the ground. From the general surface of the ground, thermometers are used for this purpose, either a double ventilated box with louver-boarded sides, fixed at its north window, and projecting 13 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-stick ventilated box with louver-boarded sides, fixed in an exposed place, and if possible over grass. Whatever means are finally decided on, the position of the instruments should be mentioned, and should not be changed (without the notice being given to the Secretary), in order that the results of one month's observations may be strictly comparable with those of another.

The *Scientific* 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 raised by the force of gravity in pushing forward the float or the column. In the case of the minimum Thermometer, the bulb should not 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, which read once a-day, should *always be read on the evening*, so that the temperature marked on the floats indicate the minimum and the maximum of the day in which the reading is taken. N.B.—The readings of these instruments are taken from that extremity of the tube which is nearest the head of the column of mercury or of spirit.

The minimum. Registering Thermometry for ascertaining the lowest temperature during the night from radiation, should have been similarly blackened and reddened clay, and be similarly mounted. It should be put out about sunset, over grass, in a place fully exposed to the sky, but raised on wooden supports a few inches above the surface, and removed during the day.

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

on from the ice going on as from the simply wetted bulb.

SHRUBS, ETC.	Barberry,	
	Broom,	
	Bourtree or Elder,	
	Cherry,	
	Cornus,	
	Geoseberry,	
	Hawthorn,	
	Holly,	
	Lavender,	
	Lilac,	
	Mazoeon,	
	Mountain Ash or Rowan,	
	Red Flowering Currant,	
	Rhododendron Ponticum,	
	Viburnum,	
Fruit in Blossom.	Apple,	
FRUIT-TREES.		
Fruit in Blossom.	Black Currant,	
	Cherry,	
	Cornus,	
	Geoseberry,	
	Peach,	
	Pear,	
	Plum,	
	Strawberry,	
Fruit ripe generally.	Cuckoo,	
	Curlew,	
	House-Swallow,	
	Lapwing,	
	Plover,	
	Sand-Martin,	
	Starling,	
	Swan,	
	Rail or Corn Crake,	
	Other Birds, naming them—	
MIGRATORY BIRDS.		
First Arrival.		
Departure.		

Turnips, Prunels, etc., whether planted or in pasture; and the Agricultural condition of the district generally. Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Wheat, etc., whether planted or in pasture, and the Agricultural condition of the district generally.

EDINBURGH.

10 St Andrews Square ~~21, Bedford Street,~~

 T_G

~~DR STARK,~~

A. H. Burgess Esq.

Harder
March 16

Acrocom
no 1

151

, in Lat. $57^{\circ} 9' N$, Long. $2^{\circ} 6' W$, Distance from Sea 2 miles

During the MONTH of *March.*

186 *J*

The Hours of Observation are of Greenwich Time.

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb,											
Mean (corrected) A.M. and P.M. Reading of Wet Bulb,											
†† Computed Temperature of Dew-point,											
†† Do. Elastic Force of Vapour,											
†† Do. Weight of Vapour in a Cubic Foot of Air, ... =											
†† Relative Humidity, (Saturation = 100)..... =											
RAIN fell on 21 Days; Amount in Inches, = 2.45											

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	1	0	1	0	0	16	6	7	0	1.53	
P.M.	2	4	0	0	4	7	4	10		1.8	

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gumm'd or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by } Alex Cruckshank

(Signed) Alex Bruckshank 12 Rox St Herndon

Observations on the Well Rubistan Bleachfield
by Alex^r D. Milne Rubistan CB

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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Height above Sea mean level of 115 feet.
Distance from Sea 1 1/2 miles. During the MONTH of April 1880.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS. under Ground.			SEA. Temperature.	OZONE.	ELECTRICITY.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.
	8 ⁴⁵ A.M.		9 ¹⁵ P.M.		PROTECTED.		EXPOSED.		8 ⁴⁵ A.M.		P.M.		A.M.		P.M.		Days on which it fell.	Amount.			A.M.							
	Barometer.	Attached Ther- mometer	Barometer.	Attach- ed Ther- mometer	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ††	Direction.	Force ††					3 inches.	12 inches.	22 inches.					
	Inches.		Inches.																									
1	28.356	49	28.930	48	48	35			47.7	44.3																	1	
2	28.970	52	29.076	49	50	27.5			41	38.5																	2	
3	29.172	49	29.576	50	47	25			37	36.5																	3	
4	29.202	52	30.056	49	46.5	31			41	37.5																	4	
5	30.114	52	29.980	49	45	29			41.5	37																	5	
6	29.894	51	29.722	48	44	27			42	40																	6	
7	29.606	52	29.450	51	47	31			45	42																	7	
8	29.376	48	29.062	47	49	31			43.5	41.5																	8	
9	29.138	50	29.414	47	48.5	26			37	33																	9	
10	29.760	48	30.002	45	42	27			37.5	34																	10	
11	30.088	48	30.116	45	40	27			39.5	35.5																	11	
12	30.118	47	29.968	46	45	23			39	35.5																	12	
13	30.042	47	30.302	46	45	32			41.5	41																	13	
14	30.384	48			42	25			40.5	38.3																	14	
15	30.440	53	30.452	48	45	31.5			43.5	40.5																	15	
16	30.534	51	30.544	48	46	36			44.5	42.7																	16	
17	30.534	52	30.452	47	47	34			42.5	41																	17	
18	30.426	50	30.310	44	47	36			44	40.5																	18	
19	30.200	49	30.024	49	45	35			43.5	39																	19	
20	29.910	47	29.764	49	48.5	31			38.7	35.3																	20	
21	29.666	50	29.860	49	42	27			40.5	37.5																	21	
22	29.682	51	29.690	53	43	27			40.5	36.5																	22	
23	29.754	54	29.824	53	44	25			41.3	39.3																	23	
24	29.986	53			43	29			42	39.5																	24	
25	30.112	55	30.196	57	47	27			46.5	41.5																	25	
26	30.250	56	30.284	50	52	35			44.3	41.7																	26	
27	30.324	52	30.324	49	46	26			44.5	41.5																	27	
28	30.294	55	30.208	45	47	29			43.3	39.7																	28	
29	30.212	54	30.180	48	48	35			47.5	44																	29	
30	30.326	56	30.474	60	52	39			51.3	44.3																	30	
31																											31	
Sums.	1211 11	1551	1159 11	15	15	15			1210 11	1181 11																		
Means.	29.923	51.0	29.938	47.1	46.0	29.9			42.3	39.5																		
Index Errors.	-0.018		-0.018		+4	+1			-1	+1																		
Correc- tion for Diurnal Range.†																												
Corrected Means.	29.905		29.920		46.4	30.0			42.6	39.6																		
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.),.....																												

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

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

Diameter of tube 1/16 inch; correction for capillarity to be added.....+

Capillarity.....= +

Sum..... 29.905Sum..... 29.920

Correction for Temperature from Column No. 2 to be deducted.....= -

Temp. from Col. 4.....= -

Sum..... 29.847Sum..... 29.840Mean of the above..... 29.856

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

1.26

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

29.9822Dry bulb Thermometer (mean of Cols. 9 and 11),*..... 42.6Wet bulb Thermometer (mean of Cols. 10 and 12),*..... 39.6† Dew-point Temperature..... 36.0† Elastic Force of Vapour..... 2.12† Weight of Vapour in a Cubic Foot of Air..... 2.46

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

† Degree of Humidity (Saturation 100),..... 78

†† In the above columns for the registration of the Force of the Wind, may be entered the number of revolutions, by Professor Robinson's Cup

* Wind Gauge, which registers the velocity of the Wind—540 revolutions being equal to one statute mile.

† If the readings are taken at 9° and 3°, the 9° readings to be alone taken to account, as the correction for Diurnal Range in Scotland is unknown.

† All these calculated from Ghilshier's Hygrometric Tables, Second Edition only.

† The Diurnal Range for Scotland is as yet unknown.

Barometer, Highest observed reading of Month.....= 30.524 on the 16thLowest do. do.....= 28.556 on the 1stDifference, or Monthly Range,.....= 1.968

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

Highest Reading Self-Registering Thermometer in Air and Protected,..... 52.4 on the 30thLowest do. do..... 23.1 on the 12thDifference, being Monthly Range..... 29.3Mean of Self-Registering Thermometers in Air and Protected,..... 38.2Mean Daily Range in Air and Protected,..... 16.4Greatest Daily Range, do.,..... 22.5 on the 2nd

Highest Reading Self-Registering Black Bulb Thermometer in Sun,..... on the

Lowest do. do..... on the

from Radiation during Night,..... on the

(Signed) Thomas David Gray(Designation) Student

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.

Correction for Index error and capillarity in one sum

SCOTTISH METEOROLOGICAL SOCIETY.

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Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 2 miles.Height of Cistern of the Barometer above Mean Sea-level _____ feet, above Ground _____ feet, During the MONTH of April 1860.

The Hours of Observation are of Greenwich Time.

ELECTRICITY	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.				CLOUDS.				THERMOMETERS.				SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.		P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		Barometer, No.	Atmospheric Thermometer	Barometer, No.	Atmospheric Thermometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No. of hours in which it fell.	Amount in inches.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. 1.	No. 2.	No. 3.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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NOTATION USED IN GENERAL REMARKS.

a.	aurora.	m.	meteor.
cl.	clouds.	ms.	meteors.
cl-cu.	cirro-cumulus.	n.	nimbus.
cl-s.	cirro-stratus.	r.	rain.
cu.	cumulus.	h. r.	heavy rain.
cu-s.	cumulo-stratus.	c. h. r.	continued heavy rain.
d.	dew.	s.	stratus.
f.	fog.	sc.	scud.
fr.	frost.	sl.	sleet.
h-fr.	hoar-frost.	sn.	snow.
h.	haze.	so. h.	solar halo.
h. d.	heavy dew.	sq.	squall.
h. l.	light drizzle.	sq. s.	squalls.
l.	light rain.	t.	thunder.
h. el.	light ebullitions.	t. s.	thunder-storm.
h. sh.	light showers.	w.	wind.
h. cu.	large cumulus.	g.	gale of wind.
h. h.	large hail.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-10.	Common Designation.	Estimated Force, 0-10.	Common Designation.	Estimated Force, 0-10.	Common Designation.
0	Calm	1.5	Light breeze	4	Blowing hard
0.5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† = _____
for Temp. (Col. 2), = _____"Corrected Mean" of Barometer at 9 P.M., minus the Correction† = _____
for Temp. (Col. 4), = _____

Mean at Station, corrected, and at 32°, = _____

Correction for Height, _____ feet, above Mean Sea-level, = _____

Mean, reduced to 32°, and Sea-level, = _____

Highest Reading, corrected for Index error, on the _____ th, = _____

Lowest Do., _____ Do., _____ on the _____ th, = _____

Difference, or Monthly Range, = _____

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the _____ th, = _____

Lowest in Month, corrected for Index errors, on the _____ th, = _____

Difference, or Monthly Range, = _____

"Corrected Mean" of all the Highest, (Col. 5), = _____

"Corrected Mean" of all the Lowest, (Col. 6), = _____

Difference, or Mean Daily Range, = _____

** Calculated Mean Temperature of Month, = _____

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index errors), on the _____ th, = _____

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = _____

Lowest at Night, Black Bulb, (corrected for Index errors), on the _____ th, = _____

"Corrected Mean," (Col. 8), of Black Bulb Min. on the _____ th, = _____

Difference of above Means or Range ("exposed"), = _____

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = _____

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = _____

†† Computed Temperature of Dew-point, = _____

†† Do. Elastic Force of Vapour, = _____

†† Do. Weight of Vapour in a Cubic Foot of Air, = _____

†† Relative Humidity, (Saturation = 100), = _____

RAIN fell on 12 Days; Amount in Inches, = 1.30

WIND.		SUMMARY.			
Direction.		N	NE	E	SE
A.M.		6	5	2	4
P.M.		3	4	3	4
Mean.		4.5	4.5	2.5	4

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by(Signed) Alex^r Cuckshank 12 Rose St. Aberdeen

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Height above Sea mean level 115 feet.
Distance from Sea 1 1/2 miles. During the MONTH of May 1860.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUD.	SUNSHINE.	THERMOMETERS, under Ground.			SEA.	OZONE.	ELECTRICITY.	GENERAL REMARKS, As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, etc. Mention the hour at which these began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
	8-45 h. A.M.		9 h. P.M.		PROTECTED.		EXPOSED.		8 1/2 h. A.M.		h. P.M.		h. A.M.		h. P.M.		Days on which it fell.	Amount.			h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Highest in Air.	Lowest in Air.	Max. Black bulb in Sun.	Min. Black bulb during Night.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force ††.	Direction.	Force ††.					3 inches.	12 inches.	22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
	Inches.		Inches.															days.			inches.	1 to 10	Hours.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

Barometer, mean corrected reading of Column No. 1 (A.M.),.....=.....
Diameter of tube..... inch; correction for capillarity to be added,.....+.....
Sum,..... 29.783
Correction for Temperature from Column No. 2 to be deducted,.....=-..... 0.076
Sum,..... 29.707
Mean of the above..... 29.696
Correction for Height above Sea-level,..... feet, to add,..... +1.26
Barometer corrected and reduced to 32° and Sea-level,..... 29.822

Column No. 3 (P.M.),.....=.....
Capillarity,.....=+.....
Sum,..... 29.758
Temp. from Col. 4,.....=-..... 0.074
Sum,..... 29.684

Barometer, Highest observed reading of Month,.....= 30.516 on the 1st
Lowest do. do.,.....= 29.184 on the 8th
Difference, or Monthly Range,.....= 1.332

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

Dry bulb Thermometer (mean of Cols. 9 and 11),..... 57.4
Wet bulb Thermometer (mean of Cols. 10 and 12),..... 47.2
† Dew-point Temperature,..... 42.9
† Elastic Force of Vapour,..... .277
† Weight of Vapour in a Cubic Foot of Air,..... 3.12
† Additional Weight required to Saturate a Cubic Foot,.....
† Degree of Humidity (Saturation 100),..... 73

Highest Reading Self-Registering Thermometer in Air and Protected, 65.5 65.5 on the 20th
Lowest do. do. do., 29.0 32.0 on the 8th
Difference, being Monthly Range,..... 36.5 33.5
Mean of Self-Registering Thermometers in Air and Protected,..... 48.6
Mean Daily Range in Air and Protected,..... 19.4
Greatest Daily Range, do.,..... 29.0 on the 31st
Highest Reading Self-Registering Black Bulb Thermometer in Sun,..... on the
Lowest do. do. from Radiation during Night,..... on the

(Signed) Thomas David Gray A.M.
(Designation).....

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

* Correction for Index error and capillarity in one sum

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. A. & S. and Sorby'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 holding 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 and must be replaced.

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

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

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

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

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

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

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

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

Winds.—Isolated Wind-vanes or Weather-cocks are apt to give false indications of the general direction of the wind, consequence of the currents of air at the surface of the ground being so much influenced by the neighbourhood of hills, valleys, buildings, etc. When four or five 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, with, 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. Rating the clouds, the general direction of the smoke of a chimney, or of a tall chimney, gives a better indication of the general direction of the wind than any wind-vane. The observer should state whether he has ascertained the direction by reflection or otherwise. For mode of estimating the force of the wind, see "Directions for Reading Instruments." Lind's Anemometer is commonly used for this purpose, but the best Anemometer of moderate price yet invented is Professor Robinson's Cup Wind Gauge, which registers the velocity of the wind—540 revolutions of the cups, as registered by the instrument, being equal to one statute mile.

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

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

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

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

Planting, 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.

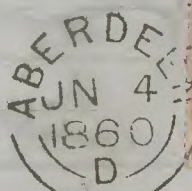
Ozone.—Mention whether Schomburgk's or Moffat's scale and papers are used. Schomburgk's are preferred. They may be had at Messrs. Alder and Son's, 40, Princess Street, and at Mr. Bryson's, 60, Princes Street, Edinburgh.

Electricity.—Pith balls suspended by a linen thread, in connection with a metallic conductor, and under cover, and the degree 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.

Table with 4 main sections: SHRUBS, ETC.; FRUITS; MAGNATORY BIRDS; and FOREST TREES. Each section has columns for 'In flower', 'In leaf', and 'First in blossom'. The table lists various plants and birds, such as Sycamore, Oak, Elm, Birch, Ash, Alder, etc., and includes a section for 'MAGNATORY BIRDS' with columns for 'First in blossom', 'In flower', and 'In leaf'.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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.

Sec., Meteorological Society,

10 St. Andrew's Square, 21, Randolph Street,

EDINBURGH.

A. H. Burgess Esq.

To

Aberdeen

Aberdeen May 1860

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Aberdeen*County of *Aberdeen*in Lat. $57^{\circ} 9' N$, Long. $2^{\circ} 6' W$, Distance from Sea $1\frac{1}{2}$ miles.

159

Height of Cistern of the Barometer above Mean Sea-level

feet, above Ground *115*—feet.During the MONTH of *May*186*0*

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.					
		9 h. A.M.		9 h. P.M.		Protected, in Shade, & feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	Velocity (0-10), and Direction.	Amount (0-10), and Direction.	Velocity (0-10), and Direction.	Amount (0-10), and Direction.	9 h. A.M.							Temperature of Well, & Depth of 3 feet. No.	Transparency at 1 mile, and Density.	9 A.M. 9 P.M.		
		Barometer. † No.	Attached Ther- mometer.	Barometer. No.	Attached Ther- mometer.	Max. No.	Min. No.	Max. in Sun's ray. No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direc- tion.	Force.	Direc- tion.	Force.							No.											
																								3 inches.	12 inches.	22 inches.									
		Inches.		Inches.																															
	1													SW	0.5	SW	2				1														
	2													NE	0.5	E	1				1														
	3													E	1	S	1.5				1														
	4													NE	2	E	2				9														
	5													NE	1	NE	1				8														
	6													NE	1	SE	1.5				6														
	7													SE	1.5	SE	2				9														
	8													S	1.5	S	2				9														
	9													SW	2	SW	3				10														
	10													SW	1.5	SW	2				2														
	11													E	0.5	SE	0.5				3														
	12													SW	0.5	N	0.5				7														
	13													NE	1.5	NE	1.5				8														
	14													NE	1	SE	1.5				8														
	15													SE	2	SE	2				9														
	16													SE	1	S	1				10														
	17													SE	1	SE	1				7														
	18													SW	2	SE	1.5				7														
	19													SW	1.5	NE	1.5				8														
	20													N	1.5	SE	1.5				4														
	21													SW	2	SW	3				4														
	22													SW	2	SW	2				4														
	23													SW	3	W	2				8														
	24													SW	2	NW	1				8														
	25													SW	2	SW	2				9														
	26													SW	1.5	SW	2				4														
	27													NW	3	NW	2				3														
	28													NW	1.5	S	0.5				5														
	29													NW	1	S	0.5				8														
	30													NW	1.5	E	1.5				8														
	31													SE	1.5	SE	1.5				3														
Sums.																																			
Means.																																			
* Total Corrections for Instrumental Errors.																																			
† Corrections 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	28	29	30	31			

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†)

10-2 THERMOMETER

NOTATION USED IN GENERAL REMARKS.

a.	densest fog.	ms.	drizzle.	ms.	drizzle.
ch.	clouds.	u.	clouds.	u.	clouds.
cl.	clouds.	u.	clouds.	u.	clouds.
cu.	cumulus.	h. r.	heavy rain.	h. r.	heavy rain.
cu.	cumulus.	sc.	scattered.	sc.	scattered.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.
cu.	cumulus.	st.	stratus.	st.	stratus.

BAROMETER, “corrected Mean” at 9 A.M., minus the Correction† =
for Temp. (Col. 2), =
“Corrected Mean” of Barometer at 9 P.M., minus the Correction† =
for Temp. (Col. 4), =
Mean at Station, corrected, and at 32°,
Correction for Height, feet, above Mean Sea-level,
Mean, reduced to 32°, and Sea-level,
Highest Reading, corrected for Index error, on the th,
Lowest Do., Do., on the th,
Difference, or Monthly Range,
* Each instrument tested at the Office in Edinburgh bears the stamp “S.M.S.,” and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† Enabling corrections for both capillarity and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ Practically, though not absolutely, a minus correction.
|| These “Hygrometrical Deductions” are calculated from Glaisher’s Hygrometrical Tables, Second Edition only.
¶ While the Diurnal Range is unknown, the Arithmetical Mean of Col. 5 and 6 will be entered as the “Calculated Mean Temperature.”
Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column must be marked as such by the Observer, in each Schedule. See over.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the th,
Lowest in Month, corrected for Index errors, on the th,
Difference, or Monthly Range,
“Corrected Mean” of all the Highest, (Col. 5),
“Corrected Mean” of all the Lowest, (Col. 6),
Difference, or Mean Daily Range,
* Calculated Mean Temperature of Month,
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the th,
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun,
Lowest at Night, Black Bulb, (corrected for Index errors), on the th,
“Corrected Mean,” (Col. 8), of Black Bulb Min. on the th,
Difference of above Means or Range (“exposed”),
N.B.—The Sums to be correctly added, and the Means deduced. Returns from the “Principal Towns” should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb,
Mean (corrected) A.M. and P.M. Reading of Wet Bulb,
†† Computed Temperature of Dew-point,
†† Do. Elastic Force of Vapour,
†† Do. Weight of Vapour in a Cubic Foot of Air,
†† Relative Humidity, (Saturation = 100),
RAIN fell on 17 Days; Amount in Inches,
WIND, SUMMARY.

Direction.	N	NE	E	SE	S	SW	W	NW	Calculated Force, Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	1	6	2	5	1	12	0	4	0	1.48	
P.M.	1	6	2	5	1	12	0	4	0	1.48	
Mean.	1	6	2	5	1	12	0	4	0	1.48	

Observations made and Return verified by

Alexander Crumckshank
12 Rose St. Aberdeen(Signed) *SE*

17th May 3.44 P.M. In the woods of Countesswells five miles West of Aberdeen a Spruce fir tree about thirty years old and about 1 1/2 feet diameter at the base was struck by the lightning. The upper half of the tree was broken across and lay upon the ground partly attached by splinters to the rest of the trunk. The lower half of the tree was charred in bits from the very centre some of the splinters detached from the trunk were two to three feet long and three or four inches in diameter, some of the splinters were charred every joint of the tree & others were driven to the tops of the neighbouring trees.

27th May On the morning of the 27th between 9.30 A.M. & 11 A.M. there was a very bright Solar Halo in a stratum of very light crystalline clouds coming very rapidly from the South-East while large detached cumuli clouds were coming very rapidly from the North-West. The force of the wind being 4 to 5 from the North-West.

ONE of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock, (Greenwich or Railway Time only), twice a-day for some, and once, (morning or evening), for other instruments, as specified in the following remarks, or at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers in some few cases may find this impossible; in such instances they are specially requested to mark opposite every Reading at what time it was taken, if not at 9 o'clock.

Barometer.—*Weather-glasses* and *Aneroids*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of *adjustment* or *compensation* as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

Two moderate-sized Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no *adjustment* of the cistern. Its *scale-inches* are not true inches, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather; and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; their co-incidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *edge-line* on this little piston-rod is brought, by the adjusting screw, to form a straight line with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *seize* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern upmost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a good *light*, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the Sun's direct rays nor the heat of a fire.

In taking an *Observation*, the attached Thermometer is first noted: the tube must then be gently tipped and the cistern-adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the *vernier*, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly, so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The lids forming the sides and doors of the Boxes are arranged so as to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's *Latent "Maximum"* Thermometers are recommended; primed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maximum*." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper globe, and must be dislodged from thence by heating the part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly downwards, rather than the other.

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays and the least from radiation during night. Their bulbs have a black coating, which may easily be made, or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Maximum*" should be freely exposed to the Sun, and the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat, to affect the alcohol by distillation.

Vernification of Thermometers.—No instrument ought to be used for Meteorological purposes that has not been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are not graduated, on the stem, but merely on an attached scale, undergoing repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "*Minimum*," Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube), ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested Fierometer may be had, on loan, by any observer, from the Meteorological Secretary.

The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—

The bulbs must hang down by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water-cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the framed-out requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—33.5°, 40.0°, or 40.1°; or again, 40.3°, 40.3°, or 40.4°, according as it indicates a little under, an exact coincidence with, or a little over 40°; or 40.5°, 40.5°, or 40.6°, according as it indicates a little over, an exact coincidence with, or a little over 40.5° respectively. So also 40.4°, and 40.7°, or 40.8° respectively. In reading Rutherford's "*Max.*" and "*Min.*" Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 A.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

Wind.—A wind-vane ought to be elevated 12 feet at least, above surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke; etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation pursued at different Stations, would be likely to give highly interesting and important results.

The Council would strongly recommend that every Observatory be furnished with a *Henri's* (Cup) Anemometer; a self-registering instrument which shows the amount of wind that passes in per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Lind's Anemometer is also recommended: the method of *Estimating* Wind Force by such tables as that given in the schedule is, to say the least, unsatisfactory.

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unavoidable situation for observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions.—When a snow-shower occurs it must be noted in the "Remarks," and the letter S affixed to the depth of water received in gauges. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indicated in every column, the observer cannot be too careful to register *observations only*; and nothing that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's nomenclature of deduction or inference.

clature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky overhead (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds column, though their appearance and changes ought to be noted among the "*Remarks*." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is half-covered by clouds, 5 is entered as the *observation*, and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner.—In the column "Velocity and Direction," 2 W., (for example) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of 2, east., (*etc.*) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

Shadows.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. **Underground Thermometers.**—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and constancy; the Council recommend that observations in this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to 3, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. Mention must be made of the geological formation, and agricultural condition of the soil in which these thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our climate, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly-constructed apparatus from the ends of piers and rocks round the coast, where it is not influenced by the river water. At or near the time of high water, on the 5th, 15th, and 25th of each month, a thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

Temperature of Wells.—The temperature of the water at the bottom of wells ought, when practicable, to be taken, and the depth of wells and of the water noted. **Ozone.**—Mention whether Schönbien's or Moffat's papers are used.—Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3.5°, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 3.5° on the scale, that the wind is from the N.W., and that its force on the scale 0-5 is 3.5°. *etc.*, that it is *blowing fresh*. Boxes of Papers may be had at the Society's Office.

Electricity.—Too much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial magnetism, and as a meteorological phenomenon. A proper Electrometer is necessary to every complete meteorological observatory.

Remarks.—The "*Remarks*" column is too narrow, but unavoidable so. Some of the most valuable observations that can be taken are those for which no rules can be given but hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of mists, mists, mists, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, rain, the hour of storms of wind affecting their minimum, as well as such notes on storms as have been hinted at above. When forty-falls are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns otherwise unoccupied, or in two ruled off for the purpose, from that headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner, or on the side margin. Additional remarks may be made on the margin.

Observations in connection with the periodic return of the seasons' possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

The Council recommend that *ten-day* observations be taken;—viz., on the 21st days of March, June, September, and December, for these hourly observations separate schedules will be furnished to observers.

Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the makers.

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary; and they consider it desirable that he should have full power to reject any instrument that, on being presented for comparison, does not afford him satisfaction.

(By Order,) A. H. B.

Edinburgh, 24th Feb. 1860.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Leaf	First Bud	Flower	Leaf fallen	Decayed of Leaves	CROPS	Sowing or Ploughing	Harvesting or Ploughing	In Ear or Ripe	First Cut
Alder	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Aspen	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Beech	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Birch	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Elm	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Larch	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Linne	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Oak	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0
Sycamore or Plane	10.0	10.0	10.0	10.0	10.0	Barley	10.0	10.0	10.0	10.0

SHRUBS, ETC.	First in Blossom	First in Blossom	First in Blossom	First in Blossom	First in Blossom	FRUITS	First in Blossom	First in Blossom	First in Blossom	First in Blossom
Bacberry	10.0	10.0	10.0	10.0	10.0	Apple	10.0	10.0	10.0	10.0
Broom	10.0	10.0	10.0	10.0	10.0	Black Currant	10.0	10.0	10.0	10.0
Hazel	10.0	10.0	10.0	10.0	10.0	Cherry	10.0	10.0	10.0	10.0
Hawthorn	10.0	10.0	10.0	10.0	10.0	Gooseberry	10.0	10.0	10.0	10.0
Laburnum	10.0	10.0	10.0	10.0	10.0	Peach	10.0	10.0	10.0	10.0
Lilac	10.0	10.0	10.0	10.0	10.0	Plum	10.0	10.0	10.0	10.0
Mountain Ash or Rowan	10.0	10.0	10.0	10.0	10.0	Strawberry	10.0	10.0	10.0	10.0
Red Flowering Currant	10.0	10.0	10.0	10.0	10.0	Other Birds, naming them	10.0	10.0	10.0	10.0
Rhododendron Ponticum	10.0	10.0	10.0	10.0	10.0	Rail or Corn Crake	10.0	10.0	10.0	10.0
Whin	10.0	10.0	10.0	10.0	10.0	First in Blossom	10.0	10.0	10.0	10.0

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 planted, 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.

During the year your grass crops have been very abundant.

The quantity of potatoes and turnips has been very abundant.

EDINBURGH.

10, St Andrew Square,

Secretary of the Meteorological Society of Scotland,

Mr. A. H. BURGESS,

BOOK-POST.

Albion No 2

Albion
May 1860

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Height of Cistern of the Barometer above Mean Sea-level _____ feet, above Ground _____ feet. During the MONTH of *June* 186*0*.
The Hours of Observation are of Greenwich Time.

(Signed) ALB

BAR TAKING METEOROLOGICAL WITH REMARKS ON THE USE OF INSTRUMENTS.

Self-Regulating Thermometers—Professor Phillips, and Ne-
metz and Zambri's Patent "*Maximum*" Thermometers are re-
commended; printed directions for their use may be obtained with
this instrument. The "*Minimum*" Thermometer of Rutherford
is recommended when graduated on the glass stem and affixed
to a frame separate from the "*Maximum*." This thermometer is
liable to two derangements, both of which must be guarded
against, and may be easily remedied by an observer. When the
column of spirit breaks, it may be re-unioned by striking the
instrument repeatedly against the palm of the hand; when part
of the spirit divides by high temperature, it will be found in the
upper tube and must be dislodged from thence by heating that
part over a lamp; the alcohol will evaporate and again condense
in contact with the body of the liquid. This instrument must
hang perfectly horizontal; the bulb end should incline slightly
downwards, rather than the other.

Storm-falls may, for convenience, be registered in the run-gauges, under the following conditions:—When a snow shower is passing, the observer must note the time, and the letter S must be noted in the "Remarks," and the letter D prefixed to the depth of water received in gauge. The depth of snow must be measured in some open place where no drift has accumulated, and registered in addition to, and as a check upon, the indications of the run-gauge. For wind, rain, and snow, as usual in every column, the observer cannot be too careful to make *careful observations* only; and nothing that partakes of the nature of deduction or inference.

The Council recommend that *tempest* observations be taken; viz., on the 21st days of May, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the publishers.

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary; and they consider it desirable that he should have full power to reject any instrument that, on being presented for comparison, does not afford him satisfaction.

(By Order.) A. H. B.

DUNN, 24th Feb'y-1860.

Clouds.—Convenient abbreviations for Luke Howard's nomenclature of deduction or inference.

Unripe, 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.

[illegible]

BOOK-POST.

Mr A. H. BURGESS,

Secretary of the Meteorological Society of Scotland.

10, *St Andrew Square,*

EDINBURGH.

Aberdeen
June, 1864

SCOTTISH METEOROLOGICAL SOCIETY.

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Observations taken at

Aberdeen

, County of

Aberdeen

, in Lat.

57° 9' N, Long.

2° 6' W, Distance from Sea

1½

miles.

Height of Cistern of the Barometer above Mean Sea-level 115 feet, above Ground 18 feet.

During the MONTH of

June

1860

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 A.M.				HYGROMETER. No.				WIND.				RAIN.				CLOUDS.				THERMOMETERS. under Ground.				SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.		9 h. A.M.									
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of WELL at Depth of feet. No.	Temperature at 1 fathom, and Density.	9 A.M. 9 P.M.						
		inches.		inches.		No.	No.	No.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.				
		inches.		inches.		No.	No.	No.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.				
	1	29.630	55	29.608	56	58.5	33			51	46																		1				
	2	29.628	56	29.518	55	59.5	43			49.5	48.5																		2				
	3	29.400	55	29.402	55	52	41			49.3	48.5																		3				
	4	29.396	54	29.486	55	53	42			48.3	48																		4				
	5	29.564	55	29.686	54	57.5	42			50.5	49																		5				
	6	29.738	55	29.746	55	58	42			54	51																		6				
	7	29.672	55	29.676	64	59	43			50.3	48.8																		7				
	8	29.676	56	29.720	57	54	42			52.5	50																		8				
	9	29.692	57	29.650	58	61	39			54.5	49																		9				
	10	29.646	58	29.722	56	59	42			51.1	47.2																		10				
	11	29.770	57	29.788	57	53	40			50	46																		11				
	12	29.676	55	29.164	54	59	41			47.7	46.7																		12				
	13	29.146	57	29.252	54	55	42			54	51.5																		13				
	14	29.372	55			61	43			52.5	49.5																		14				
	15	29.638	60	29.728	60	62	43			55.5	51																		15				
	16	29.762	58	29.830	60	67	45			56	53																		16				
	17	29.832	63	29.820	60	68.1	47			55	54																		17				
	18	29.802	61	29.830	60	59	42			52.5	49.5																		18				
	19	29.800	62	29.802	56	67	39			56.5	52																		19				
	20	29.714	61	29.660	61	58.5	44			57.5	51.5																		20				
	21	29.694	61	29.738	61	64	44			58	54																		21				
	22	29.802	62	29.774	61	64	47			58.5	50.5																		22				
	23	29.542	60	29.912	61	56	47			55	51.7																		23				
	24	30.042	63	29.928	62	64	38			56	52.3																		24				
	25	29.644	59	29.456	59	63	45			53.7	52.3																		25				
	26	29.560	62	29.650	62	59.5	44			54.5	52.5																		26				
	27	29.508	63	29.454	62	60	47			57.5	54																		27				
	28	29.410	65	29.512	68	61	42			60.3	54.3																		28				
	29	29.728	65	30.010	60	65	45			57.3	50.8																		29				
	30	30.132	59	30.218	60	58	40			51.5	47.7																		30				
	31																												31				
Sums.		29.616	513	29.750	510	29.25	74			514.5	514.8																						
Means.		29.654	58.8	29.681	58.7	59.7	42.5			53.8	50.4																						
* Total Corrections for Instru- mental Errors.		-0.18		-0.18																													
+ Corrections for Diurnal Range.																																	
"Cor- rected Means."		29.636		29.663																													
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	28	29	30		

NOTATION USED IN GENERAL REMARKS.					
a.	denotes aurora.	m.	denotes meteor.		
ci.	" cirrus.	ms.	" meteors.		
ci-cu.	" cirro-cumulus.	n.	" nimbus.		
ci-s.	" cirro-stratus.	r.	" rain.		
cu.	" cumulus.	b. r.	" heavy rain.		
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.		
d.	" dew.	s.	" stratus.		
f.	" fog.	sc.	" scud.		
fr.	" frost.	sk.	" sleet.		
h-fr.	" hoar-frost.	sn.	" snow.		
h.	" haze.	so. ha.	" solar halo.		
h. d.	" heavy dew.	sq.	" squall.		
hl.	" hail.	sq.s.	" squalls.		
l.	" lightning.	t.	" thunder.		
li. cl.	" light clouds.	t-s.	" thunder-storm.		
li. sh.	" light showers.	w.	" wind.		
lu. co.	" lunar corona.	g.	" gale of wind.		
lu. ha.	" lunar halo.				

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1-5	Light breeze	4	Blowing hard
0.5	Very light air	2-	Fresh breeze	5	Blowing a gale
1-	Light air	3-	Very fresh	6	Violent gale

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ms.	" meteor.
ci-cu.	" cirro-cumulus.	n.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" scud.
fr.	" frost.	sl.	" sleet.
h. fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. ha.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sq.s.	" squalls.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t-s.	" thunder-storm.
li. sh.	" light showers.	w.	" wind.
li. co.	" lunar corona.	g.	" gale of wind.
li. ha.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1.5	Light breeze	4	Blowing hard
0.5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† = 29.556

"Corrected Mean" of Barometer at 9 P.M., minus the Correction† = 29.583

Mean at Station, corrected, and at 32°, = 29.570

Correction for Height, feet, above Mean Sea-level, = 1.26

Mean, reduced to 32°, and Sea-level, = 29.696

Highest Reading, corrected for Index error, on the 30th, = 30.218

Lowest Do., Do., on the 13th, = 29.146

Difference, or Monthly Range, = 1.072

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 27th, = 68.0

Lowest in Month, corrected for Index errors, on the 4th, = 33.0

Difference, or Monthly Range, = 35.0

"Corrected Mean" of all the Highest, (Col. 5), = 59.7

"Corrected Mean" of all the Lowest, (Col. 6), = 42.5

Difference, or Mean Daily Range, = 17.2

** Calculated Mean Temperature of Month, = 51.1

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 13th, = 51.1

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 51.1

Lowest at Night, Black Bulb, (corrected for Index errors), on the 13th, = 42.5

"Corrected Mean," (Col. 8), of Black Bulb Min. on the 13th, = 42.5

Difference of above Means or Range ("exposed"), = 8.6

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 53.8

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 50.4

†† Computed Temperature of Dew-point, = 47.1

†† Do. Elastic Force of Vapour, = 3.22

†† Do. Weight of Vapour in a Cubic Foot of Air, = 3.64

†† Relative Humidity, (Saturation = 100), = 78

RAIN fell on Days; Amount in Inches, =

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gunned or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by

(Signed)

Thomas David Gray A.M.

Greatest daily range = 28.0 on the 19th

SCOTTISH METEOROLOGICAL SOCIETY.

165

Observations taken at

Aberdeen

County of

Aberdeen

in Lat. $57^{\circ} 9' N$, Long. $2^{\circ} 6' W$, Distance from Sea $1\frac{1}{2}$ miles.Height of Cistern of the Barometer above Mean Sea-level 115 feet, above Ground 18 feet.During the MONTH of *July* 1860

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No. 22.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.									
		Barometer. No.	Atmospheric Thermometer.	Barometer. No.	Atmospheric Thermometer.	Max. No.	Min. No.	Max. No.	Min. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No.	No.	No.							
		inches.	inches.																												
	1	30.172	64	30.280	66	65	46			64.3	57.3																1				
	2	30.302	65	30.298	65	69	49			59	52.3																2				
	3	30.208	67	30.068	65	67	52			64	55.3																3				
	4	30.056	65	30.238	66	65	49			56.3	49.5																4				
	5	30.128	67	30.150	67	67	42			66	60																5				
	6	30.238	63	30.292	64	70.5	46			57.3	52.5																6				
	7	30.296	63	30.306	63	62	46			55.3	50.5																7				
	8	30.306	66	30.268	61	70	44			57.3	53																8				
	9	30.234	61	30.174	62	63	43			57.3	54.5																9				
	10	30.128	59			63	42			54.5	50.3																10				
	11	30.002	68	30.010	59	62	45			57	54.5																11				
	12	30.036	60	30.020	58	66	45			58.3	53.8																12				
	13	29.960	57	29.764	57	61	46			54.5	52																13				
	14	29.584	56	29.678	60	58.5	47			54.5	54																14				
	15	29.706	54	29.694	62	61.5	49			61	57																15				
	16	29.894	62	29.662	61	65	45			59	54																16				
	17	29.880	61	29.866	63	61.5	49			57	55																17				
	18	29.846	62	29.776	59	67	51			58	56.8																18				
	19	29.706	61	29.692	60	61	48			56	54.7																19				
	20	29.694	61	29.750	60	60	48			55.1	52.8																20				
	21	29.814	63	29.822	60	60	48			56.7	53.3																21				
	22	29.774	62	29.722	61	61	45			56.5	53																22				
	23	29.644	61	29.754	61	59.5	44			57	53.5																23				
	24	29.876	60	29.994	59	61	44			55	50.5																24				
	25	30.032	59	30.032	58	58.5	42			52	48																25				
	26	29.960	58	29.704	59	56.5	42			52.7	48																26				
	27	29.708	60			62	44			57.5	52.5																27				
	28	29.720	64	29.876	62	65	46.5			49.8																	28				
	29	30.010	63	30.194	61	61	45			54.7	52.5																29				
	30	30.110	61	29.972	61	64	42			58	54																30				
	31	29.932	63			65.5	46			60.5	57																31				
Sums.		28.956	1916	27.336	1720	1959	142.0	5		1721	804.1																				
Means.		29.934	61.8	29.777	61.4	63.2	45.8			56.8	53.5																				
* Total Corrections for Instru- mental Errors.		-0.018		-0.018																											
+ Corre- ctions for Diurnal Range.																															
"Cor- rected Means."		29.916		29.959																											
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	28	29	30

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ms.	" meteors.
ci-cu.	" cirro-cumulus.	h.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" scud.
fr.	" frost.	sl.	" sleet.
h.-fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. ha.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sq.	" squalls.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t-s.	" thunder-storm.
li. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	g.	" gale of wind.
lu. ha.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1.5	Light breeze	4	Blowing hard
0.5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† = 29.826
for Temp. (Col. 2), = 29.916 - 0.090 "Corrected Mean" of Barometer at 9 P.M., minus the Correction† = 29.871
for Temp. (Col. 4), = 29.959 - 0.088 Mean at Station, corrected, and at 32°, = 29.848 Correction for Height, feet, above Mean Sea-level, = $.126$ Mean, reduced to 32°, and Sea-level, = 29.974 Highest Reading, corrected for Index error, on the 8 th, = 30.1306 Lowest Do., Do., on the 14 th, = 29.504 Difference, or Monthly Range, = 0.802 S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 6 th, = 70.5 Lowest in Month, corrected for Index errors, on the 5 th, = 42.0 Difference, or Monthly Range, = 28.5 "Corrected Mean" of all the Highest, (Col. 5), = 63.2 "Corrected Mean" of all the Lowest, (Col. 6), = 45.8 Difference, or Mean Daily Range, = 17.4 ** Calculated Mean Temperature of Month, = 54.5

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the th, =

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =

Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =

"Corrected Mean," (Col. 8), of Black Bulb Min. on the th, =

Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry

Bulb, = 56.8 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 53.5 †† Computed Temperature of Dew-point, = 50.4 †† Do. Elastic Force of Vapour, = $.367$

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

†† Relative Humidity, (Saturation = 100), = 79

RAIN fell on Days; Amount in Inches, =

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

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be sent to Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by

(Signed) Thomas David Gray A.M.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Ardeer*, County of *Aberdeen*, in Lat. *57° 9' N.* Long. *2° 6' W.* Distance from Sea *1 1/2* miles. 167Height of Cistern of the Barometer above Mean Sea-level feet, above Ground feet. During the MONTH of *July* 1860
The Hours of Observation are of Greenwich Time.

ELECTRICITY	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.		RAIN.	CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.			9 A.M.		Day.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max. No.	Min. No.	Max. in sun's rays No.	Min. on Grass No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.		Direction.	Force.	Direction.	Force.	Velocity (0-6) and Direction.	Amount (0-10) and Specie.	Velocity (0-10) and Direction.					Amount (0-10) and Specie.	SUNSHINE.	No. 1.	No. 2.	No. 3.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† for Temp. (Col. 2), =

"Corrected Mean" of Barometer at 9 P.M., minus the Correction† for Temp. (Col. 4), =

Mean at Station, corrected, and at 32°, =

Correction for Height, feet, above Mean Sea-level, =

Mean, reduced to 32°, and Sea-level, =

Highest Reading, corrected for Index error, on the th, =

Lowest Do., Do., on the th, =

Difference, or Monthly Range, =

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† Barometric corrections for both capillary and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
|| While the Diurnal Range is unknown, the Arithmetic Mean of Cols. 9 and 10 will be entered as the "Calculated Mean Temperature."
Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column must be marked as such by the Observer, in each Schedule. See Over.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the th, =

Lowest in Month, corrected for Index errors, on the th, =

Difference, or Monthly Range, =

"Corrected Mean" of all the Highest, (Col. 5), =

"Corrected Mean" of all the Lowest, (Col. 6), =

Difference, or Mean Daily Range, =

* Calculated Mean Temperature of Month, =

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the th, =

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =

Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =

"Corrected Mean," (Col. 8), of Black Bulb Min. on the th, =

Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, =

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, =

†† Computed Temperature of Dew-point, =

†† Do. Elastic Force of Vapour, =

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

†† Relative Humidity, (Saturation = 100), =

RAIN fell on 16 Days; Amount in Inches, 1.25 =

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		6	2	4	4	6	2	0	7	0
P.M.		5	5	1	6	7	2	0	5	1.47
Mean.		5.5	3.5	2.5	5	6.5	2	0	6	1.5

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by

Alec Bruckshank
12 Rose St Aberdeen

(Signed)

A.B.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Aberdeen*County of *Aberdeen*in Lat. $57^{\circ}9'N$, Long. $2^{\circ}6'W$, Distance from Sea $1\frac{1}{2}$ miles.Height of Cistern of the Barometer above Mean Sea-level *115* feet, above Ground *18* feet.During the MONTH of *August*

1860

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.				CLOUDS.				SUNSHINE.	THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.					
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.																
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H-Cell Anemometer, at 9 P.M.	No. of hours in which it fell.	Amount in inches.	Velocity (0-10), and Direction.	Amount, (0-10), and Species.	Velocity (0-10), and Direction.	Amount, (0-10), and Species.	No.		3 inches.	No.	12 inches.					No.	22 inches.	Temperature of WELL, at Depth of feet. No.	Temperature at 1 fathom, and Density.	0-10.
		† No.		No.		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	No.					No.	No.	No.	No.	No.
	1	29.868	60	29.790	61	64	42			56.5	52																											
	2	29.740	62	29.700	62	66	48			57	53.5																								1			
	3	29.672	63			65	45																												2			
	4			29.330	58																															3		
	5	29.430	61	29.584	59	64	38			56.5	50.5																								4			
	6	29.580	58	29.448	58	59	38			52.5	49																								5			
	7			29.550	60	53.5	42			54.7	51																								6			
	8	29.534	61	29.544	58	59	37			58	53																								7			
	9	29.570	61	29.630	59	64	38			57	52.5																								8			
	10	29.632	64	29.584	60	61	46			59.5	54.5																								9			
	11	29.644	61	29.768	60	62.5	46			56.5	53.5																								10			
	12	29.816	60	29.824	60	58.5	45			54.5	51																								11			
	13	29.812	60	29.800	60	60	44			56.7	54																								12			
	14	29.700	64	29.660	60	60.5	42			56.5	54																								13			
	15	29.648	65	29.626	60	65	44			59.5	56.5																								14			
	16	29.456	60	29.346	63	62.5	50			55.8	53.5																								15			
	17	29.214	60	29.380	63	57.5	56			60	50																								16			
	18	29.400	61	29.578	60																															17		
	19	29.586	62	29.574	62	61	41			59	55.6																									18		
	20	29.510	63	29.746	62	64	48			57	53																									19		
	21	29.870	64	29.820	63	58	46			57.2	53																									20		
	22	29.626	55	29.502	59	62	46			57.5	50.5																									21		
	23	29.560	59	29.546	58	56	42			58.3	49.7																									22		
	24	29.510	60	29.460	60	57	35			52.7	48.1																									23		
	25	29.396	58	29.422	59	61	37			53.3	50																									24		
	26	29.440	60	29.615	60	58	42			55.7	50.7																									25		
	27	29.648	61			61	38			54.3	50.3																									26		
	28	29.672	58	29.540	62	60	43			52.7	49.7																									27		
	29	29.772	58	29.184	59	60	43			54.6	53.7																									28		
	30	29.864	59	28.774	58	61	44			55.3	52.7																									29		
	31	29.092	62	29.400	57	58	42			54.5	50.5																									30		
																																				31		
Sums.		1566.27		1572.30		13	8.8			60.3	58																											
Means.		29.5406		29.5426		60.7430				55.7521																												
* Total Corrections for Instrumental Errors.		- 0.18		- 0.18																																		
† Corrections for Diurnal Range.		29.522		29.524																																		
"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	28	29	30							

NOTATION USED IN GENERAL REMARKS.					
a.	denotes aurora.	ms.	denotes meteor.		
ci.	" cirrus.	ms.	" meteor.		
ci-cu.	" cirro-cumulus.	n.	" nimbus.		
ci-s.	" cirro-stratus.	r.	" rain.		
cu.	" cumulus.	h. r.	" heavy rain.		
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.		
d.	" dew.	s.	" stratus.		
f.	" fog.	sc.	" sleet.		
fr.	" frost.	sl.	" snow.		
h-fr.	" hoar-frost.	sn.	" snow.		
h.	" haze.	so. ha.	" solar halo.		
h. d.	" heavy dew.	sq.	" squall.		
hl.	" hail.	sq.	" squalls.		
l.	" lightning.	t.	" thunder.		
li. cl.	" light clouds.	t-s.	" thunder-storm.		
li. sh.	" light showers.	w.	" wind.		
li. cu.	" lunar coronae.	g.	" gale of wind.		
li. ha.	" lunar halo.				

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1-5	Light breeze	4	Blowing hard
0.5	Very light air	2-	Fresh breeze	5	Blowing a gale
1-	Light air	3-	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., 29.5406 , the Correction for Temp. (Col. 2), = 29.454 438
"Corrected Mean" of Barometer at 9 P.M., 29.5426 , the Correction for Temp. (Col. 4), = 29.459 441
Mean at Station, corrected, and at 32°, = 29.456 440
Correction for Height, feet, above Mean Sea-level, = $.126$
Mean, reduced to 32°, and Sea-level, = 29.582 566
Highest Reading, corrected for Index error, on the 26th, = 29.870
Lowest Do., Do., on the 30th, = 28.774
Difference, or Monthly Range, = 1.096

S.-R. THERMOMETER, (in shade, &c.), Highest in Month (corrected for Index errors), on the 24th, = 66.0
Lowest in Month, corrected for Index errors, on the 24th, = 35.0
Difference, or Monthly Range, = 31.0
"Corrected Mean" of all the Highest, (Col. 5), = 60.7
"Corrected Mean" of all the Lowest, (Col. 6), = 43.0
Difference, or Mean Daily Range, = 17.7
* Calculated Mean Temperature of Month, = 51.8

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index errors), on the 11th, =
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =
Lowest at Night, Black Bulb, (corrected for Index errors), on the 11th, =
"Corrected Mean," (Col. 8), of Black Bulb Min. on the 11th, =
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 55.7 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 52.1 †† Computed Temperature of Dew-point, = 48.7 †† Do. Elastic Force of Vapour, = $.345$ †† Do. Weight of Vapour in a Cubic Foot of Air, = 3.86 †† Relative Humidity, (Saturation = 100), = 78

RAIN fell on Days; Amount in Inches, =

WIND.		SUMMARY.							
Direction.		N	NE	E	SE	S	SW	W	NW
A.M.									
P.M.									
Mean.									

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by

Baromet. diff. range of S.R. T = 26.0 on 25th

(Signed)

Thomas David Gray. R. M.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a perfect uniformity in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock, (Greenwich or Railway Time only), twice a-day for some, and once, (morning or evening), for other instruments, as specified in the following remarks at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances they are specially requested to mark opposite every reading at what time it was taken; if not at 9 o'clock.

Barometer.—*Weather-glasses* and *Anemometers*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. No can any Barometer be used for Meteorological Observations that is not supplied with such means of adjustment or compensation as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

Two moderate-priced Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its *scale* is not true inches, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the siting of the *cistern* is of leather; and thus, by a screw, acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-time* on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the vernier.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *slight tap* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails the instrument must be repaired.

The Barometer should be suspended in a good *light*, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular and exposed to neither the Sun's direct rays nor the heat of a fire.

In taking an observation, the attached Thermometer is first noted; the tube must then be gently tapped and the cistern adjusted carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as to protect the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "Maximum" Thermometers, are recommended; printed directions for their use may be obtained with each instrument. The "Minimum" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum". This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating the part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly downwards, rather than the other.

This above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays and the least, or less observation of the sky, *clouds*, etc., within 20° of the zenith. The status of clouds the appear near the horizon are viewed obliquely; and this is particularly to be noted in the case of cumuli, which, though they appear to be in the air, are in fact on the ground, and their appearance ought to be noted about the 4 P.M. The amount of cloud is entered from 1 to 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity with Direction," 5 S.W. (for example) will indicate that the upper strata of clouds travel with extreme velocity from S.W. and those in the lower regions from W. with one-third the (average) speed of the former. Again, in the second "Cloud" column, an entry of 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, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

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Hygrometer.—The Hygrometer consists of two Thermometers usually, but not necessarily mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the Hygrometrical Deductions, Observers are specially requested to attend to the following conditions:—The bulbs must be kept perfectly dry, and must be kept free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which immediately altered by pulling the boxwood frame out of the case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—38°·9, 40°·0, or 40°·1; or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40°·5, respectively. So also 40°·3, and 40°·7 or 40°·8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 A.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

Wind.—A wind-vane ought to be elevated 12 feet at least above surrounding objects. When it oscillates necessarily, the mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results.

The Council would strongly recommend that every Observatory be furnished with a Hemispherical-Cup Anemometer;—a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Lind's Anemometer is also recommended: the method of *Estimating* Wind Force by such tables as that given in the schedule is, to say the least, unsatisfactory.

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation for observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unquestionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the rain columns under the following conditions:—When a snow shower occurs it must be noted in the "Remarks," and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition by and as a check upon the indications of the rain-gauges. For what rain, and snow as included in every column, the observer cannot be too careful to register observations only; and nothing that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's nomenclature.

Measure of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less observation of the sky, *clouds*, etc., within 20° of the zenith. The status of clouds the appear near the horizon are viewed obliquely; and this is particularly to be noted in the case of cumuli, which, though they appear to be in the air, are in fact on the ground, and their appearance ought to be noted about the 4 P.M. The amount of cloud is entered from 1 to 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

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Shadows.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column.

Direction of Winds.—As the germination and health of crops and plants greatly depend on the temperature of the soil, its amount and constancy; the Council recommend that observations of this interesting department be made at 9 A.M. and 9 P.M. The bulbs must be kept perfectly dry, and must be kept free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which immediately altered by pulling the boxwood frame out of the case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—38°·9, 40°·0, or 40°·1; or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40°·5, respectively. So also 40°·3, and 40°·7 or 40°·8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 A.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

Wind.—A wind-vane ought to be elevated 12 feet at least above surrounding objects. When it oscillates necessarily, the mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results.

The Council would strongly recommend that every Observatory be furnished with a Hemispherical-Cup Anemometer;—a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Lind's Anemometer is also recommended: the method of *Estimating* Wind Force by such tables as that given in the schedule is, to say the least, unsatisfactory.

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation for observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unquestionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the rain columns under the following conditions:—When a snow shower occurs it must be noted in the "Remarks," and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition by and as a check upon the indications of the rain-gauges. For what rain, and snow as included in every column, the observer cannot be too careful to register observations only; and nothing that partakes of the nature of deduction or inference.

(By Order.) A. H. B.

EDINBURGH, 24th Feb. 1860.

FOREST TREES.		FRUIT.		MIGRATORY BIRDS.		Other Birds, naming them.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in Arrival.	First in Departure.		
Alder.						Cuckoo.	
Aspen.						House-Swallow.	
Beech.						Curlew.	
Birch.						Lapwing.	
Elm.						Gooseberry.	
Larch.						Pear.	
Lin.						Strawberry.	
Oak.						Plum.	
Sycamore or Plane.						Swan.	
						Starling.	
						Sand-Martin.	
						Floer.	
						Corn.	
						Cherry.	
						Black Currant.	
						Apple.	
						Bourtree or Elder.	
						Broom.	
						Hazel.	
						Hawthorn.	
						Holly.	
						Laburnum.	
						Mountain Ash or Rowan.	
						Red Flowering Currant.	
						Rhododendron Ponticum.	
						Willow.	

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 or in perfection; and the Agricultural condition of the district generally. Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

Mr. A. H. BURGESS,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

BOOK-POST.

Edinburgh
July 6 1860

Abundant To

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Abdeen, County of Abdeen, in Lat. 57° 9' N Long. 2° 6' W, Distance from Sea 1 1/2 miles.

Height of Cistern of the Barometer above Mean Sea-level _____ feet, above Ground _____ feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of August 1860.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.			
		9 h. A.M.	9 h. P.M.	Protected, in Shade, 4 feet above Ground.	Exposed, Black Bulb.	9 h. A.M.	9 h. P.M.	9 h. A.M.	4 P.M.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
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	2																														
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Sums.																															
Means.																															
* Total Corrections for Instrumental Errors.																															
* Corrections 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	28	29	30	31

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" "	nc.	" "
ci-cu.	" "	ni.	" "
ci-s.	" "	ps.	" "
cu.	" "	sc.	" "
cu-s.	" "	st.	" "
l.	" "	su.	" "
fr.	" "	th.	" "
fr.	" "	tr.	" "
h.	" "	u.	" "
h.	" "	v.	" "
h.	" "	w.	" "
h.	" "	x.	" "
h.	" "	y.	" "
h.	" "	z.	" "

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1-5	Light breeze	4	Blowing hard
0-5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction + for Temp. (Col. 2), = _____

"Corrected Mean" of Barometer at 9 P.M., minus the Correction + for Temp. (Col. 4), = _____

Mean at Station, corrected, and at 32°, = _____

Correction for Height, feet, above Mean Sea-level, = _____

Mean, reduced to 32°, and Sea-level, = _____

Highest Readings, corrected for Index error, on the _____ th, = _____

Lowest Do., Do., on the _____ th, = _____

Difference, or Monthly Range, = _____

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the _____ th, = _____

Lowest in Month, corrected for Index errors, on the _____ th, = _____

Difference, or Monthly Range, = _____

"Corrected Mean" of all the Highest, (Col. 5), = _____

"Corrected Mean" of all the Lowest, (Col. 6), = _____

Difference, or Mean Daily Range, = _____

* Calculated Mean Temperature of Month, = _____

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the _____ th, = _____

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = _____

Lowest at Night, Black Bulb, (corrected for Index errors), on the _____ th, = _____

"Corrected Mean," (Col. 8), of Black Bulb Min. on the _____ th, = _____

Difference of above Means or Range ("exposed"), = _____

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = _____

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = _____

†† Computed Temperature of Dew-point, = _____

†† Do. Elastic Force of Vapour, = _____

†† Do. Weight of Vapour in a Cubic Foot of Air, = _____

†† Relative Humidity, (Saturation = 100), = _____

RAIN fell on 24 Days; Amount in Inches, = 3.4

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Variable.
A.M.		1	3	1	5	3	9	2	4	0
P.M.		0	7	4	7	4	4	1	7	1
Mean.		1	3	1	6	3	6	5	5	1

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by

Alfred Shank
12 Rose St Aberdeen

(Signed)

AB

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Height of Cistern of the Barometer above Mean Sea-level 115 feet, above Ground ~~115~~ 18 feet.

During the MONTH of *September* 1860

The Hours of Observation are of Greenwich Time.

BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction +		
for Temp. (Col. 2), =	<i>29.826 - 0.85</i>	= 29.936
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction +		
for Temp. (Col. 4), =	<i>29.816 - 0.80</i>	= 29.936
Mean at Station, corrected; and at 32°,		= 29.936
Correction for Height, feet, above Mean Sea-level,		= .126
Mean, reduced to 32°, and Sea-level,		= 29.862
Highest Reading, corrected for Index error, on the 6th,		= 29.394
Lowest Do., Do., on the 11th,		= 29.240
Difference, or Monthly Range,		= 1.154

Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S." and a number to be entered in the Heading; or the Number and Initials of the Maker may be given.

† Entering corrections for the barometer is not required.

† The Diurnal Range for Scotland is as yet unknown.

† Practically, though not absolutely, a minus correction.

† Hypometrical Productions are taken from Glaisher's *Hypometrical Tables*, Second Edition only.

While the Diurnal Range is unknown, the Arithmetical Mean of Col. 6 and 7 will be entered as the "Calculated Mean Temperature."

Any other remarks, such as the name of the Observer, or the name of the Office, or the date, or the place, or the name of the instrument, may be marked as such by the Observer, in each Schedule. See *Order*.

S.-R. THERMOMETER, (in shade, etc.),	Highest in Month (corrected for Index errors), on the 8 th ,	=	71.4
Lowest in Month, corrected for Index errors, on the 25 th ,		=	29.0
Difference, or Monthly Range,		=	42.4
" Corrected Mean " of all the Highest, (Col. 5)		=	57.9
" Corrected Mean " of all the Lowest, (Col. 6)		=	39.4
Difference, or Mean Daily Range,		=	18.5
** Calculated Mean Temperature of Month,		=	48.6

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the	th,	=
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun,		=
Lowest at Night, Black Bulb, (corrected for Index errors), on the	th,	=
"Corrected Mean," (Col. 8), of Black Bulb Min. on the	th,	=
Difference of above Means or Range ("exposed"),		=

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb,	=	52.3
Mean (corrected) A.M. and P.M. Reading of Wet Bulb,	=	48.6
†† Computed Temperature of Dew-point ,	=	44.8
†† Do. Elastic Force of Vapour ,	=	.298
†† Do. Weight of Vapour in a Cubic Foot of Air , ...	=	3.439
†† Relative Humidity , (Saturation = 100),	=	76

RAIN fell on	Days; Amount in Inches ,	=
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RAIN fell on **Days; Amount in Inches.**

[illegible]

Observations made and
Return verified by

(Signed)

Thomas D. Gray

SCOTTISH METEOROLOGICAL SOCIETY.

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Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 1/2 miles.Height of Cistern of the Barometer above Mean Sea-level feet, above Ground feet. During the MONTH of September 1860
The Hours of Observation are of Greenwich Time.

ELECTRICITY	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN. Amount in inches. No.	CLOUDS.				THERMOMETERS. under Ground.				SEA. Temperature, Direction, and Density.	OZONE. 0-10. 3 A.M. 9 P.M.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.			9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.						
		Barometer.	Attached Ther- mometer.	Barometer.	Attached Ther- mometer.	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.		Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	SUNSHINE. Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.					Thermometer at height of WIND, at height of W

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† for Temp. (Col. 2), =
"Corrected Mean" of Barometer at 9 P.M., minus the Correction† for Temp. (Col. 4), =
Mean at Station, corrected, and at 32°,
Correction for Height, feet, above Mean Sea-level,
Mean, reduced to 32°, and Sea-level,
Highest Reading, corrected for Index error, on the th,
Lowest Do., Do., on the th,
Difference, or Monthly Range,

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the th,
Lowest in Month, corrected for Index errors, on the th,
Difference, or Monthly Range,
"Corrected Mean" of all the Highest, (Col. 5),
"Corrected Mean" of all the Lowest, (Col. 6),
Difference, or Mean Daily Range,
* Calculated Mean Temperature of Month,

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index errors), on the th,
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun,
Lowest at Night, Black Bulb, (corrected for Index errors), on the th,
"Corrected Mean," (Col. 8), of Black Bulb, Min. on the th,
Difference of above Means or Range ("exposed"),

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb,

Mean (corrected) A.M. and P.M. Reading of Wet Bulb,

†† Computed Temperature of Dew-point,

†† Do. Elastic Force of Vapour,

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

†† Relative Humidity, (Saturation = 100),

RAIN fell on 19 Days; Amount in Inches, 7.50

WIND.	SUMMARY.											Mean Force.	Mean Velocity in miles per day.
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.			
A.M.		0	2	0	1	1	13	1	12	0	1.26		
P.M.		0	2	0	0	2	11	3	12	7	1.35		
Mean.		0	2	0	0.5	1.5	12	2	12	7.50	1.28		

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by

Alex. Bruckshank
12 Rose Street, Aberdeen

(Signed) 46

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS,

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock, (Greenwich or Railway time only), twice a-day for some, and once, (morning or evening), for other instruments, as specified, in the following remarks, or at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

Barometer.—*Weather-glasses* and *aneroids*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of *adjustment or compensation* as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

Two moderate-sized Barometers have been approved by the Council; it is properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr Adie of London, the use of which is attended with the great convenience of requiring no *adjustment* of the cistern. Its *scale-indices* are not true inches, but so much shorter as to *compensate* the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the *cistern* are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their co-incidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-tube* on this little piston-rod is brought, by the adjusting screw, to *form one straight line* with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

When a Barometer having adjustable scales has to be removed from its fastenings, the ivory peg must be screwed up so as to form a tight plug to the cistern. Then *seize up* the mercury to take down a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is done when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a good *light*, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the Sun's direct rays nor the heat of a fire.

In taking an *Observation*, the attached Thermometer is first noted; the tube must then be gently tapped and the adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the venous, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly, so as to prevent loss from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Potability of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box painted white outside and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The balls forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers and to allow complete ventilation of the interior. The instruments are suspended on cross-balls in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self-Reporting Thermometers.—Professor Phillips, and Negretti and Zambra's Patent "*Maxim*." Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Maxim*." Thermometer of Rathbone is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maxim*." This thermometer is liable to two demerits, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks, it may be re-quired by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly upwards, rather than the other.

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays and the least from radiation during night. Their bulbs have a black coating which may easily be made, or mercuried, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Macurum*" should be freely exposed to the Sun, and the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat, to affect the alcohol by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes that has not been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are *not* graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "*Minimum*" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested *Thermometer* may be had, on loan, by any observer, from the Meteorological Secretary.

The *Thermometer* consists of two *Thermometers* usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested figure of the *Thermometer* seriously vitiates the H_2O geometrical Deductions, Observers are specially requested to attend to the following conditions:—

The bulbs must be *long* enough to allow the water-cup to be sealed and framed by at least an inch free from the scales and frame to which they are attached—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb—in no case under the bulbs;—the mesh must be of medium fineness and fastened at the neck of the bulb by a cotton thread, which also supplies it with water. It must be seen to by the observer that the mesh is *always clean and moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be immersed by immersion from 15 to 20 minutes before the hour of observation. From the time of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

— One form of a Mason's Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

Reading of the Thermometer.— Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The readings ought to be taken to tenths of a degree, and noted in the following manner:—Thermometer readings 40° 0', or 40° 1', or 40° 2', or 40° 3', or 40° 4', or 40° 5', or 40° 6', or 40° 7', or 40° 8', or 40° 9', or 40° 10', or 40° 11', or 40° 12', or 40° 13', or 40° 14', or 40° 15', or 40° 16', or 40° 17', or 40° 18', or 40° 19', or 40° 20', or 40° 21', or 40° 22', or 40° 23', or 40° 24', or 40° 25', or 40° 26', or 40° 27', or 40° 28', or 40° 29', or 40° 30', or 40° 31', or 40° 32', or 40° 33', or 40° 34', or 40° 35', or 40° 36', or 40° 37', or 40° 38', or 40° 39', or 40° 40', or 40° 41', or 40° 42', or 40° 43', or 40° 44', or 40° 45', or 40° 46', or 40° 47', or 40° 48', or 40° 49', or 40° 50', or 40° 51', or 40° 52', or 40° 53', or 40° 54', or 40° 55', or 40° 56', or 40° 57', or 40° 58', or 40° 59', or 40° 60', or 40° 61', or 40° 62', or 40° 63', or 40° 64', or 40° 65', or 40° 66', or 40° 67', or 40° 68', or 40° 69', or 40° 70', or 40° 71', or 40° 72', or 40° 73', or 40° 74', or 40° 75', or 40° 76', or 40° 77', or 40° 78', or 40° 79', or 40° 80', or 40° 81', or 40° 82', or 40° 83', or 40° 84', or 40° 85', or 40° 86', or 40° 87', or 40° 88', or 40° 89', or 40° 90', or 40° 91', or 40° 92', or 40° 93', or 40° 94', or 40° 95', or 40° 96', or 40° 97', or 40° 98', or 40° 99', or 40° 100'. In reading Rutherford's *"H₂O"*, *"H₂O"*, and *"H₂O"* Thermometers, the indication of that end of the *water* which is next to the surface of the mercury or alcohol is alone noted. Readings of the thermometers, especially of the wet and dry *bulbs*, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observing Temperature—The Hygrometer is read at 4 A.M. and 9 P.M. only. The self-registering Thermometers are read at 4 A.M. and 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of inference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological hour. In the Society's schedules, the indications registered on the *Hygrometer* are those of a series of phenomena commencing at 9 P.M. of the *2nd*, and extending till 9 P.M. on the *3rd*.

Wind—A wind-vane ought to be elevated 12 feet at least above the surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always in the same position, the direction must be made to the direction of the lower strata of clouds overhead, and to the direction of the smoke, etc., etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations should be made at every hour of Greenwich time. Such a series of simultaneous observations, pursued at different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every Observatory be furnished with a Hemispherical-Cup Anemometer, — a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, the Anemometer is also recommended: the method of *Estimating* Wind Force by such tables as that given in the schedule will say the least, unsatisfactory.

rain-gauges.—Many causes conspire to produce anomalies in rain-gauges. They arise, partly, from unfavourable situation and exposure, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge must be read daily, and the readings entered in the returns for the day on which the rain fell.

Sturm-falla may, for convenience, be registered in the rain gauge, under the following conditions:—When a snow-shower falls, it must be noted in the "Remarks," and the letter S prefixed to the depth of water received in gauge. The depth of snow must be measured in some open place where no drift has been observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as noted in every column, the observer cannot be too careful to register *observations* only; and nothing that partakes of the character of deduction or inference.

clouds. -- Convenience abbreviations for Luke Howard's nomen-

exture of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less observation of the sky-*overhead* (i.e. near 90° or 10° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the *clouds* column, though their appearances and changes ought to be noted among the *Remarks*. The amount of cloud is entered from a scale of 0 to 10; thus, when the sky *overhead* is *half-covered* by clouds, 5 is entered as the *observation*, and so on.

Observations of the clouds are made at 9 A.M. and at sunset, thus illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," v_s, W , (for example) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Clouds" column, an entry of $\frac{2}{3}$ $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{16}$ $\frac{1}{32}$ $\frac{1}{64}$ $\frac{1}{128}$ $\frac{1}{256}$ $\frac{1}{512}$ $\frac{1}{1024}$ $\frac{1}{2048}$ $\frac{1}{4096}$ $\frac{1}{8192}$ $\frac{1}{16384}$ $\frac{1}{32768}$ $\frac{1}{65536}$ $\frac{1}{131072}$ $\frac{1}{262144}$ $\frac{1}{524288}$ $\frac{1}{1048576}$ $\frac{1}{2097152}$ $\frac{1}{4194304}$ $\frac{1}{8388608}$ $\frac{1}{16777216}$ $\frac{1}{33554432}$ $\frac{1}{67108864}$ $\frac{1}{134217728}$ $\frac{1}{268435456}$ $\frac{1}{536870912}$ $\frac{1}{1073741824}$ $\frac{1}{2147483648}$ $\frac{1}{4294967296}$ $\frac{1}{8589934592}$ $\frac{1}{17179869184}$ $\frac{1}{34359738368}$ $\frac{1}{68719476736}$ $\frac{1}{137438953472}$ $\frac{1}{274877906944}$ $\frac{1}{549755813888}$ $\frac{1}{1099511627776}$ $\frac{1}{2199023255552}$ $\frac{1}{4398046511104}$ $\frac{1}{8796093022208}$ $\frac{1}{17592186044416}$ $\frac{1}{35184372088832}$ $\frac{1}{70368744177664}$ $\frac{1}{140737488355328}$ $\frac{1}{281474976710656}$ $\frac{1}{562949953421312}$ $\frac{1}{1125899906842624}$ $\frac{1}{2251799813685248}$ $\frac{1}{4503599627370496}$ $\frac{1}{9007199254740992}$ $\frac{1}{18014398509481984}$ $\frac{1}{36028797018963968}$ $\frac{1}{72057594037927936}$ $\frac{1}{144115188075855872}$ $\frac{1}{288230376151711744}$ $\frac{1}{576460752303423488}$ $\frac{1}{1152921504606846976}$ $\frac{1}{2305843009213693952}$ $\frac{1}{4611686018427387904}$ $\frac{1}{9223372036854775808}$ $\frac{1}{18446744073709551616}$ $\frac{1}{36893488147419103232}$ $\frac{1}{73786976294838206464}$ $\frac{1}{147573952589676412928}$ $\frac{1}{295147905179352825856}$ $\frac{1}{590295810358705651712}$ $\frac{1}{1180591620717411303424}$ $\frac{1}{2361183241434822606848}$ $\frac{1}{4722366482869645213696}$ $\frac{1}{9444732965739290427392}$ $\frac{1}{18889465931478580854784}$ $\frac{1}{37778931862957161709568}$ $\frac{1}{75557863725914323419136}$ $\frac{1}{151115727451828646838272}$ $\frac{1}{302231454903657293676544}$ $\frac{1}{604462909807314587353088}$ $\frac{1}{1208925819614629174706176}$ $\frac{1}{2417851639229258349412352}$ $\frac{1}{4835703278458516698824704}$ $\frac{1}{9671406556917033397649408}$ $\frac{1}{19342813113834066795298816}$ $\frac{1}{38685626227668133590597632}$ $\frac{1}{77371252455336267181195264}$ $\frac{1}{154742504910672534362390528}$ $\frac{1}{309485009821345068724781056}$ $\frac{1}{618970019642690137449562112}$ $\frac{1}{1237940039285380274899124224}$ $\frac{1}{2475880078570760549798248448}$ $\frac{1}{4951760157141521099596496896}$ $\frac{1}{9903520314283042199192993792}$ $\frac{1}{19807040628566084398385987584}$ $\frac{1}{39614081257132168796771975168}$ $\frac{1}{79228162514264337593543950336}$ $\frac{1}{158456325028528675187087900672}$ $\frac{1}{316912650057057350374175801344}$ $\frac{1}{633825300114114700748351602688}$ $\frac{1}{1267650600228229401496703205376}$ $\frac{1}{2535301200456458802993406410752}$ $\frac{1}{5070602400912917605986812821504}$ $\frac{1}{10141204801825835211973625643008}$ $\frac{1}{20282409603651670423947251286016}$ $\frac{1}{40564819207303340847894502572032}$ $\frac{1}{81129638414606681695789005144064}$ $\frac{1}{162259276829213363391578010288128}$ $\frac{1}{324518553658426726783156020576256}$ $\frac{1}{649037107316853453566312041152512}$ $\frac{1}{1298074214633706907132624082305024}$ $\frac{1}{2596148429267413814265248164610048}$ $\frac{1}{5192296858534827628530496329220096}$ $\frac{1}{10384593717069655257060992658440192}$ $\frac{1}{20769187434139310514121985316880384}$ $\frac{1}{41538374868278621028243970633760768}$ $\frac{1}{83076749736557242056487941267521536}$ $\frac{1}{166153499473114484112975882535043072}$ $\frac{1}{332306998946228968225951765070086144}$ $\frac{1}{664613997892457936451903530140172288}$ $\frac{1}{1329227995784915872903807060280344576}$ $\frac{1}{2658455991569831745807614120560689152}$ $\frac{1}{5316911983139663491615228241121378304}$ $\frac{1}{10633823966279326983230456482242756608}$ $\frac{1}{21267647932558653966460912964485513216}$ $\frac{1}{42535295865117307932921825928971026432}$ $\frac{1}{85070591730234615865843651857942052864}$ $\frac{1}{170141183460469231731687303715884105728}$ $\frac{1}{340282366920938463463374607431768211456}$ $\frac{1}{680564733841876926926749214863536422912}$ $\frac{1}{1361129467683753853853498429727072845824}$ $\frac{1}{2722258935367507707706996$

Sunshine.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column.

Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil, its amount and consistency; the Council recommend that observations in this interesting department be made at 9 a.m., 12, 2, 5, 8, and 11 p.m., and the stems above ground, protected from the sun's rays, and fitted with sloping tin collars, to prevent water being conveyed to the bulbs by the stems or wooden frames. Attention must be made of the geological formation, and agricultural condition of the soil in which these thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our atmosphere and land, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus from the ends of piers and rocks round the coast, where it is not influenced by that of the river water. At or near the time of high water, on the 5th, 15th, 25th, and 29th of each month, the thermometer ought to be sunk

eachly six feet (one fathom), and after ten minutes have elapsed, "swim up and read." When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air and the hour of observation: and continuing to observe for particular depths.

Temperature of Wells.—The temperature of the water at the bottom of the wells ought, when practicable, to be taken, and the depth of the well and of the water noted.

Observations.—Mention whether Schönbach's or Moffat's papers are used—Moffat's are preferred. The paper is affixed by a pin to the indicator in the thermometer box, and the indication registered at 10 A.M. and 4 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—this 3rd, as *ozone* entry in the schedule, will indicate that the ozone paper tinted as 4³ on the scale, that the wind is from the N.W., that its force on the scale 0—5 is 4; 4³ *etc.*, that it is *blowing* W.S.W. Boxes of Papers may be had at the Society's Office.

Electricity.—Too much importance cannot be attached to the electric condition of the atmosphere in connection with terrestrial magnetism, and as a meteorological phenomenon. A proper electro-mechanical recorder is necessary to every complete meteorological observatory.

Remarks.—The *z* *Remarks* column is too narrow, but unavoidable, so. Some of the most valuable observations that can be made are those for which no rules can be given nor hours assigned. The use of contractions ought therefore to be taken every train, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. It provides special and extraordinary observations, great prominence to be given in this column to prevalent diseases, differences of character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks, if to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of onsets of wind attaining their maximum, as well as such notes as storm winds, and the height of the clouds, as well as such notes as the vicinity of an Observatory, the height of clouds and of the line in winter ought to be recorded.

by the use of abbreviations, the state of the weather at 9 A.M., or P.M. ought to be registered, either in two columns either side of the record, or in two ruled off for the purpose, from that unoccupied, or in two ruled off for the purpose, from that unoccupied, "Remarks." It is intended that observations by the thermometer should be entered in this manner, on the side-panels. Additional remarks may be made on the margin.

Observations in connection with the periodic return of the "Observers" possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reaped from year to year in selected pieces of ground or farms.

For these hourly observations separate schedules will be issued to observers.

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary, and they consider it desirable that he should feel free to reject any instrument that, on being presented for comparison, does not afford him satisfaction.

(By Order) A. H. B.

FINNBERG, 24th Feb. 1860.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	Leaf buds first appear.	In leaf.	Divided or in leaf.	Barry, or mentioning variety.
Alder,					
Asb.,					
Beech,					
Birch,					
Elm,					
Larch,					
Lime,					
Oak,					
Sycamore or Plane,					
Barry,					
CROPS.					
Barry,					
Wheat,					
Oats,					
Bare or Bligh,					
Beans,					
Peas,					
Potatoes,					
Turnips,					
Rye Grass,					
Sowing or planting.					
Aperting or above ground.					
In Bar or flower.					
Rise Cut or raised.					

[illegible]

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turneps, Fruits, etc., whether plentiful, or in perfection; and the Agricultural condition of the district generally.

BOOK-POST.

EDINBURGH.

10, *St Andrew Square,*

Secretary of the Meteorological Society of Scotland

Mr A. H. BURGESS.

 T_G

Aberdeen,
N^o 2.

Handlen
Sept 1860

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N., Long. 2° 6' W., Distance from Sea 1/2 miles.Height of Cistern of the Barometer above Mean Sea-level 115 feet, above Ground 1 feet.During the MONTH of October 1860.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.		RAIN.		CLOUDS.		THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.							
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.													
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	No.	No.											
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.											
		inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.											
	1	30.224	54			50	38			49.5	48.5													1							
	2	30.204	57	29.984	57	54	36			49.6	47.8													2							
	3	29.202	58	29.938	54	60	38			44	43.5													3							
	4	30.016	57	29.778	54	51	32			48.3	43.6													4							
	5	29.466	55	30.074	50	58	40			58	54													5							
	6	30.026	51	29.882	56	59	31			46.3	45.3													6							
	7	29.882	56	29.798	55	54.5	40			49.5	44													7							
	8	29.760	54	29.730	51	54	31			45.5	41													8							
	9	29.826	49	30.124	49	48	31			45.5	44.5													9							
	10	29.840	47	29.606	49	46	29			40	38													10							
	11	29.686	50	29.722	42	44	28			40	36.5													11							
	12	29.750	49	29.412	45	42	26			36.5	32.5													12							
	13	29.244	52	29.200	48	43	30			43	41.5													13							
	14	29.496	52	29.670	51	48.3	27			45.5	43.3													14							
	15	29.290	50	29.148	52	49	31			47.5	47													15							
	16	29.126	54	29.216	47	50.5	32			42.5	41													16							
	17	29.470	52	29.364	50	50	28			44.5	40.5													17							
	18	28.960	51	29.062	50	50.5	38			50.5	49.3													18							
	19	29.210	50	29.106	51	53	35			45.5	43.5													19							
	20	29.398	53	29.788		52	32			48	44													20							
	21	29.998	52	29.988	54	57	33			46.3	45													21							
	22	29.690	51	29.782	51	50	35			48.5	46.3													22							
	23	29.770	49	29.901	54	51	31			46.2	45.3													23							
	24	29.832	56	29.706	55	52	39			51	48.5													24							
	25	29.650	53	29.706	59	54	38			50.3	47													25							
	26	29.566	62	29.666	59	55	44			54.5	49.5													26							
	27	29.838	57	29.978	54	55	57			44.4	42.5													27							
	28	30.064	54	30.180	53	49	37			44.8	42.1													28							
	29	29.282	50			41.5	39.5			48.5	31													29							
	30	29.230	50	30.224	52	48	34			47.7	46.7													30							
	31	30.216	57	30.174	52	48	36			43.3	42.8													31							
	Sums.	1515.10	8 8	1513.12	11 5	52 2	11 11			4 16 11	11 14 7																				
	Means.	29.649	52.8	29.718	52.0	50.7	34.7			46.6	43.7																				
	* Total Corrections for Instrumental Errors.	-.018		-.048						+.1	-.1																				
	+ Corrections for Diurnal Range.																														
	"Corrected Means."	29.631		29.700						46.7	43.6																				
	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	28	29	30

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ms.	" meteor.
ci-cu.	" cirro-cumulus.	n.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" scud.
fr.	" frost.	sl.	" sleet.
h.-fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. h.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sq.s.	" squalls.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t.-s.	" thunder-storm.
li. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	g.	" gale of wind.
lu. ha.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1-5	Light breeze	4	Blowing hard
0.5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† for Temp. (Col. 2), = 29.631..... - .018..... = 29.613
"Corrected Mean" of Barometer at 9 P.M., minus the Correction† for Temp. (Col. 4), = 29.700..... - .048..... = 29.652
Mean at Station, corrected, and at 32°, = 29.602
Correction for Height, feet, above Mean Sea-level, = 126
Mean, reduced to 32°, and Sea-level, = 29.728
Highest Reading, corrected for Index error, on the 1 th, = 30.224
Lowest Do., Do., on the 18 th, = 28.960
Difference, or Monthly Range, = 1.264

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 3 th, = 60.0
Lowest in Month, corrected for Index errors, on the 12 th, = 26.0
Difference, or Monthly Range, = 34.0
"Corrected Mean" of all the Highest, (Col. 5), = 50.7
"Corrected Mean" of all the Lowest, (Col. 6), = 34.7
Difference, or Mean Daily Range, = 16.0
* Calculated Mean Temperature of Month, = 42.7

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the th, =
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =
Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =
"Corrected Mean," (Col. 8), of Black Bulb Min. on the th, =
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 46.7
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 43.6
†† Computed Temperature of Dew-point, = 40.1
†† Do. Elastic Force of Vapour, = .249
†† Do. Weight of Vapour in a Cubic Foot of Air, = 2.91
†† Relative Humidity, (Saturation = 100), = 79

RAIN fell on Days; Amount in Inches.

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.										
P.M.										
Mean.										

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by

(Signed)

Thomas David Gray

Greatest daily Range 28.0 on the 6th

* 29.902

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself is to secure a perfect uniformity in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite inapplicable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock (Greenwich or Railway Time only), twice a-day for some, and once, (morning or evening), for other instruments, as specified in the following remarks or at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers in some few cases, may find this impossible; in such instances they are specially requested to notify, opposite to any reading at what time it was taken, at not at 9 o'clock.

Barometer.—Weather-glasses and *aneroids*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. No one can any Barometer be used for Meteorological Observations that is not supplied with such means of adjustment or compensation as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

Two moderate-priced Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr. Alié of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its *scale-inches* are not true inches, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the scales of the *cistern* are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; their co-incidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought by the adjusting screw, to form one straight line with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *serve up* the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a good light, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the Sun's direct rays nor the heat of a fire.

In taking an Observation, the attached Thermometer is first noted; the tube must then be gently tapped and the cistern-adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index;—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be mounted in a Box, painted white outside, and black within, and fixed 4 feet above ground in an exposed position, free from merely local influences. The lids forming the sides and doors of the Boxes are arranged so as to open to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-sticks, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These boxes may be had at the Society's Office.

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maximum*." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be reunited by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly downwards, rather than the other.

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays and the least from radiation during night. Their bulbs have a black coating, which may easily be made or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Maximum*" should be freely exposed to the Sun and wind; the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat, to affect the alcohol by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes that has not been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are not graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being re-tested. The self-registering, and especially the "*Minimum*" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

The Hygrometer consists of two Thermometers, usually, but not necessarily, mounted of *one foot*. As previously stated, for the approved and well-known form of the instrument, the bulb of the upper thermometer is placed in a glass jar, the bulb of the lower thermometer being exposed to the atmosphere. The jar is specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch, free from the seats and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean and moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "*Mason's*" Hygrometer is highly objectionable, also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39.9, 40.0, or 40.1; or again, 40.4, 40.5, or 40.6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40.5, respectively. So also 40.2, and 40.3, more or less, must be registered. Rutherford's "*Max*," and "*Min*," Thermometers, the reading Rutherford's "*Max*," and "*Min*," Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of difference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

Wind.—A wind-vane ought to be elevated 12 feet at least, above surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results.

The Council would strongly recommend that every Observatory be furnished with a Hemispherical-Cup Anemometer, a self-registering instrument which shows the amount of Wind that passes in a day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Lind's Anemometer is also recommended; the method of *Estimating Wind Force* by such tables as that given in the schedule is, to say the least, unsatisfactory.

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation for observations, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an inextinguishable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

Snow-falls vary, for convenience, be registered in the rain columns, under the following conditions.—When a snow shower occurs it must be noted in the "*Remarks*," and the depth of snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indicated in every column, the observer cannot be too careful to register observations only; and nothing that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's nomen-

ature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky overhead (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds column, though their appearances and changes ought to be noted in the "*Remarks*." The amount of cloud is entered from a scale of 0 to 10, thus, when the sky overhead is half-covered by clouds, it is entered as 5, &c. &c. in this observation, and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as indicating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "*Velocity and Direction*," 9 W. S. (for example) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W. S. with one-third the (*extreme*) speed of the former. Again, in the second "*Cloud*" column, an entry of 2, 3, 4, 5, (e.g.) will indicate that the higher regions are covered to the "*amount*" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

Shadows.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column.

Direction of Winds.—As the germination and health of crops and plants greatly depend on the temperature of the soil—its amount and constancy; the Council recommend that observations of this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to 3, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. Mention must be made of the geological formation, and agricultural condition of the soil in which these thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At or near the time of high water, on the 5th, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

Temperature of Wells.—The temperature of the water at the bottoms of wells ought, when practicable, to be taken, and the depth of the well and of the water noted.

Drains.—Mention whether Schönbach's or Moffet's papers are used. Moffet's are preferred. The paper is affixed by a pin to a board in the drainage box, and the indication registered at 9 A.M. and 9 P.M. It is desired that the indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3 1/4, as an *east* entry on the schedule, will indicate that the ozone paper is tinted as 3 1/4 on the scale, that the wind is from the N.W., and that its force on the scale 0—8 is "4"; i.e., that it is blowing fresh. Boxes of Papers may be had at the Society's Office.

Electricity.—Too much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial magnetism, and as a meteorological phenomenon. A proper Electrometer is necessary to every complete meteorological observatory.

Remarks.—The "*Remarks*" column is too narrow, but unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. These of contractions ought, therefore, to be taken every advantage of, and of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns otherwise unoccupied, or in two ruled off for the purpose, from that headed "*Remarks*." It is intended that observations by the Electrometer should be entered in this manner, or on the side.

Observations in connection with the periodical return of the seasons.—Additional remarks may be made on the margin. Seasons possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

The Council recommend that *year-day* observations be taken;—viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the makers.

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary; and they consider it desirable that he should have full power to reject any instrument that, on being presented for comparison, does not afford him satisfaction.

(By Order.) A. H. B.

EDINBURGH, 24th Feb. 1850.

BOOK-POST.

EDINBURGH.

10, St Andrew Square,

Secretary of the Meteorological Society of Scotland,

Mr A. H. BURGESS,

To Remind at Royal Observatory on Tuesday 6th Nov. at 11th Am.

Kherdeen No 1

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 any have suffered from blight, disease, etc. Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

SHRUBS, ETC.	FRUITS.	PLANTS.	Other Birds, naming them.
Barberry,	Apple,	Cuckoo,	
Boulevard or Elder,	Black Currant,	Curlew,	
Broom,	Cherry,	House-Swallow,	
Hazel,	Cean,	Lapwing,	
Hawthorn,	Gooseberry,	Plover,	
Holly,	Peach,	Sand-Martin,	
Laburnum,	Pear,	Shrike,	
Lilac,	Plum,	Swain,	
Mezereum,	Strawberry,	Rail or Corn Crake,	
Mountain Ash or Rowan,			
Red Flowering Currant,			
Rhododendron Ponticum,			
Whin,			

FOREST TREES.	GRASSES.	Other Plants.	Other Birds.
Alder,	Barley,	Pease,	
Ash,	Beech,	Wheat,	
Beech,	Bracken,	Oats,	
Birch,	Elm,	Beans,	
Elm,	Larch,	Peas,	
Larch,	Oak,	Turnips,	
Oak,	Sycamore or Plane,		

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at AberdeenCounty of Aberdeenin Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 1/2 miles.

179

Height of Cistern of the Barometer above Mean Sea-level

feet, above Ground

feet.

During the MONTH of October

1860

The Hours of Observation are of Greenwich Time.

ELECTRICITY	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.						
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		Day P.M.		9 h. A.M.												
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H. Cat. Anemometer, at 9 P.M. No.	No. of hours in which it fell.	Amount in inches.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.					SUNSHINE.	No. 1.	No. 2.	No. 3.	Temperature of Air at 1 foot above and Density.	9 A.M. 9 P.M.
		† No.		No.																														
		inches.		inches.																														
	1													SW 1.5	SW 1									3	84				31		1			
	2													W 1	W 2									5	63				51		2			
	3													NW 6	NW 4									2	34				51		3			
	4													NW 2	NW 2									4	45				51		4			
	5													SW 1.5	SW 1									6	50				51		5			
	6													SW 1	W 1									1	62				50.5		6			
	7													W 2	W 3									3	49				50.5		7			
	8													NW 2	NW 1									4	60				50.5		8			
	9													NW 1.5	NW 0.5									6	40				50.5		9			
	10													SE 0.5	SE 0.5									10	05				50.5		10			
	11													N 1	N 1.5									7	34				50.5		11			
	12													SW 1.5	SW 1									4	40				50		12			
	13													SW 1	SW 1									6	65				50		13			
	14													N 1.5	NW 0.5									2	80				50		14			
	15													SW 4	SW 1.5									10	0				50		15			
	16													SW 1	SW 1									4	6				50		16			
	17													SW 1	SW 1									10	1				50		17			
	18													SW 1.5	SW 0.5									6	5				50		18			
	19													SW 2	SW 3									5	6				50		19			
	20													W 1	W 2									4	8				49.5		20			
	21													SE 0.5	SE 1.5									5	8				49.5		21			
	22													SE 0.5	SW 0.5									8	0				48.5		22			
	23													SW 0.5	SW 0.5									2	9				49.5		23			
	24													SW 1.5	SW 3									6	2				49.5		24			
	25													SW 1.5	SW 2									6	4				49.5		25			
	26													SW 3	SW 3									8	2				49.5		26			
	27													SW 0.5	SW 0.5									9	3				49		27			
	28													NE 0.5	N 0.5									6	6				49		28			
	29													N 0.5	NE 0.5									8	3				48		29			
	30													SE 0.5	S 1									10	0				48		30			
	31													S 0.5	S 0.5									10	0				48		31			
Sums.														44.5	42.5									180	190				154.5					
Means.														1.44	1.37									5.8	4.2				50.0					
* Total Corrections for Instrumental Errors.																																		
† Corrections 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	28	29	30			

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† =

for Temp. (Col. 2), =

"Corrected Mean" of Barometer at 9 P.M., minus the Correction† =

for Temp. (Col. 4), =

Mean at Station, corrected, and at 32°, =

Correction for Height, feet, above Mean Sea-level, =

Mean, reduced to 32°, and Sea-level, =

Highest Reading, corrected for Index error, on the th, =

Lowest Do., Do., on the th, =

Difference, or Monthly Range, =

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the th, =

Lowest in Month, corrected for Index errors, on the th, =

Difference, or Monthly Range, =

"Corrected Mean" of all the Highest, (Col. 5), =

"Corrected Mean" of all the Lowest, (Col. 6), =

Difference, or Mean Daily Range, =

** Calculated Mean Temperature of Month, =

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the th, =

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =

Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =

"Corrected Mean," (Col. 8), of Black Bulb Min. on the th, =

Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, =

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, =

†† Computed Temperature of Dew-point, =

†† Do. Elastic Force of Vapour, =

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

†† Relative Humidity, (Saturation = 100), =

RAIN fell on 21 Days; Amount in Inches, = 2.50

WIND.		SUMMARY.			
Direction.		N	NE	E	SE
A.M.		3	1	0	4
P.M.		2	1	0	2
Mean.		2 1/2	1	0	3

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th.

This Schedule not to be Gummed or Pasted, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by{ Alex. Bruckshank
12 Rose Street Aberdeen

(Signed)

A.B.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aburdeen, County of Aburdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1/2 miles.Height of Cistern of the Barometer above Mean Sea-level 115 feet, above Ground 18 feet.During the MONTH of November 1860

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.				CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevailing Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.											
		Barometer. † No.	Atmospheric Thermometer.	Barometer. No.	Atmospheric Thermometer.	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity, the H-Cup Anemo- meter, at 9 P.M. No.	No. of hours in which it fell.	Amount in inches. No.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	No.	No.	No.						
		inches.	"	inches.	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"					"
		†	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"					"
	1	30.216	53	30.242	50	49	37			48.5	47.3																	1					
	2	30.266	51	30.242	50	51	29			38.5	37																	2					
	3	30.244	48	30.242	48	45	24			35.7	35																	3					
	4	30.250	49	30.286	48	46	29			46	44																	4					
	5	30.368	50			48	28			46.5	43.5																	5					
	6	30.580	48	30.652	48	49	37			46	43																	6					
	7	30.634	48	30.525	49	47	32			39.3	38.7																	7					
	8	30.490	48	30.476	47	49	32			39.5	39																	8					
	9	30.538	47	30.476	42	44	32			42.5	39.2																	9					
	10	30.378	43	29.820	45	44	29			38.3	36.8																	10					
	11	30.018	46	29.820	45	45	32			44.7	42																	11					
	12	29.768	46	29.676	45	45	36			43	42																	12					
	13	29.564	46	29.580	46	45	34			44	43.3																	13					
	14	29.316	44	29.720		45	30			39.4	38.3																	14					
	15	29.894	47	29.930	45	44	32			39.6	37.3																	15					
	16	29.192	45	29.352	42	42	28			39	35.5																	16					
	17	29.370	44	29.572	43	43.5	22			33	31.5																	17					
	18	29.706	44	29.774	41	38.5	23			32.3	32.3																	18					
	19	29.864	40	29.892	40	35.5	22			33	32.5																	19					
	20	29.818	40	29.688	46	39	23			37.5	37																	20					
	21	29.506	47	29.312	47	45	31			45	44.7																	21					
	22	29.410	48	29.772	45	47	37			45.6	45																	22					
	23	29.906	44	29.768	45	46	34			41.3	39																	23					
	24	29.900	45	29.730	43	49	32			39.5	38.5																	24					
	25	29.768	44	29.780	44	42	32			41.8	38.4																	25					
	26	29.812	44	29.784	41	43	30			37.2	36.7																	26					
	27	29.754	42	29.730	37	40	28			35.3	32.5																	27					
	28	29.980	37	29.884	39	43.8	19			27.3	27																	28					
	29	29.908	41	29.956	43	40	20			40	38.8																	29					
	30	29.906	44	29.700	45	43.3	33			43.3	41.7																	30					
	31																											31					
Sums.		712 13	14	161 58	12	151	12			179	169																						
		27.324	16.3	23.841	12	41.27	8.887			122.6	107.5																						
Means.		29.911	45.4	29.883	44.6	44.3	29.6			40.8	38.6																						
* Total Corrections for Instrumental Errors.		-0.08		-0.08						+1	-1																						
† Corrections for Diurnal Range.																																	
"Corrected Means."		29.893		29.865						40.9	38.5																						
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	28	29	30		

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ms.	" meteors.
ci-cu.	" cirro-cumulus.	n.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h.r.	" heavy rain.
cu-s.	" cumulo-stratus.	c.h.r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" scud.
fr.	" frost.	st.	" sleet.
h-fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. ha.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sq.	" squalls.
l.	" lightning.	t.	" thunder.
l. cl.	" light clouds.	t-s.	" thunder-storm.
l. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	g.	" gale of wind.
lu. ha.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1.5	Light breeze	4	Blowing hard
0.5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† for Temp. (Col. 2), = 29.848"Corrected Mean" of Barometer at 9 P.M., minus the Correction† for Temp. (Col. 4), = 29.821Mean at Station, corrected, and at 32°, = 29.834Correction for Height, feet, above Mean Sea-level, = 12.6Mean, reduced to 32°, and Sea-level, = 29.960Highest Reading, corrected for Index error, on the 6 th, = 30.652Lowest Do., Do., on the 15 th, = 28.894Difference, or Monthly Range, = 1.758S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 2 th, = 57.0Lowest in Month, corrected for Index errors, on the 28 th, = 19.0Difference, or Monthly Range, = 38.0"Corrected Mean" of all the Highest, (Col. 5), = 44.3"Corrected Mean" of all the Lowest, (Col. 6), = 29.6Difference, or Mean Daily Range, = 14.7** Calculated Mean Temperature of Month, = 37.0

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index errors), on the th, =

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =

Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =

"Corrected Mean," (Col. 8), of Black Bulb Min. on the th, =

Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 40.89Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 38.5†† Computed Temperature of Dew-point, = 35.5†† Do. Elastic Force of Vapour, = 2.08†† Do. Weight of Vapour in a Cubic Foot of Air, = 2.41†† Relative Humidity, (Saturation = 100), = 82

RAIN fell on Days; Amount in Inches, =

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Mean Velocity in miles per day.
A.M.										
P.M.										
Mean.										

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by

(Signed)

Thomas David Gray

Greatest daily range 22.0 on the 2^d

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a perfect uniformity in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from many Stations, so very considerable as to render them quite incompatible, may arise from dissimilarity in the position or shelter of instruments, different hours of observations, or even from the use of differently constructed instruments. It is therefore hoped, that these persons who kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock (Greenwich or Railway Time only), twice a-day for some, and once (morning or evening), for other instruments as specified in the following remarks, on at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

Barometer.—*Weather-glasses and Anemometers*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Not can any Barometer be used for Meteorological Observations that is not supplied with such means of adjustment or compensation as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a Standard.

Two moderate-priced Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scale-marks are not true inches, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; when passes freely through the lid and case of the cistern. When the *index* on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its own frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the vernier.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the Vory peg must be screwed so as to form a tight plug to the cistern. Then screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a sharp tap is produced. If this is prevented by air it may be removed to the cistern, and got rid of by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the Vory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a good light, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the Sun's direct rays nor the heat of a fire.

In taking an Observation, the attached Thermometer is first noted; the tube must then be gently tapped and the cistern-adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly, so as to prevent heat from the observer's hands and perspiration affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Provision of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The lids forming the sides and doors of the Boxes are arranged so as to once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self-registering Thermometers.—Professor Phillips's and Negretti and Zambra's Patent "Macman" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Macman" Thermometer of Rutherford is also recommended when graduated on the glass stem and affixed to a frame separate from the "Macmanum." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-secured by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating the part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly downwards, rather than the other.

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays, and to the Hygrometers for measuring the humidity of the air. Hygrometers have a black coating, which may easily be made, or renewed, by the application of fine blue or black ink, and painted in a line. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "Macmanum" should be freely exposed to the Sun, and the "Hygrometer" should be placed in a position where it is not exposed to the direct rays of the Sun, but where it is not exposed to the wind. The surface of the glass, in a position where it is not exposed to the direct rays of the Sun, but where it is not exposed to the wind. The surface of the glass, in a position where it is not exposed to the direct rays of the Sun, but where it is not exposed to the wind.

Hygrometer.—The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As a general rule, the thermometer for the greatest heat from the Sun's rays, and the thermometer for the humidity of the air, are mounted on one frame. The thermometer for the greatest heat from the Sun's rays, and the thermometer for the humidity of the air, are mounted on one frame. The thermometer for the greatest heat from the Sun's rays, and the thermometer for the humidity of the air, are mounted on one frame.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the top of the index or column of mercury. The reading should be taken to tenths of a degree, and noted in decimals. Thus the thermometer will be read 39.9, 40.0, or 40.1; or 40.4, 40.5, or 40.6, according as it has, over a little under, an exact coincidence with, or little over 40, or 40.1, respectively. So also 40.1, 40.2, 40.3, 40.4, 40.5, 40.6, 40.7, 40.8, 40.9, 41.0, 41.1, 41.2, 41.3, 41.4, 41.5, 41.6, 41.7, 41.8, 41.9, 42.0, 42.1, 42.2, 42.3, 42.4, 42.5, 42.6, 42.7, 42.8, 42.9, 43.0, 43.1, 43.2, 43.3, 43.4, 43.5, 43.6, 43.7, 43.8, 43.9, 44.0, 44.1, 44.2, 44.3, 44.4, 44.5, 44.6, 44.7, 44.8, 44.9, 45.0, 45.1, 45.2, 45.3, 45.4, 45.5, 45.6, 45.7, 45.8, 45.9, 46.0, 46.1, 46.2, 46.3, 46.4, 46.5, 46.6, 46.7, 46.8, 46.9, 47.0, 47.1, 47.2, 47.3, 47.4, 47.5, 47.6, 47.7, 47.8, 47.9, 48.0, 48.1, 48.2, 48.3, 48.4, 48.5, 48.6, 48.7, 48.8, 48.9, 49.0, 49.1, 49.2, 49.3, 49.4, 49.5, 49.6, 49.7, 49.8, 49.9, 50.0, 50.1, 50.2, 50.3, 50.4, 50.5, 50.6, 50.7, 50.8, 50.9, 51.0, 51.1, 51.2, 51.3, 51.4, 51.5, 51.6, 51.7, 51.8, 51.9, 52.0, 52.1, 52.2, 52.3, 52.4, 52.5, 52.6, 52.7, 52.8, 52.9, 53.0, 53.1, 53.2, 53.3, 53.4, 53.5, 53.6, 53.7, 53.8, 53.9, 54.0, 54.1, 54.2, 54.3, 54.4, 54.5, 54.6, 54.7, 54.8, 54.9, 55.0, 55.1, 55.2, 55.3, 55.4, 55.5, 55.6, 55.7, 55.8, 55.9, 56.0, 56.1, 56.2, 56.3, 56.4, 56.5, 56.6, 56.7, 56.8, 56.9, 57.0, 57.1, 57.2, 57.3, 57.4, 57.5, 57.6, 57.7, 57.8, 57.9, 58.0, 58.1, 58.2, 58.3, 58.4, 58.5, 58.6, 58.7, 58.8, 58.9, 59.0, 59.1, 59.2, 59.3, 59.4, 59.5, 59.6, 59.7, 59.8, 59.9, 60.0, 60.1, 60.2, 60.3, 60.4, 60.5, 60.6, 60.7, 60.8, 60.9, 61.0, 61.1, 61.2, 61.3, 61.4, 61.5, 61.6, 61.7, 61.8, 61.9, 62.0, 62.1, 62.2, 62.3, 62.4, 62.5, 62.6, 62.7, 62.8, 62.9, 63.0, 63.1, 63.2, 63.3, 63.4, 63.5, 63.6, 63.7, 63.8, 63.9, 64.0, 64.1, 64.2, 64.3, 64.4, 64.5, 64.6, 64.7, 64.8, 64.9, 65.0, 65.1, 65.2, 65.3, 65.4, 65.5, 65.6, 65.7, 65.8, 65.9, 66.0, 66.1, 66.2, 66.3, 66.4, 66.5, 66.6, 66.7, 66.8, 66.9, 67.0, 67.1, 67.2, 67.3, 67.4, 67.5, 67.6, 67.7, 67.8, 67.9, 68.0, 68.1, 68.2, 68.3, 68.4, 68.5, 68.6, 68.7, 68.8, 68.9, 69.0, 69.1, 69.2, 69.3, 69.4, 69.5, 69.6, 69.7, 69.8, 69.9, 70.0, 70.1, 70.2, 70.3, 70.4, 70.5, 70.6, 70.7, 70.8, 70.9, 71.0, 71.1, 71.2, 71.3, 71.4, 71.5, 71.6, 71.7, 71.8, 71.9, 72.0, 72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 73.0, 73.1, 73.2, 73.3, 73.4, 73.5, 73.6, 73.7, 73.8, 73.9, 74.0, 74.1, 74.2, 74.3, 74.4, 74.5, 74.6, 74.7, 74.8, 74.9, 75.0, 75.1, 75.2, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, 75.9, 76.0, 76.1, 76.2, 76.3, 76.4, 76.5, 76.6, 76.7, 76.8, 76.9, 77.0, 77.1, 77.2, 77.3, 77.4, 77.5, 77.6, 77.7, 77.8, 77.9, 78.0, 78.1, 78.2, 78.3, 78.4, 78.5, 78.6, 78.7, 78.8, 78.9, 79.0, 79.1, 79.2, 79.3, 79.4, 79.5, 79.6, 79.7, 79.8, 79.9, 80.0, 80.1, 80.2, 80.3, 80.4, 80.5, 80.6, 80.7, 80.8, 80.9, 81.0, 81.1, 81.2, 81.3, 81.4, 81.5, 81.6, 81.7, 81.8, 81.9, 82.0, 82.1, 82.2, 82.3, 82.4, 82.5, 82.6, 82.7, 82.8, 82.9, 83.0, 83.1, 83.2, 83.3, 83.4, 83.5, 83.6, 83.7, 83.8, 83.9, 84.0, 84.1, 84.2, 84.3, 84.4, 84.5, 84.6, 84.7, 84.8, 84.9, 85.0, 85.1, 85.2, 85.3, 85.4, 85.5, 85.6, 85.7, 85.8, 85.9, 86.0, 86.1, 86.2, 86.3, 86.4, 86.5, 86.6, 86.7, 86.8, 86.9, 87.0, 87.1, 87.2, 87.3, 87.4, 87.5, 87.6, 87.7, 87.8, 87.9, 88.0, 88.1, 88.2, 88.3, 88.4, 88.5, 88.6, 88.7, 88.8, 88.9, 89.0, 89.1, 89.2, 89.3, 89.4, 89.5, 89.6, 89.7, 89.8, 89.9, 90.0, 90.1, 90.2, 90.3, 90.4, 90.5, 90.6, 90.7, 90.8, 90.9, 91.0, 91.1, 91.2, 91.3, 91.4, 91.5, 91.6, 91.7, 91.8, 91.9, 92.0, 92.1, 92.2, 92.3, 92.4, 92.5, 92.6, 92.7, 92.8, 92.9, 93.0, 93.1, 93.2, 93.3, 93.4, 93.5, 93.6, 93.7, 93.8, 93.9, 94.0, 94.1, 94.2, 94.3, 94.4, 94.5, 94.6, 94.7, 94.8, 94.9, 95.0, 95.1, 95.2, 95.3, 95.4, 95.5, 95.6, 95.7, 95.8, 95.9, 96.0, 96.1, 96.2, 96.3, 96.4, 96.5, 96.6, 96.7, 96.8, 96.9, 97.0, 97.1, 97.2, 97.3, 97.4, 97.5, 97.6, 97.7, 97.8, 97.9, 98.0, 98.1, 98.2, 98.3, 98.4, 98.5, 98.6, 98.7, 98.8, 98.9, 99.0, 99.1, 99.2, 99.3, 99.4, 99.5, 99.6, 99.7, 99.8, 99.9, 100.0, 100.1, 100.2, 100.3, 100.4, 100.5, 100.6, 100.7, 100.8, 100.9, 101.0, 101.1, 101.2, 101.3, 101.4, 101.5, 101.6, 101.7, 101.8, 101.9, 102.0, 102.1, 102.2, 102.3, 102.4, 102.5, 102.6, 102.7, 102.8, 102.9, 103.0, 103.1, 103.2, 103.3, 103.4, 103.5, 103.6, 103.7, 103.8, 103.9, 104.0, 104.1, 104.2, 104.3, 104.4, 104.5, 104.6, 104.7, 104.8, 104.9, 105.0, 105.1, 105.2, 105.3, 105.4, 105.5, 105.6, 105.7, 105.8, 105.9, 106.0, 106.1, 106.2, 106.3, 106.4, 106.5, 106.6, 106.7, 106.8, 106.9, 107.0, 107.1, 107.2, 107.3, 107.4, 107.5, 107.6, 107.7, 107.8, 107.9, 108.0, 108.1, 108.2, 108.3, 108.4, 108.5, 108.6, 108.7, 108.8, 108.9, 109.0, 109.1, 109.2, 109.3, 109.4, 109.5, 109.6, 109.7, 109.8, 109.9, 110.0, 110.1, 110.2, 110.3, 110.4, 110.5, 110.6, 110.7, 110.8, 110.9, 111.0, 111.1, 111.2, 111.3, 111.4, 111.5, 111.6, 111.7, 111.8, 111.9, 112.0, 112.1, 112.2, 112.3, 112.4, 112.5, 112.6, 112.7, 112.8, 112.9, 113.0, 113.1, 113.2, 113.3, 113.4, 113.5, 113.6, 113.7, 113.8, 113.9, 114.0, 114.1, 114.2, 114.3, 114.4, 114.5, 114.6, 114.7, 114.8, 114.9, 115.0, 115.1, 115.2, 115.3, 115.4, 115.5, 115.6, 115.7, 115.8, 115.9, 116.0, 116.1, 116.2, 116.3, 116.4, 116.5, 116.6, 116.7, 116.8, 116.9, 117.0, 117.1, 117.2, 117.3, 117.4, 117.5, 117.6, 117.7, 117.8, 117.9, 118.0, 118.1, 118.2, 118.3, 118.4, 118.5, 118.6, 118.7, 118.8, 118.9, 119.0, 119.1, 119.2, 119.3, 119.4, 119.5, 119.6, 119.7, 119.8, 119.9, 120.0, 120.1, 120.2, 120.3, 120.4, 120.5, 120.6, 120.7, 120.8, 120.9, 121.0, 121.1, 121.2, 121.3, 121.4, 121.5, 121.6, 121.7, 121.8, 121.9, 122.0, 122.1, 122.2, 122.3, 122.4, 122.5, 122.6, 122.7, 122.8, 122.9, 123.0, 123.1, 123.2, 123.3, 123.4, 123.5, 123.6, 123.7, 123.8, 123.9, 124.0, 124.1, 124.2, 124.3, 124.4, 124.5, 124.6, 124.7, 124.8, 124.9, 125.0, 125.1, 125.2, 125.3, 125.4, 125.5, 125.6, 125.7, 125.8, 125.9, 126.0, 126.1, 126.2, 126.3, 126.4, 126.5, 126.6, 126.7, 126.8, 126.9, 127.0, 127.1, 127.2, 127.3, 127.4, 127.5, 127.6, 127.7, 127.8, 127.9, 128.0, 128.1, 128.2, 128.3, 128.4, 128.5, 128.6, 128.7, 128.8, 128.9, 129.0, 129.1, 129.2, 129.3, 129.4, 129.5, 129.6, 129.7, 129.8, 129.9, 130.0, 130.1, 130.2, 130.3, 130.4, 130.5, 130.6, 130.7, 130.8, 130.9, 131.0, 131.1, 131.2, 131.3, 131.4, 131.5, 131.6, 131.7, 131.8, 131.9, 132.0, 132.1, 132.2, 132.3, 132.4, 132.5, 132.6, 132.7, 132.8, 132.9, 133.0, 133.1, 133.2, 133.3, 133.4, 133.5, 133.6, 133.7, 133.8, 133.9, 134.0, 134.1, 134.2, 134.3, 134.4, 134.5, 134.6, 134.7, 134.8, 134.9, 135.0, 135.1, 135.2, 135.3, 135.4, 135.5, 135.6, 135.7, 135.8, 135.9, 136.0, 136.1, 136.2, 136.3, 136.4, 136.5, 136.6, 136.7, 136.8, 136.9, 137.0, 137.1, 137.2, 137.3, 137.4, 137.5, 137.6, 137.7, 137.8, 137.9, 138.0, 138.1, 138.2, 138.3, 138.4, 138.5, 138.6, 138.7, 138.8, 138.9, 139.0, 139.1, 139.2, 139.3, 139.4, 139.5, 139.6, 139.7, 139.8, 139.9, 140.0, 140.1, 140.2, 140.3, 140.4, 140.5, 140.6, 140.7, 140.8, 140.9, 141.0, 141.1, 141.2, 141.3, 141.4, 141.5, 141.6, 141.7, 141.8, 141.9, 142.0, 142.1, 142.2, 142.3, 142.4, 142.5, 142.6, 142.7, 142.8, 142.9, 143.0, 143.1, 143.2, 143.3, 143.4, 143.5, 143.6, 143.7, 143.8, 143.9, 144.0, 144.1, 144.2, 144.3, 144.4, 144.5, 144.6, 144.7, 144.8, 144.9, 145.0, 145.1, 145.2, 145.3, 145.4, 145.5, 145.6, 145.7, 145.8, 145.9, 146.0, 146.1, 146.2, 146.3, 146.4, 146.5, 146.6, 146.7, 146.8, 146.9, 147.0, 147.1, 147.2, 147.3, 147.4, 147.5, 147.6, 147.7, 147.8, 147.9, 148.0, 148.1, 148.2, 148.3, 148.4, 148.5, 148.6, 148.7, 148.8, 148.9, 149.0, 149.1, 149.2, 149.3, 149.4, 149.5, 149.6, 149.7, 149.8, 149.9, 150.0, 150.1, 150.2, 150.3, 150.4, 150.5, 150.6, 150.7, 150.8, 150.9, 151.0, 151.1, 151.2, 151.3, 151.4, 151.5, 151.6, 151.7, 151.8, 151.9, 152.0, 152.1, 152.2, 152.3, 152.4, 152.5, 152.6, 152.7, 152.8, 152.9, 153.0, 153.1, 153.2, 153.3, 153.4, 153.5, 153.6, 153.7, 153.8, 153.9, 154.0, 154.1, 154.2, 154.3, 154.4, 154.5, 154.6, 154.7, 154.8, 154.9, 155.0, 155.1, 155.2, 155.3, 155.4, 155.5, 155.6, 155.7, 155.8, 155.9, 156.0, 156.1, 156.2, 156.3, 156.4, 156.5, 156.6, 156.7, 156.8, 156.9, 157.0, 157.1, 157.2, 157.3, 157.4, 157.5, 157.6, 157.7, 157.8, 157.9, 158.0, 158.1, 158.2, 158.3, 158.4, 158.5, 158.6, 158.7, 158.8, 158.9, 159.0, 159.1, 159.2, 159.3, 159.4, 159.5, 159.6, 159.7, 159.8, 159.9, 160.0, 160.1, 160.2, 160.3, 160.4, 160.5, 160.6, 160.7, 160.8, 160.9, 161.0, 161.1, 161.2, 161.3, 161.4, 161.5, 161.6, 161.7, 161.8, 161.9, 162.0, 162.1, 162.2, 162.3, 162.4, 162.5, 162.6, 162.7, 162.8, 162.9, 163.0, 163.1, 163.2, 163.3, 163.4, 163.5, 163.6, 163.7, 163.8, 163.9, 164.0, 164.1, 164.2, 164.3, 164.4, 164.5, 164.6, 164.7, 164.8, 164.9, 165.0, 165.1, 165.2, 165.3, 165.4, 165.5, 165.6, 165.7, 165.8, 165.9, 166.0, 166.1, 166.2, 166.3, 166.4, 166.5, 166.6, 166.7, 166.8, 166.9, 167.0, 167.1, 167.2, 167.3, 167.4, 167.5, 167.6, 167.7, 167.8, 167.9, 168.0, 168.1, 168.2, 168.3, 168.4, 168.5, 168.6, 168.7, 168.8, 168.9, 169.0, 169.1, 169.2, 169.3, 169.4, 169.5, 169.6, 169.7, 169.8, 169.9, 170.0, 170.1, 170.2, 170.3, 170.4, 170.5, 170.6, 170.7, 170.8, 170.9, 171.0, 171.1, 171.2, 171.3, 171.4, 171.5, 171.6, 171.7, 171.8, 171.9, 172.0, 172.1, 172.2, 172.3, 172.4, 172.5, 172.6, 172.7, 172.8, 172.9, 173.0, 173.1, 173.2, 173.3, 173.4, 173.5, 173.6, 173.7, 173.8, 173.9, 174.0, 174.1, 174.2, 174.3, 174.4, 174.5, 174.6, 174.7, 174.8, 174.9, 175.0, 175.1, 175.2, 175.3, 175.4, 175.5, 175.6, 175.7, 175.8, 175.9, 176.0, 176.1, 176.2, 176.3, 176.4, 176.5, 176.6, 176.7, 176.8, 176.9, 177.0, 177.1, 177.2, 177.3, 177.4, 177.5, 177.6, 177.7, 177.8, 177.9, 178.0, 178.1, 178.2, 178.3, 178.4, 178.5, 178.6, 178.7, 178.8, 178.9, 179.0, 179.1, 179.2, 179.3, 179.4, 179.5, 179.6, 179.7, 179.8, 179.9, 180.0, 180.1, 180.2, 180.3, 180.4, 180.5, 180.6, 180.7, 180.8, 180.9, 181.0, 181.1, 181.2, 181.3, 181.4, 181.5, 181.6, 181.7, 181.8, 181.9, 182.0, 182.1, 182.2, 182.3, 182.4, 182.5, 182.6, 182.7, 182.8, 182.9, 183.0, 183.1, 183.2, 183.3, 183.4, 183.5, 183.6, 183.7, 183.8, 183.9, 184.0, 184.1, 184.2, 184.3, 184.4, 184.5, 184.6, 184.7, 184.8, 184.9, 185.0, 185.1, 185.2, 185.3, 185.4, 185.5, 185.6, 185.7, 185.8, 185.9, 186.0, 186.1, 186.2, 186.3, 186.4, 186.5, 186.6, 186.7, 186.8, 186.9, 187.0, 187.1, 187.2, 187.3, 187.4, 187.5, 187.6, 187.7, 187.8, 187.9, 188.0, 188.1, 188.2, 188.3, 188.4, 188.5, 188.6, 188.7, 188.8, 188.9, 189.0, 189.1, 189.2, 189.3, 189.4, 189.5, 189.6, 189.7, 189.8, 189.9, 190.0, 190.1, 190.2, 190.3, 190.4, 190.5, 190.6, 190.7, 190.8, 190.9, 191.0, 191.1, 191.2, 191.3, 191.4, 191.5, 191.6, 191.7, 191.8, 191.9, 192.0, 192.1, 192.2, 192.3, 192.4, 192.5, 192.6, 192.7, 192.8, 192.9, 193.0, 193.1, 193.2, 193.3, 1

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N., Long. 2° 6' W., Distance from Sea 115 miles.Height of Cistern of the Barometer above Mean Sea-level 115 feet, above Ground feet.During the MONTH of December 1860

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.				CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Amount in inches.		9 A.M.		P.M.		9 h. A.M.								
		Barometer.	Attached Ther- mometer.	Barometer.	Attach- ed Ther- mometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	Amount in inches.	Velocity (0—6), and Direction.	Amount (0—10), and Species.	Velocity (0—6), and Direction.	Amount (0—10), and Species.	No.	No.	No.						
		<i>No. 1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>10</i>	<i>11</i>	<i>12</i>	<i>13</i>	<i>14</i>	<i>15</i>	<i>16</i>	<i>17</i>	<i>18</i>	<i>19</i>	<i>20</i>	<i>21</i>	<i>22</i>	<i>23</i>	<i>24</i>	<i>25</i>	<i>26</i>	<i>27</i>				
		Inches.		Inches.																												
	1	29.676	47	29.792	48	46	36			45	44.6																	1				
	2	29.764	46	29.740	46	47	38			43.5	41.5																	2				
	3	29.676	43	29.624	43	45	35			41.7	40.5																	3				
	4	29.530	43	29.398	44	42.5	33			40.6	39.2																	4				
	5	29.344	45	29.316	47	44	34			43.6	42.3																	5				
	6	29.250	47	28.774	48	45	37			44.6	43.6																	6				
	7	28.928	48	28.880	48	44	36			43.3	42.6																	7				
	8	28.804	48			47	36			44.3	43																	8				
	9	29.096	48	29.316	48	46	36			45.3	44.3																	9				
	10	29.438	48	29.560	44	47	35.5			44	43.3																	10				
	11	29.756	45	29.976	45	44	35			42.5	40.7																	11				
	12	30.048	46	30.110	41	42	32			41.5	40.5																	12				
	13	30.132	45	30.120	44	43	30			38.6	38																	13				
	14	30.076	43	30.144	45	42	34			40	39.6																	14				
	15	30.184	43	30.090	45	46	32.5			37.5	35.6																	15				
	16	30.046	44	29.976	44	42	35			38	37																	16				
	17	29.818	41	29.590	40	39	32			34.5	34.3																	17				
	18	29.488	38	29.380	38	37	27			28.5	28																	18				
	19	29.444	37	29.676	36	34	25			28.6	26.6																	19				
	20	29.936	36	30.028	37	35	20			34.3	32.5																	20				
	21	30.110	36	30.072	32	35	30			32	31.5																	21				
	22	29.964	43	-		33	27			30	29.5																	22				
	23	29.638	41	29.434	44	32.5	23			24.3	24																	23				
	24	29.294	32	29.276	26	25	13			14.5	14																	24				
	25	29.372	24	29.450	22	16	9			11																		25				
	26	29.488	20			17.8	7			17.8	17.3																	26				
	27	29.616	35	29.780	35	35	18			34	32.5																	27				
	28	29.872	35	30.074	32	36	29.5			29.5																		28				
	29	30.104	34	29.816	36	32	27			32	31.5																	29				
	30	29.538	38	29.580	40	37.5	31			36.5	35.3																	30				
	31	29.712	40	29.584	39	40	38			39.8	37.5																	31				
	Sums.	1515.15	44	1216.8	43	37	117.3			121.3	121.8																					
	Means.	29.656	40.6	29.662	41.2	38.6	29.4			35.5	33.3																					
	* Total Corrections for Instrumental Errors.	-0.018		-0.018		+4				+1	-1																					
	† Corrections for Diurnal Range.																															
	"Corrected Means."	29.632		29.644		39.0				35.6	33.2																					
	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				

a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ms.	" meteors.
ci-cu.	" cirro-cumulus.	n.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" squall.
fr.	" frost.	sl.	" sleet.
h-fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. ha.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sq.	" squalls.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t-s.	" thunder-storm.
li. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	g.	" gale of wind.
lu. lu.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0—6.	Common Designation.	Estimated Force, 0—6.	Common Designation.	Estimated Force, 0—6.	Common Designation.
0	Calm	1-5	Light breeze	4	Blowing hard
0-5	Very light air	2-	Fresh breeze	5	Blowing a gale
1-	Light air	3-	Very fresh	6	Violent gale

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
cl.	" cirrus.	ms.	" meteors.
ci-cu.	" cirro-cumulus.	n.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" scud.
fr.	" frost.	sl.	" sleet.
h. fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. ha.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sq.	" squalls.
l.	" lightning.	t.	" thunder.
l. cl.	" light clouds.	t. s.	" thunder-storm.
l. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	sc.	" gale of wind.
lu. ha.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 7-9.	Common Designation.	Estimated Force, 10-12.	Common Designation.
0	Calm	1.5	Light breeze	4	Blowing hard
0.5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† = 29.599
for Temp. (Col. 2), = 29.632..... - 0.033.....
"Corrected Mean" of Barometer at 9 P.M., minus the Correction† = 29.611
for Temp. (Col. 4), = 29.644..... - 0.033.....
Mean at Station, corrected, and at 32°, = 29.605
Correction for Height, feet, above Mean Sea-level, = 126
Mean, reduced to 32°, and Sea-level, = 29.731
Highest Reading, corrected for Index error, on the 16th, = 30.184
Lowest Do., Do., on the 6th, = 28.774
Difference, or Monthly Range, = 1.410

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 2th, = 47.4
Lowest in Month, corrected for Index errors, on the 26th, = 7.0
Difference, or Monthly Range, = 40.4
"Corrected Mean" of all the Highest, (Col. 5), = 39.0
"Corrected Mean" of all the Lowest, (Col. 6), = 29.4
Difference, or Mean Daily Range, = 9.6
** Calculated Mean Temperature of Month, = 34.4

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the th, =
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =
Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =
"Corrected Mean," (Col. 8), of Black Bulb Min. on the th, =
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 35.6
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 33.2
†† Computed Temperature of Dew-point, = 29.5
†† Do. Elastic Force of Vapour, = 1.684
†† Do. Weight of Vapour in a Cubic Foot of Air, = 1.94
†† Relative Humidity, (Saturation = 100), = 78

RAIN fell on Days; Amount in Inches, =

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.										
P.M.										
Mean.										

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by

(Signed)

Thomas David Gray

Greatest daily range 17.0 on the 27th

575 16
534 15

The Minimum thermometer remained as it was till last month, till the 13th of December, when, by following the directions on the back of the Schedule, I got back the spirit from the far end of the tube, and believe that since then its readings have not been too low. T. D. Gray.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance, that the Scotch Meteorological Society has proposed to itself, is to secure a perfect uniformity in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incompatible, may arise from dissimilarity in the position or shelter of instruments; different hours of observation; or even from the use of differently constructed instruments.

It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire completeness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock, (Greenwich or Railway Time only), twice a-day for some, and once, (morning or evening), for other instruments, as specified, in the following remarks, or at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases may find this impossible; in such instances they are specially requested to mark approximately every reading at what time it was taken, if not at 9 o'clock.

Barometer.—Weather-glasses and Aneroids, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of adjustment or compensation as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a Standard.

Two modern-constructed Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scale-marks are not true inches, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; their co-existence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the index-line on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the vernier.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a sharp tap is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a good light, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the Sun's direct rays nor the heat of a fire.

In taking an Observation, the attached Thermometer is first noted; the tube must then be gently tapped and the cistern adjusted carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly, so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Provision of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zamboni's Patent "Maximum" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Minimum" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum." This Thermometer is liable to two disadvantages, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be reunited by striking the instrument repeatedly against the palm of the hand; when part of the spirit disintegrates by high temperature, it will be found in the upper part of the tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly downwards, rather than the other.

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays and the least from radiation during night. Their falls have a black coating, which may easily be made, or wiped, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides prevent the bulbs from the wind. The "Maximum" should be freely exposed to the Sun, and the "Minimum" should rest on wooden supports a few inches from the surface of the grass in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat to affect the alcohol by distillation.

Provision of Hygrometers.—No instrument ought to be used for Meteorological purposes that has not been carefully tested by comparison with a Standard Thermometer. When such Thermometers are not graduated on the stem, but merely on an attached scale, under-go-repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being re-tested. The self-registering, and especially the "Minimum" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube), ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

The Hygrometer consists of two Thermometers, usually, but not necessarily mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from the board, on which it may be suspended;—the water-cup must be corrected, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always clean and moist, and the water pure. In frosty weather observation is matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed. From the most cloth in ordinary circumstances. One form of "Mason's" Hygrometer is highly objectionable. The frame of "Mason's" Hygrometer is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the aforementioned requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·9, 40°·0, or 40°·1; or again, 40°·3, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°; or 40°·3, respectively. So also 40°·3, and 40°·7 or 40°·8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to note their occurrence to their proper meteorological use. In the Society's schedule, the indications registered on the 2nd, and extending till 9 P.M. on the 3rd.

Wind.—A wind-rose ought to be elevated 12 feet at least, above surrounding objects. When it oscillates incessantly, the mean direction must be taken, when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every Observatory be furnished with a Hemispherical-Cup Anemometer, a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Lind's Anemometer is also recommended; the method of Extending Wind Force by such tables as that given in the schedule is, to say the least, unsatisfactory.

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation for observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the Returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions.—When a snow-shower occurs, it must be noted in the "Remarks," and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indicated in every column, the observer cannot be too careful to register observations only; and nothing that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's nomen-

clature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the Sun's disk, (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds column, though their appearance and changes ought to be noted among the "Remarks." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky is half-covered by clouds, 5 is entered as the obscuration, and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and extent of the upper and lower regions of the atmosphere. The entries in the schedule are made in the following manner:—In the column "Upper Strata of Clouds," 2, W. (for example) will indicate that the upper strata of clouds travel with extreme velocity from S.W. to W. in the lower regions from W. to W. with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of 2, east. (i.e.,) will indicate that the lighter regions are covered to the "amount" of 4-tenths with stratus clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the cumulo-stratus kind.

Sunshine.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. **Underground Thermometers.**—As the germination and health of crops and plants greatly depend on their temperature and soil—its amount and constancy; the Council recommend that observations in this interesting department be made at 9 A.M., 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. Mention must be made of the geological formation, and agricultural condition of the soil in which these thermometers are placed. **Temperature of the Sea.**—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At or near the time of high water on the 5th, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

Temperature of Wells.—The temperature of the water at the bottoms of wells ought, when practicable, to be taken, and the depth of the well and of the water noted.

Ozone.—Mention whether Schönbain's or Moffat's papers are used—Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3·5, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 3·5 on the scale, that the wind is from the N.W., and that its force on the scale 0-6 is 4·4, i.e., that it is blowing freely. Boxes of Papers may be had at the Society's Office.

Electricity.—Too much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial magnetism, and as a meteorological phenomenon. A proper Electrometer is necessary to every complete meteorological observatory.

Remarks.—The "Remarks" column is too narrow, but unavoidable. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contrivances ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns otherwise unoccupied, or in two ruled off for the purposes, from that headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner, or on the side margin. Additional remarks may be made on the margin.

"Observations in connection with the periodic return of the seasons" possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observations ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

The Council recommend that *hour-day* observations be taken; viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the makers.

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary; and they consider it desirable that he should have full power to reject any instrument that, on being presented for completion, does not afford him satisfaction.

(By Order,) A. H. B.

Enacted at 24th Feb. 1860.

FOREST TREES.		FRUIT.		MIGRATORY BIRDS.		Other Birds, naming them.		Fishes, naming them.		Insects, naming them.		Plants, naming them.		Fossils, naming them.		Other objects, naming them.		Remarks.	
In Leaf.	First Cut.	First in Blossom.	First in Fruit.	First in Flight.	First in Nest.	First in Pair.	First in Solitary.	First in School.	First in Solitary.	First in School.	First in Solitary.	First in School.	First in Solitary.	First in School.	First in Solitary.	First in School.	First in Solitary.	First in School.	First in Solitary.
Alder.																			
Aspen.																			
Beech.																			
Birch.																			
Elm.																			
Larch.																			
Lin.																			
Oak.																			
Sycamore or Plane.																			

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

BOOK-POST.

EDINBURGH.

10, St Andrew Square,

Secretary of the Meteorological Society of Scotland,

Mr A. H. BURGESS,

To

Abderdeen
No 1

Abderdeen
Dec 1860

SCOTTISH METEOROLOGICAL SOCIETY.

187

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9', Long. 2° 6', Distance from Sea 1 1/2 miles.

Height of Cistern of the Barometer above Mean Sea-level _____ feet, above Ground _____ feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of December 1860.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				SUNSHINE.	THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.							
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.			9 h. A.M.													
		Barometer.	Attached Ther- mometer	Barometer.	Attached Ther- mometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H-Cup Anemo- meter, at 9 P.M. No.	No. of hours in which it fell.	Amount in inches.	Velocity (0-10), and Direction.		Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.					Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of WELL, at Depth of feet. No.	Temperature at 1 fathoms and Density.	9 A.M. 9 P.M.
		† No.		No.																																
	1	inches.		inches.																																
	2													SE	2	SE	3																1			
	3													SE	2	SE	3																2			
	4													SE	2	SE	2																			
	5													SE	0.5	SE	2																			
	6													SE	0.5	SE	1.5																			
	7													SE	0.5	SE	2																			
	8													SW	1	SW	1																			
	9													SW	1	SW	1																			
	10													SE	2	SE	2																			
	11													SE	2	SE	2																			
	12													SE	1	SW	0.5																			
	13													SW	0.5	N	0.5																			
	14													SW	0.5	SW	0.5																			
	15													SW	0.5	SW	0.5																			
	16													SW	0.5	N	0.5																			
	17													N	2	N	2																			
	18													N	2	N	2																			
	19													N	1	SE	0.5																			
	20													N	2	N	0.5																			
	21													SE	1	N	0.5																			
	22													N	2	N	2																			
	23													N	1	N	1																			
	24													SW	1	N	2																			
	25													N	0.5	N	0.5																			
	26													N	0.5	N	0.5																			
	27													SW	0.5	SW	0.5																			
	28													SE	2	SE	2																			
	29													SW	0.5	SW	0.5																			
	30													SW	1	SW	2																			
	31													SE	3	SE	3																			
														SE	2	SE	3																			
	Sums.													38.5	45																					
	Means.													124	14																					
	* Total Corrections for Instrumental Errors.																																			
	Corrections 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	28	29	30					

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction +
for Temp. (Col. 2), = _____
"Corrected Mean" of Barometer at 9 P.M., minus the Correction +
for Temp. (Col. 4), = _____
Mean at Station, corrected, and at 32°, = _____
Correction for Height, feet, above Mean Sea-level, = _____
Mean, reduced to 32°, and Sea-level, = _____
Highest Reading, corrected for Index error, on the _____ th, = _____
Lowest Do., Do., on the _____ th, = _____
Difference, or Monthly Range, = _____

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the _____ th, = _____
Lowest in Month, corrected for Index errors, on the _____ th, = _____
Difference, or Monthly Range, = _____
"Corrected Mean" of all the Highest, (Col. 5), = _____
"Corrected Mean" of all the Lowest, (Col. 6), = _____
Difference, or Mean Daily Range, = _____
* Calculated Mean Temperature of Month, = _____

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the _____ th, = _____
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = _____
Lowest at Night, Black Bulb, (corrected for Index errors), on the _____ th, = _____
"Corrected Mean," (Col. 8), of Black Bulb Min. on the _____ th, = _____
Difference of above Means or Range ("exposed"), = _____

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = _____

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = _____

+ Computed Temperature of Dew-point, = _____

+ Do. Elastic Force of Vapour, = _____

+ Do. Weight of Vapour in a Cubic Foot of Air, = _____

+ Relative Humidity, (Saturation = 100), = _____

RAIN, fall on _____ 26 Days; Amount in Inches 5.6
Rain on 16 days

WIND.												SUMMARY.			
Direction.	N	NE	E	SE	S	SW	W	NW	Variable.	Mean Force.	Mean Velocity in miles per day.				
A.M.	4	0	0	13	0	8	2	4	0	1.24					
P.M.	3	1	0	12	2	4	4	5	0	1.4					
Mean.	3 1/2	0	0	12 1/2	1	6	4 1/2	4 1/2	0	1.3					

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by Alexr Cruickshank
12 Rose St Aberdeen

(Signed) A.C.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS,

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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Barometer.—*Weather-glasses* and *Aneroids*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of *adjustment* or *compensation* as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

Two moderate-sized Barometers have been approved of by the Council; if properly tested and adjusted, they are found well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr. Adie & Co. London, the use of which is attended with the great advantage of requiring no adjustment of the cistern. Its *scale-index* are not true inches, but so much shorter as to compensate for the expansion of the cistern. This form of instrument has been adopted by the Board of Trade, and has gained the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather, and thus by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; its coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame, the surface of the mercury is then at the exact height, from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

When a Barometer having adjustable surfaces, has to be removed from its fastenings, the ivory peg must be screwed up so as to form a tight plug to the cistern. Then *serve up* the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is given, and it is prevented by air it may be removed to the cistern, and *serve up* by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a good *light*, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the Sun's direct rays nor the heat of a fire. **Adjustment.**—In taking an *Observation*, the attached Thermometer is first adjusted: the tube must then be gently tapped and the cistern adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the *index*, and the *index* itself, usually the lower edge of the *index*, must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as to once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maximum*." This Thermometer is liable to two departures, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit distils by high temperature, it will be found in the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating that part over a lamp: the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly downwards, rather than the other.

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays and the least from radiation during night. Their bulbs have a black coating which may easily be made, or mended, by the application of a mixture of lamp black and primer's ink. They are placed in winded blackened boxes, whose sides protect the bulbs from the sun's rays, and whose tops are open to the wind. The "*Maximum*" should be freely exposed to the Sun, and the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat, to affect the alcohol by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes that has not been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are not graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "*Minimum*," Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube), ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

The *Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and *calibrated form* of this apparatus seriously vitiate the Hygrometrical Deductions, Observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton which also supplies it with water. It must be seen to by the observer that the *muslin* is always *clean* and *new*, and that the water is *pure*. In these latter directions is a matter of much delicacy, and must be well attended to. The bulb must be moistened by immersion in water for 30 minutes before the hour of observation. From the turn of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "*Hygrometer*" is highly objectionable. The frame of the "*Hygrometer*" is enclosed in a case, which also supports the wet bulb underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tube case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading might be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·9, 40°·0, or 40°·1, or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40½, respectively. So also 40½, and 40¾, or 40·8, must be registered 40·2, or 40·3, and 40·7, or 40·8, respectively. In reading the Thermometer, the eye must be at the same level as the tip of the index, and the index must be at the same level as the tip of the index. The Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the Self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

Wind.—A wind-vane ought to be elevated 12 feet at least, above surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower stem of clouds overhead, and to the direction of smoke from chimneys, and to the direction of the wind, as indicated by the wind-vane, which is next to the sun.

Clouds are registered in the following manner:—*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*, *28*, *29*, *30*, *31*, *32*, *33*, *34*, *35*, *36*, *37*, *38*, *39*, *40*, *41*, *42*, *43*, *44*, *45*, *46*, *47*, *48*, *49*, *50*, *51*, *52*, *53*, *54*, *55*, *56*, *57*, *58*, *59*, *60*, *61*, *62*, *63*, *64*, *65*, *66*, *67*, *68*, *69*, *70*, *71*, *72*, *73*, *74*, *75*, *76*, *77*, *78*, *79*, *80*, *81*, *82*, *83*, *84*, *85*, *86*, *87*, *88*, *89*, *90*, *91*, *92*, *93*, *94*, *95*, *96*, *97*, *98*, *99*, *100*, *101*, *102*, *103*, *104*, *105*, *106*, *107*, *108*, *109*, *110*, *111*, *112*, *113*, *114*, *115*, *116*, *117*, *118*, *119*, *120*, *121*, *122*, *123*, *124*, *125*, *126*, *127*, *128*, *129*, *130*, *131*, *132*, *133*, *134*, *135*, *136*, *137*, *138*, *139*, *140*, *141*, *142*, *143*, *144*, *145*, *146*, *147*, *148*, *149*, *150*, *151*, *152*, *153*, *154*, *155*, *156*, *157*, *158*, *159*, *160*, *161*, *162*, *163*, *164*, *165*, *166*, *167*, *168*, *169*, *170*, *171*, *172*, *173*, *174*, *175*, *176*, *177*, *178*, *179*, *180*, *181*, *182*, *183*, *184*, *185*, *186*, *187*, *188*, *189*, *190*, *191*, *192*, *193*, *194*, *195*, *196*, *197*, *198*, *199*, *200*, *201*, *202*, *203*, *204*, *205*, *206*, *207*, *208*, *209*, *210*, *211*, *212*, *213*, *214*, *215*, *216*, *217*, *218*, *219*, *220*, *221*, *222*, *223*, *224*, *225*, *226*, *227*, *228*, *229*, *230*, *231*, *232*, *233*, *234*, *235*, *236*, *237*, *238*, *239*, *240*, *241*, *242*, *243*, *244*, *245*, *246*, *247*, *248*, *249*, *250*, *251*, *252*, *253*, *254*, *255*, *256*, *257*, *258*, *259*, *260*, *261*, *262*, *263*, *264*, *265*, *266*, *267*, *268*, *269*, *270*, *271*, *272*, *273*, *274*, *275*, *276*, *277*, *278*, *279*, *280*, *281*, *282*, *283*, *284*, *285*, *286*, *287*, *288*, *289*, *290*, *291*, *292*, *293*, *294*, *295*, *296*, *297*, *298*, *299*, *300*, *301*, *302*, *303*, *304*, *305*, *306*, *307*, *308*, *309*, *310*, *311*, *312*, *313*, *314*, *315*, *316*, *317*, *318*, *319*, *320*, *321*, *322*, *323*, *324*, *325*, *326*, *327*, *328*, *329*, *330*, *331*, *332*, *333*, *334*, *335*, *336*, *337*, *338*, *339*, *340*, *341*, *342*, *343*, *344*, *345*, *346*, *347*, *348*, *349*, *350*, *351*, *352*, *353*, *354*, *355*, *356*, *357*, *358*, *359*, *360*, *361*, *362*, *363*, *364*, *365*, *366*, *367*, *368*, *369*, *370*, *371*, *372*, *373*, *374*, *375*, *376*, *377*, *378*, *379*, *380*, *381*, *382*, *383*, *384*, *385*, *386*, *387*, *388*, *389*, *390*, *391*, *392*, *393*, *394*, *395*, *396*, *397*, *398*, *399*, *400*, *401*, *402*, *403*, *404*, *405*, *406*, *407*, *408*, *409*, *410*, *411*, *412*, *413*, *414*, *415*, *416*, *417*, *418*, *419*, *420*, *421*, *422*, *423*, *424*, *425*, *426*, *427*, *428*, *429*, *430*, *431*, *432*, *433*, *434*, *435*, *436*, *437*, *438*, *439*, *440*, *441*, *442*, *443*, *444*, *445*, *446*, *447*, *448*, *449*, *450*, *451*, *452*, *453*, *454*, *455*, *456*, *457*, *458*, *459*, *460*, *461*, *462*, *463*, *464*, *465*, *466*, *467*, *468*, *469*, *470*, *471*, *472*, *473*, *474*, *475*, *476*, *477*, *478*, *479*, *480*, *481*, *482*, *483*, *484*, *485*, *486*, *487*, *488*, *489*, *490*, *491*, *492*, *493*, *494*, *495*, *496*, *497*, *498*, *499*, *500*, *501*, *502*, *503*, *504*, *505*, *506*, *507*, *508*, *509*, *510*, *511*, *512*, *513*, *514*, *515*, *516*, *517*, *518*, *519*, *520*, *521*, *522*, *523*, *524*, *525*, *526*, *527*, *528*, *529*, *530*, *531*, *532*, *533*, *534*, *535*, *536*, *537*, *538*, *539*, *540*, *541*, *542*, *543*, *544*, *545*, *546*, *547*, *548*, *549*, *550*, *551*, *552*, *553*, *554*, *555*, *556*, *557*, *558*, *559*, *560*, *561*, *562*, *563*, *564*, *565*, *566*, *567*, *568*, *569*, *570*, *571*, *572*, *573*, *574*, *575*, *576*, *577*, *578*, *579*, *580*, *581*, *582*, *583*, *584*, *585*, *586*, *587*, *588*, *589*, *590*, *591*, *592*, *593*, *594*, *595*, *596*, *597*, *598*, *599*, *600*, *601*, *602*, *603*, *604*, *605*, *606*, *607*, *608*, *609*, *610*, *611*, *612*, *613*, *614*, *615*, *616*, *617*, *618*, *619*, *620*, *621*, *622*, *623*, *624*, *625*, *626*, *627*, *628*, *629*, *630*, *631*, *632*, *633*, *634*, *635*, *636*, *637*, *638*, *639*, *640*, *641*, *642*, *643*, *644*, *645*, *646*, *647*, *648*, *649*, *650*, *651*, *652*, *653*, *654*, *655*, *656*, *657*, *658*, *659*, *660*, *661*, *662*, *663*, *664*, *665*, *666*, *667*, *668*, *669*, *670*, *671*, *672*, *673*, *674*, *675*, *676*, *677*, *678*, *679*, *680*, *681*, *682*, *683*, *684*, *685*, *686*, *687*, *688*, *689*, *690*, *691*, *692*, *693*, *694*, *695*, *696*, *697*, *698*, *699*, *700*, *701*, *702*, *703*, *704*, *705*, *706*, *707*, *708*, *709*, *710*, *711*, *712*, *713*, *714*, *715*, *716*, *717*, *718*, *719*, *720*, *721*, *722*, *723*, *724*, *725*, *726*, *727*, *728*, *729*, *730*, *731*, *732*, *733*, *734*, *735*, *736*, *737*, *738*, *739*, *740*, *741*, *742*, *743*, *744*, *745*, *746*, *747*, *748*, *749*, *750*, *751*, *752*, *753*, *754*, *755*, *756*, *757*, *758*, *759*, *760*, *761*, *762*, *763*, *764*, *765*, *766*, *767*, *768*, *769*, *770*, *771*, *772*, *773*, *774*, *775*, *776*, *777*, *778*, *779*, *780*, *781*, *782*, *783*, *784*, *785*, *786*, *787*, *788*, *789*, *790*, *791*, *792*, *793*, *794*, *795*, *796*, *797*, *798*, *799*, *800*, *801*, *802*, *803*, *804*, *805*, *806*, *807*, *808*, *809*, *810*, *811*, *812*, *813*, *814*, *815*, *816*, *817*, *818*, *819*, *820*, *821*, *822*, *823*, *824*, *825*, *826*, *827*, *828*, *829*, *830*, *831*, *832*, *833*, *834*, *835*, *836*, *837*, *838*, *839*, *840*, *841*, *842*, *843*, *844*, *845*, *846*, *847*, *848*, *849*, *850*, *851*, *852*, *853*, *854*, *855*, *856*, *857*, *858*, *859*, *860*, *861*, *862*, *863*, *864*, *865*, *866*, *867*, *868*, *869*, *870*, *871*, *872*, *873*, *874*, *875*, *876*, *877*, *878*, *879*, *880*, *881*, *882*, *883*, *884*, *885*, *886*, *887*, *888*, *889*, *890*, *891*, *892*, *893*, *894*, *895*, *896*, *897*, *898*, *899*, *900*, *901*, *902*, *903*, *904*, *905*, *906*, *907*, *908*, *909*, *910*, *911*, *912*, *913*, *914*, *915*, *916*, *917*, *918*, *919*, *920*, *921*, *922*, *923*, *924*, *925*, *926*, *927*, *928*, *929*, *930*, *931*, *932*, *933*, *934*, *935*, *936*, *937*, *938*, *939*, *940*, *941*, *942*, *943*, *944*, *945*, *946*, *947*, *948*, *949*, *950*, *951*, *952*, *953*, *954*, *955*, *956*, *957*, *958*, *959*, *960*, *961*, *962*, *963*, *964*, *965*, *966*, *967*, *968*, *969*, *970*, *971*, *972*, *973*, *974*, *975*, *976*, *977*, *978*, *979*, *980*, *981*, *982*, *983*, *984*, *985*, *986*, *987*, *988*, *989*, *990*, *991*, *992*, *993*, *994*, *995*, *996*, *997*, *998*, *999*, *1000*.

Snow-falls may, for convenience, be registered in the columns under the following conditions