

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalhousie Gardens County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 3 miles

Height of Cistern of the Barometer above Mean Sea-level 190 feet, above Ground 4 feet.

During the MONTH of January 18 67

The Hours of Observation are of Greenwich Time.

[illegible]

BAROMETER, "corrected Mean" at 5 P.M., *minus* the Correction \pm = 29.480 — 0.028
for Temp. (Col. 2), = ~~29.452~~ — 0.028 } = 29.424 } 29.452

"Corrected Mean" of Barometer at 9 P.M., *minus* the Correction \pm } = _____ }
for Temp. (Col. 4), = _____ — _____ }

Mean at Station, corrected, and at 32°, _____ = 29.4 } 29.452

Correction for height, _____ feet, above Mean Sea-level, _____ = 0.209

Mean, reduced to 32°, and Sea-level, _____ = 29.191 } 29.661

Highest Reading, corrected for Index error, on the 16 th, _____ = 29.980

Lowest Do., _____ on the 8 th, _____ = 28.430

Difference, or **Monthly Range,** _____ = 1.550

S.-R. THERMOMETER,	(in shade, etc.),	Highest in Month,	(corrected for
Index Errors), on the <u>25</u> th,.....			= <u>51.0</u>
Lowest in Month,	corrected for Index errors, on the <u>2</u> th,	= <u>9.3</u>	
Difference, or Monthly Range,			= <u>41.7</u>
" Corrected Mean " of all the Highest, (Col. 5),			<u>36.4</u> = <u>41.8</u>
" Corrected Mean " of all the Lowest, (Col. 6),			<u>23.8</u> = <u>23.4</u>
Difference, or Mean Daily Range,			<u>12.6</u> = <u>18.4</u>
** Calculated Mean Temperature of Month,			<u>30.1</u> = <u>32.5</u>

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb , (Cols. 9 and 11), =	28.5 29.9
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12), =	7.5 29.6
†† Computed Temperature of Dew-Point , =	22.7 29.3
†† Do. Elastic Force of Vapour , =	1.5 162
†† Do. Weight of Vapour in a Cubic Foot of Air , =	
†† Relative Humidity , (Saturation = 100), =	88 92
RAIN fell on 15 Days ; Amount in Inches, =	2.05

WIND.	SUMMARY.											
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.	
A.M.	65	20	87	60	0	7	60	0				
P.M.	25	21	28	74	0							
Mean.	45	20	48	62	0							

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 3rd; 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)

Mr. Thompson

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Salisbury Gardens County of Wiltshire, in Lat. _____, Long. _____, Distance from Sea 3 miles.
Height of Cistern of the Barometer above Mean Sea-level 140 feet, above Ground 4 feet.
During the MONTH of February, 1867.

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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		9 h. A.M.		6 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		6 h. P.M.		9 h. A.M.		6 h. P.M.		9 A.M.		P.M.		0 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
		Baromet.	Attach- ed Ther- mometer	Baromet.	Attach- ed Ther- mometer	Max.	Min.	Max.	Min.	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. 3 inches.	No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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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.	sc.	" squall.
f.	" fog.	st.	" status.
fr.	" frost.	sl.	" sleet.
h. fr.	" hoar-frost.	so. ha.	" solar halo.
h.	" haze.	sq.	" squall.
h. d.	" heavy dew.	squ.	" squall.
h.	" hail.	t.	" thunder.
li.	" lightning.	t. s.	" thunder storm.
li. cl.	" light clouds.	w.	" wind.
li. sh.	" light showers.	g.	" gale of wind.
lu. co.	" lunar corona.		
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., 29.7462 the Correction + 1.10 = 29.6362 648
for Temp. (Col. 2), = 29.6362 - 1.10 = 29.7462 648
"Corrected Mean" of Barometer at 9 P.M., minus the Correction + 1.10 = 29.6362 648
for Temp. (Col. 4), = 29.6362 - 1.10 = 29.7462 648
Mean at Station, corrected, and at 32°, = 29.6362 648
Correction for height, feet, above Mean Sea-level, = 1.209
Mean, reduced to 32°, and Sea-level, = 29.8453 857
Highest Reading, corrected for Index error, on the 14 th, = 30.330
Lowest Do., Do., on the 6 th, = 28.370
Difference, or Monthly Range, = 1.960

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 22 th, = 55.0
Lowest in Month, corrected for Index errors, on the 27 th, = 21.6 220
Difference, or Monthly Range, = 33.4 220
"Corrected Mean" of all the Highest, (Col. 5), = 48.5
"Corrected Mean" of all the Lowest, (Col. 6), = 34.4
Difference, or Mean Daily Range, = 13.9
** Calculated Mean Temperature of Month, = 41.4

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 41.5
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 40.43
Computed Temperature of Dew-Point, = 39.1 388
Do. Elastic Force of Vapour, = 2.34
Do. Weight of Vapour in a Cubic Foot of Air, = _____
Relative Humidity, (Saturation = 100), = 85.91
RAIN fell on 9 Days; Amount in Inches, = 0.75

WIND.	SUMMARY.									
	Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		1	2	0	0	4	12	6	3	0
P.M.		1	2	0	0	7	5	9	4	0
Mean.		1	2	0	0	6	8	8	3	0

* 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.
* Enforcing 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 Cols. 9 and 11 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.

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 3rd; 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)

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4-17

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 also 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, or from the use of dissimilarly 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 (Gregorian, or Railway Time only) twice a-day for some, and once (morning, or evening) for other instruments, as specified, in the following remarks, 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-priced Barometers have been approved 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 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 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 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 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 box will greatly facilitate an accurate adjustment and reading of the Barometer.

Position 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 "project" 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 inconveniences, 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 globe, and must be dislodged from thence by leading that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for

non-structure 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 (A. S., 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 cloud column, though their appearance and changes ought to be noted among the "Remarks." The amount of cloud is entered on a scale of 0 to 10; thus, when the sky overhead is 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," (for example,) will indicate that the upper strata of clouds travel with extreme velocity from S.W., and that those in the lower regions from W., with onegaird the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of $\frac{2}{2}$, (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.

Sunshine.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. **Lightground 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., by 12 and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping in 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 Schülein's or Mofat's papers are used. 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 5th, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 5th on the scale 0-6 is 4th; 12, that it is *blowing fresh*.

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 nor 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, 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 purpose, from that headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner 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; and 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 *term day* observations be taken;—viz., on the 21st days of March, June, September, and December.

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 which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

Envoysen, 24 December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	FRUIT.	FRUIT IN BLOSSOM.	FRUIT IN GENERAL.	NIGHT-BLOOMING PLANTS.	First Arrival.	First Departure.
Alder,	Apple,	Black Currant,	Cherry,	House-Mallow,	Curlew,	Chickadee,
Beech,	Black Currant,	Gooseberry,	Plum,	Swallow,	Starling,	Starling,
Birch,	Gooseberry,	Plum,	Swallow,	Starling,	Starling,	Starling,
Elm,	Gooseberry,	Plum,	Swallow,	Starling,	Starling,	Starling,
Larch,	Gooseberry,	Plum,	Swallow,	Starling,	Starling,	Starling,
Oak,	Gooseberry,	Plum,	Swallow,	Starling,	Starling,	Starling,
Sycamore or Plane,	Gooseberry,	Plum,	Swallow,	Starling,	Starling,	Starling,

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., in perfection; whether any have suffered from blight, disease, etc. Whether Hay, Potatoes, disease prevails among cattle; and the Agricultural condition of the district generally.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

Dalkeith
26 1867

To

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Endine, County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 1 miles.
Height of Cistern of the Barometer above Mean Sea-level 140 feet, above Ground 4 feet. During the MONTH of March, 1867.
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, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.		Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		9 h. A.M.		6 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		6 h. P.M.		9 h. A.M.		6 h. P.M.		9 A.M.		P.M.		9 h. A.M.		P.M.		Temperature of Well at Depth of feet. No. —	Temperature at 1 fathom, and Drusly.	0—10.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		Baromete * No. —	Attach- ed Ther- mometer	Barometer. No. —	Attach- ed Ther- mometer	Max. No. —	Min. No. —	Max. in Sun's rays No. —	Min. on Grass. No. —	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direc- tion.	Force	Direc- tion.	Force	Readings of the H Cup Anemometer No. —	No. of hours in which it fell.	Amount in inches.	No. —	Velocity, (0—10), and Direc- tion.	Amount, (0—10), and Species.	Velocity, (0—10), and Direc- tion.	Amount, (0—10), and Species.				SUNSHINE. Hours.						No. 3 inches.	No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction $\frac{1}{1000}$ for Temp. (Col. 2), = 29.754 - 0.34... = 29.696
"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{1}{1000}$ for Temp. (Col. 4), = 29.754 - 0.34... = 29.696
Mean at Station, corrected, and at 32°, = 29.696
Correction for height, feet, above Mean Sea-level, = 2.09
Mean, reduced to 32°, and Sea-level, = 29.897905
Highest Reading, corrected for Index error, on the 3rd, = 30.630
Lowest Do., Do., on the 26th, = 28.700
Difference, or Monthly Range, = 1.930

* 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.
† Embracing 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 Cols. 3 and 6 will be entered as the "Calculated Mean Temperature."
** 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 24th, = 56.5
Lowest in Month, corrected for Index errors, on the 21st, = 18.4
Difference, or Monthly Range, = 38.1
"Corrected Mean" of all the Highest, (Col. 5), = 42.9
"Corrected Mean" of all the Lowest, (Col. 6), = 29.7
Difference, or Mean Daily Range, = 13.2
** Calculated Mean Temperature of Month, = 36.3

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 37.4
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 35.2
† Computed Temperature of Dew-Point, = 32.2
† Do. Elastic Force of Vapour, = .182
† Do. Weight of Vapour in a Cubic Foot of Air, = _____
† Relative Humidity, (Saturation = 100), = 82
RAIN fell on 16 Days; Amount in Inches, = 0.74

WIND.												SUMMARY.		
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.			
A.M.	2	6	11	2	2	3	1	4						
P.M.	2	7	9	3	2	2	2	4						
Mean.	2	6	10	2	2	3	2	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 3rd; 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)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Edinburgh, in Lat. _____, Long. _____, Distance from Sea 3 miles.
Height of Cistern of the Barometer above Mean Sea-level 190 feet, above Ground 4 feet. During the MONTH of April 18 67.

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.				SUNSHINE. Hours.	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.		6 P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		6 P.M.		9 h. A.M.		6 P.M.		9 A.M.		P.M.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		Baromete * No. —	Attach- ed Ther- mometer	Baromete- r. No. —	Attach- ed 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.	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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	cirrus.	ms.	meteors.
ci-cu.	cirro-cumulus.	n.	nebulae.
ci-s.	cirro-stratus.	r.	rain.
cu.	cumulus.	h. r.	heavy rain.
cu-s.	cumulo-stratus.	s. h. r.	continued heavy rain.
d.	dew.	s.	status.
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.	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 †† = 29.428
for Temp. (Col. 2), = 29.428... - 0.58...
“Corrected Mean” of Barometer at 9 P.M., minus the Correction †† =
for Temp. (Col. 4), =
Mean at Station, corrected, and at 32°, = 29.428
Correction for height, feet, above Mean Sea-level, = 0.209
Mean, reduced to 32°, and Sea-level, = 29.637
Highest Reading, corrected for Index error, on the 3 th, = 30.040
Lowest Do., Do., on the 14 th, = 28.850
Difference, or Monthly Range, = 1.190

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 18 th, = 59.0
Lowest in Month, corrected for Index errors, on the 12 th, = 34.6
Difference, or Monthly Range, = 24.4
“Corrected Mean” of all the Highest, (Col. 5), = 52.5
“Corrected Mean” of all the Lowest, (Col. 6), = 40.1
Difference, or Mean Daily Range, = 12.4
** Calculated Mean Temperature of Month, = 46.3

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 grass, =
Difference of above Means or Range (“exposed”), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 47.6
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 44.8
†† Computed Temperature of Dew-Point, = 41.8
†† Do. Elastic Force of Vapour, = 0.265
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = 81
RAIN fell on // Days; Amount in Inches, = 2.60

WIND.	SUMMARY.											
	Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	0	1	2	2	3	11	9	2	0			
P.M.	0	5	0	5	3	9	7	1	0			
Mean.	0	3	1	3	3	10	8	2	0			

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 fall 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-priced Barometers have been approved of 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-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 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 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-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 laths forming the sides and doors of the Boxes are arranged so as at 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 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 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 that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

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 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 Minimum Thermometer by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has 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 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-cap 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 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 40½; respectively. So also 40½, and 40¾, more or less must be registered 40.2 or 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 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 observer 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 Linds 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.

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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 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 indeed 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

noncondense 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 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, cir-st., (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.

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 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 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 Schönbein's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indications 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 3½, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as ½, on the scale, that the wind is from the N.W.; and that its force on the scale 0—6 is 4½; i.e., that it is blowing fresh.

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. 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, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of 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-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 *terni day* observations be taken;—viz., on the 21st days of March, June, September, and December.

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 which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

EDINBURGH, 9th December 1855.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	IN	FLOWER.	LEAF BUDS.	LEAF.	DIVESTED OF LEAVES.	CROPS.	STANDING OR ABOVE GROUND.	APPEARING.	IN BAR.	FIRST CUT.
Alder,						Barley,				
Beech,						Bere or Bigg,				
Birch,						Wheat,				
Elm,						Beans,				
Larch,						Potatoes,				
Linne,						Turnips,				
Oak,						Rye Grass,				
Sycamore or Plane,										

SHRUBS, ETC.	FIRST IN BLOSSOM.	FRUITS.	FIRST IN BLOSSOM.	FRUIT RIFE.	FRUIT IN GENERAL.	MIGRATORY BIRDS.	FIRST ARRIVAL.	DEPARTURE.
Barberry,						Cuckoo,		
Bourtree or Elder,						House-Swallow,		
Broom,						Lapwing,		
Hazel,						Plover,		
Hawthorn,						Sand-Martin,		
Holly,						Starling,		
Lilac,						Swain,		
Mezerion,						Rail or Corn Crake,		
Mountain Ash or Rowan,								
Red Flowering Currant,								
Rhododendron Ponticum,								
Whin,								

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

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

Dalbeth

April 1867

To

Dalkeith Gardens, County of Mid Lothian

Height of Cistern of the Barometer above Mean Sea-level 190 feet, above Ground 4 feet.

The Hours of Observation are of Greenwich Time.

NOTATION USED IN GENERAL REMARKS.			
<i>a.</i>	<i>dentat.</i>	<i>anura.</i>	<i>ma.</i> <i>dentat.</i>
<i>cl.</i>	<i>n.</i>	<i>ciurus.</i>	<i>m.</i>
<i>cl. cu.</i>	<i>n.</i>	<i>cirro-caudus.</i>	<i>ms.</i>
<i>cl. cu.</i>	<i>n.</i>	<i>cirro stratus.</i>	<i>n.</i>
<i>cu.</i>	<i>n.</i>	<i>cumulus.</i>	<i>h. r.</i>
<i>cu. s.</i>	<i>n.</i>	<i>cumulo-stratus.</i>	<i>c. h. r.</i>
<i>d.</i>	<i>n.</i>	<i>dew.</i>	<i>al.</i>
<i>f.</i>	<i>n.</i>	<i>fog.</i>	<i>se.</i>
<i>fr.</i>	<i>n.</i>	<i>frost.</i>	<i>al.</i>
<i>h. fr.</i>	<i>n.</i>	<i>hoar-frost.</i>	<i>al.</i>
<i>h.</i>	<i>n.</i>	<i>haze.</i>	<i>so. ha.</i>
<i>h. d.</i>	<i>n.</i>	<i>heavy dew.</i>	<i>sq.</i>
<i>h.</i>	<i>n.</i>	<i>hail.</i>	<i>sq.</i>
<i>l.</i>	<i>n.</i>	<i>lightning.</i>	<i>sq.</i>
<i>li. cl.</i>	<i>n.</i>	<i>light clouds.</i>	<i>t. s.</i>
<i>li. sh.</i>	<i>n.</i>	<i>light showers.</i>	<i>t.</i>
<i>lu. co.</i>	<i>n.</i>	<i>lunar corona.</i>	<i>th.</i>
<i>lu. ha.</i>	<i>n.</i>	<i>lunar halo.</i>	<i>ts.</i>
			<i>w.</i>
			<i>g.</i>

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 6 th,.....	=	68'0
Lowest in Month, corrected for Index errors, on the 14 th,	=	30'1
Difference, or Monthly Range,	=	37'9
" Corrected Mean " of all the Highest, (Col. 5),	=	54'3
" Corrected Mean " of all the Lowest, (Col. 6),	=	40'5
Difference, or Mean Daily Range,	=	13' 8
** Calculated Mean Temperature of Month,	=	47' 4

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11),	=	48.3
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12),	=	45.8
‡ Computed Temperature of Dew-Point,	=	43.1
‡ Do. Elastic Force of Vapour,	=	.2
‡ Do. Weight of Vapour in a Cubic Foot of Air,	=	
‡ Relative Humidity, (Saturation = 100),	=	83
RAIN fell on $\frac{4}{}$ Days; Amount in Inches,	=	1.30

(Signed) Mr. Morrison

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.

Emending corrections for both cantillana and Index Entries.

The Diurnal Range for Scotland is 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 Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."

Any and all additions to 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 column, *in pencil*, *at once*.

Observations made and
Return verified by

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 dissimilarities 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 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, 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. 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-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 the 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 coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-rod* 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 off 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 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 enclosed in a Box, painted white outside, and black within, and fixed 4 feet above ground in an exposed position, free from all purely local influences. The laths forming the sides and floors of the Boxes are arranged so as to afford 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, and Negretti and Zambra's Patent "Maxim" 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 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. These instruments should be hung horizontally.

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 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 Minimum Thermometer by dissipation.

Variation of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are as 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 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 forwardly an inch, from any board on which it may be suspended;—the water-peg 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 pite. 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 fronted 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—39.3, 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 40½, more or less must be registered 40.2 or 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, 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 is situated necessarily, 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, &c.

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, will 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 unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk to 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 covered, 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 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 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 $\frac{2}{4}$, (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.

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 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 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 Schönbein's or Moffat's papers are used. 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 3½, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 3½ on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4"; i. e., that it is *blowing fresh*.

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. 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, &c. 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 on the side-margin. Additional remarks may be made on the margin of the "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 *term day* observations be taken;—i. e., on the 21st days of March, June, September, and December.

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 which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

EDINBURGH, 9th December 1862.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	In Leaf first appear.	In Leaf.	Directed of Leaves.	Barley.	Oats.	Wheat.	Beans.	Lenses.	Potatoes.	Turnips.	Rye Grass.
Alder.												
Ash.												
Beech.												
Birch.												
Elm.												
Larch.												
Time.												
Oak.												
Sycamore or Plane.												

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalruth Gardens, County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 3 miles.Height of Cistern of the Barometer above Mean Sea-level 190 feet, above Ground 4 feet.During the MONTH of June1867.

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 Direction or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.		Days of Month.		
		9 h. A.M.		6 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		6 h. P.M.		9 h. A.M.		6 h. P.M.		9 A.M.		P.M.		9 h. A.M.		6 h. P.M.												
		Baromete * No.	Attach- ed Ther- mometer	Baromete. No.	Attach- ed Ther- mometer	Max. No.	Min. No.	Max. in Sun's rays. No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Dirac- tion.	Force	Dirac- tion.	Force	Readings of the H Cup Anemometer No.	No. of hours in which it fell.	Amount in inches.	Velocity, (0-10), and Dirac- tion.	Amount, (0-10), and Species.	Velocity, (0-10), and Dirac- tion.	Amount, (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of WET at Depth of feet. No.	Temperature at 1 fathom, and Drusity.						9 A.M.	9 P.M.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°						°	°
	1	29.80	61	29.85	66	67	47			60	57	64	59	SW	W																			fine throughout	1	
	2	29.85	63	29.80	67	68	49			61	57	63	57	SW	SW																			passing clouds Am, very fine	2	
	3	29.75	60	29.72	58	65	47			55.5	54	57	57	W	SE																			dull throughout mist P.M.	3	
	4	29.70	57	29.70	63	63	49			53	52	60	54	SW	W																			heavy rain Am Bright fine P.M.	4	
	5	29.44	56	29.36	62	65	46			54	52.5	59	56	SW	SW																			very changeable throughout	5	
	6	29.35	60	29.34	62	61	51			57	55	57.5	53.5	W	W																			not cut Am, cold & dull throughout	6	
	7	29.50	53	29.70	63	55	47			45	45	41	40	E	E																			changeable cold showers	7	
	8	29.80	55	29.66	67	56	43			53	49	56	53	W	W																			very changeable with showers	8	
	9	29.85	58	29.90	68	62	47			57	58	55	58	W	W																			fine with passing clouds	9	
	10	29.98	62	30.13	65	68	56			61	55	63	57	W	W																			very fine throughout	10	
	11	30.15	62	29.98	72	76	49			60	55	72	63	W	SW																				11	
	12	29.92	63	29.90	68	64	54			56	52	55	57.5	W	W																				12	
	13	29.83	62	29.80	72	61.5	46.5			49	48	53	51	W	SE																				13	
	14	29.72	56	29.78	62	52	44			43.5	42	57	49.5	SW	SE																				14	
	15	29.92	55	29.92	58	51	44			52	50	61	59	SW	SW																				15	
	16	30.03	56	29.97	63	64.5	47			56	53	61	58	W	W																				16	
	17	30.02	60	29.97	67	68	47.5			59	57	62	59	W	W																				17	
	18	29.98	64	29.96	64	65.5	53.5			52.5	51	56	52	W	W																				18	
	19	30.02	57	30.03	61	65	42			52	50	53	50	E	E																				19	
	20	30.07	56	30.08	58	59	41.5			51	48.5	54	57	W	W																				20	
	21	30.09	55	30.08	59	59.5	46			57	52	54	53.5	W	E																				21	
	22	30.14	59	30.01	59	61.5	47			58	55	59	55	W	W																				22	
	23	29.98	60	29.94	68	61	47			52	53	58	56	SW	E																				23	
	24	30.02	57	30.02	62	67	47			60	56	64	59	SE	SE																				24	
	25	30.20	61	30.33	66	69	48			63	59	72	63	SE	SE																				25	
	26	30.47	62	30.49	71	76.5	46			63.5	60	62	59.5	W	SE																				26	
	27	30.52	66	30.47	66	67	57			61	56.5	69	63	W	W																				27	
	28	30.53	62	30.42	68	72	57			63	58	61	57	W	SW																				28	
	29	30.28	64	30.12	66	69	58			60	56	63	57	SW	SW																				29	
	30	29.90	62	29.80	65	67	50.5			Day long from 10.30 to 1.30				SW	SW																			30		
	31									13	56	52	68	52																					31	
Sums.		15 11 28 11				12 15 23 15 2				5 11 2 14 1																										
Means.		29.71	1734			1926	14345			1817	1005																									
† Total Corrections for Instrumental Errors.		29.957	595			642	478			56.1	534																									
† Corrections for Diurnal Range.						-4				+5	+5	+5	+5																							
"Corrected Means."						474				56.6	539																									
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.	" squalls.		
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.		
h.	" 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 1/2	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 †† = 29.874
for Temp. (Col. 2), = 29.957 - 0.083"Corrected Mean" of Barometre at 9 P.M., minus the Correction †† =
for Temp. (Col. 4), =Mean at Station, corrected, and at 32°, = 29.874Correction for height, feet, above Mean Sea-level, = 2.09Mean, reduced to 32°, and Sea-level, = 30.083Highest Reading, corrected for Index error, on the 28 th, = 30.530Lowest Do., Do., on the 6 th, = 29.340Difference, or Monthly Range, = 1.190S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 26 th, = 76.5Lowest in Month, corrected for Index errors, on the 20 th, = 41.1Difference, or Monthly Range, = 35.4"Corrected Mean" of all the Highest, (Col. 5), = 64.2"Corrected Mean" of all the Lowest, (Col. 6), = 47.4Difference, or Mean Daily Range, = 16.8** Calculated Mean Temperature of Month, = 55.8

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 grass, =

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading, of Dry Bulb, (Cols. 9 and 11), = 56.6Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 53.9†† Computed Temperature of Dew-Point, = 57.4†† Do. Elastic Force of Vapour, = 380

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

†† Relative Humidity, (Saturation = 100), = 83

RAIN fell on Days; Amount in Inches, =

WIND.		SUMMARY.									
Direction		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		6	2	2	0	1	3	11	5	0	
P.M.		3	3	4	1	0	4	11	4	0	
Mean.		4	2	3	0	1	4	10	5	0	

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 3rd; 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)

M. Thomson

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance that the Society has in view is to secure the most perfect uniformity in the system of observation adopted by all the Stations. A certain degree of uniformity is already secured by the publication of Monthly Results from different Stations; and it is found that the greater the uniformity, the more accurate and reliable are the results. It is therefore hoped, that persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure the most perfect uniformity in the system of observation adopted by all the Stations. Returns are accepted and value commensurate with the labor 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, at not less than 15 minutes before or after the hour. The Council recommend that the thermometer be adapted, as the latter certainly are, to different 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 fluctuations of the barometer in the cistern. It is also necessary that every Barometer should have been compared with a Standard.

Two moderate-priced Barometers have been approved for the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes. Mr. Adie's London, and an excellent Barometer is constructed by Mr. Adie's London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scale is graduated in 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 great Barometer, the sites 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 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 served 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 planing 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 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 instruments. 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, the 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" Thermometer are recommended; printed directions for their use may be obtained with each instrument. The "Minimum" Thermometer, of the same construction, 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 repaired by striking the instrument repeatedly against the palm of the hand; when the spirit has part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from place by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for Clouds.—Convenient abbreviations for the Howard's

non-transparent clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the gradation of the sky, as defined in the "Remarks" on 20 or 30 of the "Remarks." The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their extent, we ought not to take them into account in the clouds column, though their appearance and changes ought to be noted in the "Remarks." The amount of cloud is entered on 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 strata of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity of Wind," the direction and force (for example) will indicate that the wind is from the S.W. with a force of 3 miles per hour, 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 are visible should be entered in the proper column. The number of hours in which objects in the sun's rays are visible should be entered in the proper column. The number of hours in which objects in the sun's rays are visible should be entered in the proper column.

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. 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.

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 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 nor 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, color, velocity, and direction between the lower and upper strata of clouds, the color 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 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.—The Council recommend that every day observations be taken; viz., on the 21st days of March, June, September, and December. 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 Society; and they consider it desirable that he should have full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

(By Order). A. B.

EDINBURGH, 9th December 1855.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	IN FLOW.	IN LEAF.	DISEASED OF LEAVES.	BARLEY.	BARE OR BROWN.	WHEAT.	BEANS.	PEASE.	POTATOES.	TURNIPS.	RYE GRASS.
Alder.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Aspen.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Beech.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Birch.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Elm.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Larch.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Oak.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sycamore or Plane.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

SHRUBS, ETC.	FIRST IN BLOSSOM.	FRUITS.	FIRST IN BLOSSOM.	FRUIT Ripe.	DEPARTURE.
Barberry.	✓	✓	✓	✓	✓
Bornholme or Elder.	✓	✓	✓	✓	✓
Broom.	✓	✓	✓	✓	✓
Hazel.	✓	✓	✓	✓	✓
Hawthorn.	✓	✓	✓	✓	✓
Holly.	✓	✓	✓	✓	✓
Laburnum.	✓	✓	✓	✓	✓
Lilac.	✓	✓	✓	✓	✓
Mezereum.	✓	✓	✓	✓	✓
Mountain Ash or Rowan.	✓	✓	✓	✓	✓
Red flowering Currant.	✓	✓	✓	✓	✓
Rhododendron.	✓	✓	✓	✓	✓
Whin.	✓	✓	✓	✓	✓

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

EDINBURGH.

Secretary of the Meteorological Society of Scotland,

Mr ALEXANDER BUCHAN,

BOOK-POST.

Dalkeith June 1856

To



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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 3 miles.
Height of Cistern of the Barometer above Mean Sea-level 170 feet, above Ground 4 feet. During the MONTH of July 1867.

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, 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.									
		Baromet. No.	Attach. of Thermometer	Baromet. No.	Attach. of 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. 3 inches.	No. 12 inches.	No. 22 inches.							
	1	29.86	57	29.83	61	64	46			67	49	55	52	E		S												Dull generally. Sunshine after P.M.	1		
	2	29.80	58	29.79	53	62	44			67	49	49	49	E		S												Very dull throughout. Like rain.	2		
	3	29.84	57	29.78	61	63	54			57	55	57	56	S		S												Do Do Do.	3		
	4	29.65	60	29.70	62	70	54			58	57	57	56	S		S												Dull to 11 A.M. Sunshine P.M.	4		
	5	29.76	57	29.90	61	60	49			54	54	54	53	S		S												Sunshine with passing clouds.	5		
	6	29.67	57	30.63	59	62	46			56	53	54	53	S		S												Sunshine A.M. very dull P.M.	6		
	7	30.16	57	30.18	63	68	47			53	50	62	57	S		S												Bright Sunshine very fine through.	7		
	8	30.21	58	30.17	67	71	54			57	54	70	63	E		S												Do Do Do.	8		
	9	30.17	63	30.17	72	78	50			63	60	77	70	E		S													Am exceedingly fine day, through.	9	
	10	30.16	67	30.11	72	79	53			69	65	71	65	S		S												Sunshine A.M. slightly dull P.M.	10		
	11	30.06	67	29.98	73	76	54			68	64	71	67	S		S												Sunshine with passing clouds.	11		
	12	29.82	65	29.78	70	72	56			62	61	68	64	S		S													Dull with glimpses of Sun.	12	
	13	29.73	63	29.68	66	73	52			59	57	63	59	S		S													Dull A.M. Sunshine P.M.	13	
	14	29.33	61	29.49	63	61	53			55	55	58	57	S		S													Very dull with rain throughout.	14	
	15	29.87	62	29.41	61	66	47			62	57	53	54	S		S													Fine A.M. dull ending with rain P.M.	15	
	16	29.17	57	29.13	59	59	52			54	56	59	56	E		S													Heavy rain A.M. fair P.M.	16	
	17	29.23	60	29.34	68	66	52			58	56	66	58	S		S													Dull A.M. Sunshine P.M.	17	
	18	29.33	57	29.29	60	68	52			55	53	66	56	S		S													Dull with clouds of Sun ending rain.	18	
	19	29.47	56	29.61	60	61	57			63	57	58	55	S		S													Cloudy with glimpses of Sun.	19	
	20	29.66	53	29.69	60	62	54			52	49	57	54	E		S													Bright Sunshine very fine through.	20	
	21	29.40	53	29.36	56	53	46			57	54	53	53	S		S													Constant rain throughout.	21	
	22	29.33	55	29.35	58	53	50			52	52	50	57	S		S													Do Do Do.	22	
	23	29.41	54	29.60	53	56	48			50	50	49	49	E		S													Very heavy rain & cold throughout.	23	
	24	29.56	57	29.61	57	58	46			49	49	48	48	E		S													Do Do Do.	24	
	25	29.72	57	29.83	54	59	46			48	48	57	49	E		S													Light rain A.M. fair & dull P.M.	25	
	26	29.80	52	29.90	54	53	45			57	49	57	56	E		S													Cloudy with clouds of Sun.	26	
	27	29.90	54	29.93	58	63	46			52	46	57	54	S		S													Sunshine with passing clouds.	27	
	28	29.97	58	30.01	60	64	45			54	54	58	54	S		S													Dull with glimpses of Sun.	28	
	29	30.11	56	29.97	61	65	43			57	54	60	56	S		S													Bright Sunshine very fine.	29	
	30	29.93	58	29.62	61	66	50			58	55	58	57	S		S													Dull generally. Sun. P.M. 12 A.M. 2 P.M.	30	
	31	29.97	56	29.95	62	65	49			52	57	61	58	S		S													Dull A.M. Bright Sunshine P.M.	31	
	Sums.	17 13	24 15	7 13	9 15	14 8 27				17 22	16 60	18 25	17 33																		
	Means.	29.750	57.9	29.7		64.5	48.7			55.5	53.5																				
	+ Total Corrections for Instrumental Errors.						-4			+5	+5	+5	+5																		
	+ Corrections for Diurnal Range.																														
	+ "Corrected Means."						48.3			56.0	54.0																				
	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	28	29	30

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ms.	" meteors.
ci-cu.	" cirro-cumulus.	a.	" 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.	" squalls.
f.	" fog.	sc.	" sleet.
fr.	" frost.	sl.	" snow.
h. fr.	" hoar-frost.	so. ha.	" solar halo.
h.	" haze.	sq.	" squall.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	t. s.	" thunder storm.
l.	" lightning.	w.	" wind.
li. cl.	" light clouds.	g.	" gale of wind.
li. sh.	" light showers.		
lu. co.	" lunar corona.		
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 \ddagger for Temp. (Col. 2), = 29.672

"Corrected Mean" of Barometer at 9 P.M., minus the Correction \ddagger for Temp. (Col. 4), = 29.672

Mean at Station, corrected, and at 32°, = 29.672

Correction for height, feet, above Mean Sea-level, = 209

Mean, reduced to 32°, and Sea-level, = 29.881

Highest Reading, corrected for Index error, on the 8 th, = 30.210

Lowest Do., Do., on the 16 th, = 29.130

Difference, or Monthly Range, = 1.080

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 10 th, = 79.5

Lowest in Month, corrected for Index errors, on the 9 th, = 42.6

Difference, or Monthly Range, = 36.9

"Corrected Mean" of all the Highest, (Col. 5), = 64.5

"Corrected Mean" of all the Lowest, (Col. 6), = 48.3

Difference, or Mean Daily Range, = 16.2

** Calculated Mean Temperature of Month, = 56.4

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 grass, =

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 56.0

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 54.0

Mean (corrected) A.M. and P.M. Reading of Dew-Point, = 52.1

Do. Elastic Force of Vapour, = 391

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

Do. Relative Humidity, (Saturation = 100), = 87

RAIN fell on 9 Days; Amount in Inches, = 4.90

WIND.												SUMMARY.		
Direction	N	NE	E	SE	S	SW	W	NW	Calms or Variable.	Mean Force.	Mean Velocity in miles per day.			
A.M.	6	10	0	5	2	3	1	0						
P.M.	5	9	2	1	2	3	1	0						
Mean.	6	8	1	0	2	2	3	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 3rd; 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)

W. Thomson

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalhousie Gardens, County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 3 miles.

Height of Cistern of the Barometer above Mean Sea-level 196 feet, above Ground 4 feet.

During the MONTH of August 1867.

The Hours of Observation are of Greenwich Time.

[illegible]

BAROMETER , "corrected Mean" at 9 A.M., minus the Correction $\uparrow\uparrow$ for Temp. (Col. 2), = 29.741 - 0.080 }	29.705
"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\uparrow\uparrow$ for Temp. (Col. 4), = -	29.705
Mean at Station, corrected, and at 32° ,	29.705
Correction for height, feet, above Mean Sea-level,	$\cdot 209$
Mean, reduced to 32°, and Sea-level ,	29.914
Highest Reading, corrected for Index error, on the / th,	30.020
Lowest Do., Do., on the /6 th,	29.430
Difference, or Monthly Range ,	0.590

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the <u>14</u> th,	= <u>82.0</u>
Lowest in Month, corrected for Index errors, on the <u>7</u> th,	= <u>43.6</u>
Difference, or Monthly Range,	= <u>38.4</u>
"Corrected Mean " of all the Highest, (Col. 5),	= <u>66.7</u>
"Corrected Mean " of all the Lowest, (Col. 6),	= <u>50.3</u>
Difference, or Mean Daily Range,	= <u>16.4</u>
** Calculated Mean Temperature of Month,	= <u>58.5</u>

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb , (Cols. 9 and 11),.....	=	60.4
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),.....	=	58.6
## Computed Temperature of Dew-Point ,.....	=	57.0
## Do. Elastic Force of Vapour ,	=	1.4
## Do. Weight of Vapour in a Cubic Foot of Air ,	=	
## Relative Humidity , (Saturation = 100),	=	89
RAIN fell on // Days; Amount in Inches,	=	0.70

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	1	2	1	2	17	8	0	0			
P.M.	0	2	2	0	0	18	9	0	0			
Mean.	0	2	2	0	1	18	8	0	0			

Each instrument tested at the Office 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.

For Emending corrections for both copularity and Index Errors.

The Diurnal Range for Scotland is as yet unknown.

Practically, though not absolutely a misuse correction.

These "Hypometrical Deductions" are calculated from Glaisher's Hypometrical Tables, Second Edition only.

Where the Diurnal Range is unknown, the Arithmetical Mean of Cols. 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.

Observations made and
Return verified by

(Signed)

OBSERVATIONS.

registering the greatest heat from the sun's rays, and the least during the coldest season of the year. 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 a box of luted blacked boxes, glass slides 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; for the sun's heat to affect the "*Minimum*" Thermometer by reflection from the snow.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes until it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers as 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 *Wittmann's* 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.

we seriously trust them. Hygrometrical Deductions.—Observations are especially requested to depend on the following conditions:—The bulbs must *hang down* by at least an inch from the top of the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward; the water-cup must be covered, and placed to the side, and a little below the level of the bulb;—in no case under the bulb;—the muslin must be of the medium fineness, and saturated 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 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.

cation, which also supplies it with water. It may be seen to the observer that the muslin is always *clean* and *moist*, and that the water runs off the muslin in the form of much 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 a "Thermometer" is highly objectionable. The frame of the Thermometer 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 decimal. 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 or less than, respectively. So also 60.2° , and 40.3° more or less must be registered 40.2 or 40.3 and 40.7 or 40.8 respectively. In reading Kutherford'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 observing.

reading Rutherford's "*Max.*" and "*Min.*" Thermometers, the indication 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. 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 *days*. 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, and that it passes it *per day*; from which also the Velocity of the Wind, during the time of observation, may be ascertained. They indicate the force of the Wind, at any particular hour of observation, by the Little's Anemometer, &c. 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 gauges conspire to produce anomalies in rain returns. They arise, partly, from the defective 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 should 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 only the first morning after the rain has fallen, and the readings entered in the returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the columns under the following conditions;—when a Snow-hower occurs it must be noted in the "Reports," and the latter must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The run-gauge ought to be reset daily, and the readings entered in the returns on the day on which the rain fell.

Clouds,—Convenient abbreviations for Lake Howard's

[illegible][illegible]

THE PERIODICAL RETURN OF	
CROPS,	
mentioning variety.	Sowing or
	above ground
Barley,	
Bere or Bigg,	
Oats,	
Wheat,	
Pease,	
Potatoes,	
Turnips,	
Illye Grass,	

[illegible]

FOREST TREES	Alder, . . . Ash, . . . Beech, . . . Birch, . . . Elm, . . . Larch, . . . Lime, . . . Oak, . . . Sycamore or P
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case prevails among cattle; and the Agricultural condition of the district generally.

FOREST TREES.		SHRUBS, ETC.		FRUITS.		MIGRATORY BIRDS.	
Alder.	Flower.	Barberry.	First in Blossom.	Apple.	First in Blossom.	Cuckoo.	First Arrival.
Asch.		Bourtree or Elder.		Black Currant.		Curtlew.	
Beech.		Broom.		Cherry.		House-Swallow.	
Birch.		Hazel.		Gooseberry.		Lapwing.	
Elm.		Holly.		Peach.		Sand Martin.	
Larch.		Laburnum.		Pear.		Starling.	
Plane.		Lilac.		Plum.		Swan.	
Oak.		Mountain Ash or Rowan.		Strawberry.		Rail or Corn Cuckoo.	
Sycamore or Plane.		Rhododendron Ponticum.		Whin.			

[illegible]

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 3 miles.

Height of Cistern of the Barometer above Mean Sea-level 190 feet, above Ground 4 feet.

During the MONTH of September 1867.

The Hours of Observation are of Greenwich Time

[illegible]

BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction ++}		= 29.788
for Temp. (Col. 2), = 29.803..... - 0.015 }		
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction ++}		= 29.773
for Temp. (Col. 4), = 29.853..... - 0.080 }		
Mean at Station, corrected, and at 32°,		29.780
Correction for height,	feet, above Mean Sea-level,	= .209
Mean, reduced to 32°, Sea-level,		29.989
Highest Reading, corrected for Index error, on the 18 th,		30.440
Lowest Do.,	Do., on the 29 th,	= 29.350
Difference, or Monthly Range,		= 1.090

S.-R. THERMOMETER, (in shade, etc.), **Highest in Month,** (corrected for Index Errors), on the **2** th, = 69.0

Lowest in Month, corrected for Index errors, on the **17** th, = 36.1

Difference, or **Monthly Range,** = 32.9

“ Corrected **Mean** ” of all the **Highest,** (Col. 5), = 61.0

“ Corrected **Mean** ” of all the **Lowest,** (Col. 6), = 48.2

Difference, or **Mean Daily Range,** = 12.8

**** Calculated Mean Temperature** of Month, = 54.6

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry .	
Bulb , (Cols. 9 and 11),	55.4 56.1
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),	54.4 54.8
## Computed Temperature of Dew-Point ,	53.4 53.6
## Do. Elastic Force of Vapour ,	0.449 0.412
## Do. Weight of Vapour in a Cubic Foot of Air ,	
## Relative Humidity , (Saturation = 100),	93 91
RAIN fell on 4 Days ; Amount in Inches,	0.85

WIND.	SUMMARY.											
	Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day
A.M.	0	1	1	0	10	9	8	1	0			
P.M.	2	2	0	1	9	10	5	1	0			
Mean.	1	2	0	0	10	10	6	1	0			

Observations made and
Return verified by

(Signed)

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 *uniformity of method* 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 undeniably as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instrument, 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 glass* and *Aneroid*, 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

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 dilatations 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 the use 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 coincidence being indicated by a little ivory plate, 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 making 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 served 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 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 fails, the instrument must be renovated.

The Barometer must be suspended in a *good Light*, while it 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 distemper adjusted carefully made. Beginning 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 accurate observation, and sealing of the Barometer.

Protecting Thermometers.—The Council of the Society recommended that Self-registering Thermometers and Hygrometers be enclosed in a Box painted white outside, and black within, and fixed 4 feet above in an exposed position, free from any merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at 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, and Negretti and Lambra's Patent "*Moutnum*," Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Moutnum*," Thermometer of Rathbford is recommended when graduated on the glass scale, and affixed to a frame separate from the "*Moutnum*." This Thermometer is liable to two arrangements, 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 discolored from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should have horizontal tube.

The above remarks apply equally to the Thermometers for

The moment of change of clouds will be found on the other sides. 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 they are 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 *altitudo* 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.

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" ¹ $\frac{W}{S \cdot W}$, ² $\frac{W}{S \cdot W}$, and Direction, ³ $\frac{W}{S \cdot W}$ (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" ⁴ st.

column, an entry of $\frac{2}{2}$, cu-st. (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.

Sowing.—The number of rows in which objects in the sun-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., by thermometers placed in the earth, their bulbs being sunk to 6, 12, and 22 inches, and the stems above ground protected from the sun-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 the flow 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.

Q-rose.—Mention whether Schönlein's or Moffatt's papers are used. 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 *g.w.*, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as *g.w.* on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is “4”; *s.e.*, that it is *blowing fr.*

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 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. 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 meteors, aurora, thunder, remarkable depressions and elevations of the barometer, hail, storms, and remarkable calm, the falling of the hour of storms of wind, and the height of the sea. When such notes are made, the height of clouds, as well as lofty mountains, in the vicinity of an Observatory, the height of clouds and of the snowline 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 a table ruled off for the purpose, from that headed "Remarks." It is intended that observations by the observer should be entered in this manner on the side-margins. Additional remarks may be made on the margin.

"*Observations*" in competition with the periodic return of the seasons, possess not only great scientific value, but are of considerable interest to the generalist. 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 frogs, to specified spots reared from year to year, and a selected piece of ground or farm.

The Council recommend that *term day* observations be taken, viz., on the 24th days of March, June, September, and December. 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 they should have full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

EDINBURGH, 9th December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.		In Flower.	In Leaf first appear.	In Leaf buds.	In Leaf.	Directed of Leaves.	CROPS, of mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Leaf or flower.	First cut or felled.
Alder.	...						Barley.				
Asp.	...						Bere or Bigg.				
Beech.	...						Oats.				
Birch.	...						Wheat.				
Elm.	...						Beans.				
Larch.	...						Penses.				
Time.	...						Potatoes.				
Yew.	...						Turnips.				
Sycamore or Plane.	...						Rye Grass.				

BARBERS, ETC.	Barbery, Boutree or Elder, Hazel, Hawthorn, Holly, Laburnum, Lilac, Mazzeron, Mountain Ash or Rowan, Red Flowering Currant, Rhododendron Potitum, Vibn,	
First in Blossom.	Apple, Black Currant, Cherry, Gean, Gooseberry, Pear, Plum, Strawberry,	
FRUITS.		
First in Blossom.		
Fruit Ripen in generally.		
MIGRATORY BIRDS.	Cuckoo, Curtew, House-Swallow, Lapwing, Plover, Sand-Martin, Starling, Swar, Rail or Corn Cuckoo,	
First Arrival.		
Departure.		

Have the goodness also to state any information you may be able to collect relative to the crops of grain, hay, tomatoes, turnips, brussels, 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.

BOOK-POST

EDINBURGH.

Secretary of the Meteorological Society of Scotland.

Mr ALEXANDER BUCHAN.

To

Adm. 11.

Sept 1867

00067

The evening readings of the Bar & Hygr have been omitted as it is supposed they have not been taken at 9 P.M.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 3 miles.

Height of Cistern of the Barometer above Mean Sea-level 190 feet, above Ground 4 feet.

During the MONTH of October 1867.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				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.									
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	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. 8 inches.	No. 12 inches.	No. 22 inches.							
		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.					
		inches.		inches.																											
	1	29.60	32	29.55	48	53	47			53	52	50	49	tr	tr												Changeable high wind	1			
	2	29.53	32	29.53	48	53	48			57	49	49	42	tr	tr												Cloudy high wind throughout	2			
	3	29.80	36	29.95	43	48	37.5			44	43	39	38	tr	tr												Very fine with cold wind	3			
	4	30.12	42.5	30.19	41	42	31.5			39	38	39	38	tr	tr												Blue overcast cold wind	4			
	5	30.08	42.5	30.19	43	49	33.5			41	40	40	39	tr	tr												Very clear Sunshine throughout	5			
	6	29.76	45	29.35	48	46	33			41.5	41.5	43	42	tr	tr												Blue overcast throughout	6			
	7	29.40	48	29.40	46	57	42			57	55.5	41.5	41	tr	tr												Bright Sunshine by fine	7			
	8	29.33	45	29.73	58	52.5	34			42.5	42.5	42	41	tr	tr												Sunshine with passing clouds	8			
	9	29.65	46	29.54	57	46	34			42.5	42	42.5	42	tr	tr												Blue overcast throughout	9			
	10	29.75	45	30.	57.5	57	30.5			41	40	46	45	tr	tr												Light frost Bright Sunshine	10			
	11	30.	52	29.95	56	60	42.5			54	53	56	55	tr	tr												Sunshine A.M., dull P.M.	11			
	12	29.75	54	29.70	56	59	47			53	53	52.5	52	tr	tr												Blue overcast throughout	12			
	13	29.63	50	29.55	52	52	39.5			46	43.5	46	46	tr	tr												Dull drizzling rain throughout	13			
	14	29.65	52	29.60	54	53	45			53.5	53	56	56	tr	tr												Rain throughout	14			
	15	29.70	55	29.70	56	56.5	57			53.5	53	56	56	tr	tr												No rain throughout	15			
	16	29.70	57	29.62	54	61	41			49	48	50	49	tr	tr												Sunshine A.M., light clouds P.M.	16			
	17	29.85	64	29.36	54	59	47			53	52	50	49	tr	tr												Bright Sunshine by fine drizzle	17			
	18	29.48	52	29.40	52.5	53	42.5			57	50	50	49	tr	tr												Do. Do. Do.	18			
	19	29.36	57.5	29.47	53	56	47			57	50	50	49	tr	tr												Constant Sunshine throughout	19			
	20	29.70	60	29.75	52	55	41			50	49	47.5	47	tr	tr												Sunshine with passing clouds	20			
	21	29.80	53	29.82	54	60	44			53	57	57	50	tr	tr												Very fine throughout	21			
	22	29.80	58	29.90	58	69	43			60	59	59	58	tr	tr												Bright Sunshine very fine	22			
	23	29.82	58	29.90	59	59	54			57	56	57	56	tr	tr												Blue overcast throughout	23			
	24	29.82	58	30.03	53	57	48			49	49	45	45	tr	tr												Dull rain A.M., fair P.M.	24			
	25	30.12	46	30.15	48	56	34			42.5	42	42	42.5	tr	tr												An exceedingly fine day through	25			
	26	29.82	52.5	29.42	52	54	37			50	49	50	48	tr	tr												Blue overcast throughout	26			
	27	29.98	52	29.28	57.5	50	42			44	42	41.5	40.5	tr	tr												Very fine with high wind	27			
	28	29.65	44	29.70	47	47.5	31.5			38	36	41.5	40	tr	tr												Bright Sunshine, light frost	28			
	29	29.35	49	29.48	50	55	40			50	43	48	46	tr	tr												Light Sunshine to 12 A.M., dull P.M.	29			
	30	29.65	47	29.85	53	63	40			47	43	43.5	41.5	tr	tr												Blue overcast & light rain through	30			
	31	29.58	47.5	29.57	52	62.5	32.5			46	44	50	37	tr	tr												Blue overcast throughout	31			
	Sums.	169	123	169	141	144	125			119	122	104	151															NOTATION USED IN GENERAL REMARKS.			
		1506.0		1045.16	1673.12	680				150	146.5	146.5	155																		
	Means.	29.665	50.2	29.665	48.5	50.2	40.9			48.4	47.2	46.7	46.0																		
	† 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), = 29.587 604
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = 29.586
Mean at Station, corrected, and at 32°, = 29.586 604
Correction for height, feet, above Mean Sea-level, = 209
Mean, reduced to 32°, and Sea-level, = 29.775 813
Highest Reading, corrected for Index error, on the 3 th, = 30.120
Lowest Do., Do., on the 27 th, = 28.950
Difference, or Monthly Range, = 1.170

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 22 th, = 69.0
Lowest in Month, corrected for Index errors, on the 10 th, = 50.1
Difference, or Monthly Range, = 38.9
"Corrected Mean" of all the Highest, (Col. 5), = 54.0
"Corrected Mean" of all the Lowest, (Col. 6), = 40.5
Difference, or Mean Daily Range, = 13.5
** Calculated Mean Temperature of Month, = 47.2

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 48.4 48.9
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 47.7 47.7
†† Computed Temperature of Dew-Point, = 45.7 46.4
†† Do. Elastic Force of Vapour, = 307 319
†† Do. Weight of Vapour in a Cubic Foot of Air, = 91 92
†† Relative Humidity, (Saturation = 100), = 91 92
RAIN fell on Days; Amount in Inches, = 1.45

WIND.		SUMMARY.									
Direction		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		3	0	1	1	5	4	16	1	0	
P.M.		3	0	0	2	5	4	15	2	0	
Mean.		3	0	0	2	5	4	16	2	0	

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 3rd; 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
Returns verified by

(Signed)

W. Thomson

The Hours of Observation are of Greenwich Time.

(Signed)

Mr. Benson

INSTRUCTI

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 Returns; and it is found that differences between the observations 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 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 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, when the instrument is accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer should 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 the 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; the stem passes freely through the lid and case of the cistern. When their coincidence being indicated by a little ivory float, whose 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 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 upright. 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 top* 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 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 open to "protect" the Thermometers, and to allow a 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 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 Mr. 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 disfills 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. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for

registering the greatest heat from the sun's rays, and the least amount of cold in the atmosphere ought to be estimated from the greater or less observation of the sky, *encompassed* (i.e., within 20° or 30° of the zenith), &c. The strata of clouds that appear near the horizon are viewed obliquely; and thus, being made 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 *estimated* on 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,"—(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, *en-st.*, (*en-st.*) 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.

Specimens.—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 temperature 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 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 must 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. 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 time and direction of the wind at the time of observation, in the following manner:—thus 3³⁰, as an *ozone* entry in the schedule, will indicate that the *ozone* paper is tinted as "3," on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4"; i.e., that it is *blowing fresh*.

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. 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, &c. Remarks ought to be made on the occurrence of mists, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of 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 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.—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 *ten day* observations be taken;—viz., on the 21st days of March, June, September, and December. 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 which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

Edinburgh, 9th December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	IN FLOWER.	IN FRUIT.	PHYSICAL OF LEAVES.	CHIEF CROPS.	SEEDING OR SOWING OF ABOVE GROUND.	IN BUD OR FLOWERING.	IN BUD OR FLOWERING.
Alder,				Barley or Bigg,			
Beech,				Wheat,			
Birch,				Beans,			
Elm,				Peas,			
Lime,				Potatoes,			
Oak,				Rye Grass,			
Sycamore or Plane,							

SHRUBS, &c.	IN BLOSSOM.	IN FRUIT.	PHYSICAL OF BLOSSOM.	FRUIT IN GROWTH.	FRUIT IN GROWTH.	FRUIT IN GROWTH.	FRUIT IN GROWTH.
Barberry,				Cuckoo,			
Bouree or Elder,				House-Swallow,			
Bramble,				Lapwing,			
Hawthorn,				Plover,			
Holly,				Sand-Martin,			
Lavender,				Starling,			
Lilac,				Swan,			
Mezereum,				Rail or Corn Crake,			
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, &c., in perfection; whether any have suffered from Blight, disease, &c. Whether Hay, Potatoes, disease prevails among cattle; and the Agricultural condition of the district generally.

Mr. ALEXANDER BUCHAN,
Secretary of the Meteorological Society of Scotland,
EDINBURGH.

To

Dalhousie
Nov. 1867

BOOK-POST.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Dalkeith Gardens, County of Midlothian, in Lat. _____, Long. _____, Distance from Sea 3 miles.Height of Cistern of the Barometer above Mean Sea-level 190 feet, above Ground 4 feet.During the MONTH of December, 1867.

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, 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.									
		Baromet.	Attach- ed Ther- mometer	Baromet.	Attach- ed Ther- mometer	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity, (0-10), and Species.	Amount, (0-10), and Species.	Velocity, (0-10), and Species.	Amount, (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.							
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.							
	1	29.95	49	29.0	46	50	41.7			47.3	46	34	32	1h	st												Line and mile A.M., heavy rain P.M.	1			
	2	29.55	38.5	29.65	38	32.5	26			32.7	32.3	32	32	st	st												Sharp frosty winds & clear through	2			
	3	30.05	40	30.11	37	38	29			30	29	30	29	st	st												Clear with sunshine, frosty	3			
	4	30.	39	29.77	41	41	31			35	32.5	29	28	st	st												Passing clouds, slight sunshine	4			
	5	29.69	40.5	29.57	39	40	33			35.7	35	36	33.5	st	st												Clear sunshine very fine through	5			
	6	29.95	39	30.12	40	34	32.5			34	31	32.3	31	st	st												Passing clouds with cold wind	6			
	7	30.22	38	30.23	40	37	29			34.3	34	36	33	st	st												Forecast, dull with cold wind	7			
	8	29.90	42	29.20	44	44	36.5			40	38.5	43	41	st	st												Heavy rain till 10.30, dull through	8			
	9	30.03	41	29.93	44	44	33.5			37	36	43.3	42.3	st	st												Passing clouds with cold wind	9			
	10	29.88	45	29.85	47	52	43.5	39		45	43	46	44	st	st												Cloudy fine very mild	10			
	11	29.84	47.5	29.83	57	58	46.5			47	44.5	57	48	st	st													Glimpses of sun A.M., very mild	11		
	12	29.81	50	29.85	47	47.5	39			49.3	47	43	39	st	st													Clear sunshine very fine through	12		
	13	29.96	45	29.97	47.5	57	44			42	40	46.3	44	st	st													Light breeze of sun till 10, cloudy P.M.	13		
	14	29.49	57	29.35	47	48	37			49	47	43	41	st	st													Wind with high wind through	14		
	15	29.42	46	29.53	46					40.5	37.5	43	42.5	st	st													Line, sunshine ending with rain	15		
	16	29.32	52	29.20	54	53.5	40			33.3	37	57	49	st	st													Very high wind with passing clouds	16		
	17	29.25	47	29.25	46	54	40			43	40.3	38	36	st	st													Like, sunshine with passing clouds	17		
	18	29.25	41	29.33	39.5	39.5	31			33	32.7	35	32.5	st	st													Clear & fine with sunshine through	18		
	19	29.58	41	29.66	40	37.5	31.5			33.7	31.3	29.5	28.5	st	st													Do Do Do	19		
	20	29.75	39	29.67	40	35.5	24.5			29.5	29.3	34.5	33	st	st													Forecast A.M. light rain P.M.	20		
	21	29.56	41	29.47	43	43	33			37	36.5	43	42.5	st	st													Heavy rain A.M. forecast P.M.	21		
	22	29.53	44	29.70	43.5	44	39.5			40	37	41	38	st	st													Line A.M. forecast P.M.	22		
	23	29.94	41	29.78	44	43	34			36	35	42	38.5	st	st													Light sunshine A.M. forecast P.M.	23		
	24	29.67	49	29.77	49	53	39			50	48	48	46	st	st													Very mild light showers	24		
	25	30.	45	29.99	43	45.5	33.5			38	37.5	39	38	st	st													Clear & fine with sunshine through	25		
	26	30.02	47	30.10	48	49	36			46	43	46	45	st	st													Light passing clouds sunshine	26		
	27	30.20	47	30.20	47	45.5	42			43.3	43	45	43	st	st													Forecast & like rain all day	27		
	28	30.15	46	30.07	44	46.5	39.5			40.3	39	38	37	st	st													Line sunshine throughout	28		
	29	30.09	46	30.10	45	39	35			38	35.3	38.5	36	st	st													Sunshine A.M. passing clouds	29		
	30	30.30	41	30.31	41.5	41	29			36	30	34	33	st	st													Line sunshine throughout	30		
	31	30.23	38	30.16	40.5	34	26			36.29	32	30.5	28	st	st													Forecast cloudy very cold.	31		
Sums.		1412	4141			413	144			125	156																				
Means.		29.783	43.8			43.9	35.1			39.3	37.8																				
† Total Corrections for Instrumental Errors.																															
† Corrections for Diurnal Range.																															
"Corrected" means.						43.9	34.7			39.8	38.3																				
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.	densa aurora.	m.	denso meteor.
cl.	cirrus.	ms.	massa.
cl. cu.	cirro-cumulus.	u.	umbra.
cl. s.	cirro-stratus.	v.	vis.
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.	sol. 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.	v.	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 $\frac{1}{2}$ for Temp. (Col. 2), = 29.783..... - 0.39..... = 29.744"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{1}{2}$ for Temp. (Col. 4), = =Mean at Station, corrected, and at 32°, = 29.744Correction for height, feet, above Mean Sea-level, = 209Mean, reduced to 32°, and Sea-level, = 29.953Highest Reading, corrected for Index error, on the 30 th, = 30.300Lowest Do., Do., on the 1 th, = 28.950Difference, or Monthly Range, = 1.350S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 16 th, = 55.5Lowest in Month, corrected for Index errors, on the 20 th, = 24.1Difference, or Monthly Range, = 31.4"Corrected Mean" of all the Highest, (Col. 5), = 43.9"Corrected Mean" of all the Lowest, (Col. 6), = 34.7Difference, or Mean Daily Range, = 9.2** Calculated Mean Temperature of Month, = 39.3

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 grass, =

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 39.8Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 38.3†† Computed Temperature of Dew-Point, = 36.4†† Do. Elastic Force of Vapour, = 1215

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

†† Relative Humidity, (Saturation = 100), = 88RAIN fell on 7 Days; Amount in Inches, = 1.25

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.	2	1	1	0	0	10	15	2	0	
P.M.	3	3	0	0	0	8	16	1	0	
Mean.	2	2	0	0	0	9	16	2	0	

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 3rd; 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)

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 incommensurable, 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 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 its logical Observations.

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 scale. 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 *sight-tube* is not true otherwise but so much shorter as to compensate the error that would 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 coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When *servies, 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 *graduated* setting will 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 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 laths 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-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, 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 derangements, both of which must be guarded against, and may be easily remedied by an observer. When the *columns* 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 that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for

registering the greatest heat from the sun's rays, and the least amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky *as viewed* (i.e., within 90° or 90° 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, $\frac{2}{4}$ (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 $\frac{2}{4}$ cr-st, (*eg.*) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further observed to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

Sight-line.—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 8, 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 the wells ought, when practicable, to be taken, and the depth of the well and of the water noted.

Ozone.—Mention whether Schöner's or Moffat's papers are used. 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 $\frac{2}{4}$ S.W., as an *ozone* entry in the schedule, will indicate that the ozone paper is tinted as $\frac{4}{4}$ on the scale, that the wind is from the N.W., and that its force on the scale 0 to 6 is $\frac{4}{4}$; i.e., that it is *blowing fresh*.

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 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. 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 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 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.

—viz., on the 21st days of March, June, September, and December.

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 which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

Examiner, 9th December 1865.

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

Remarks.—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 of 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 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.

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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 incommensurable, 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 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 its logical Observations.

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 scale. 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 *sight-tube* is not true otherwise but so much shorter as to compensate the error that would 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 coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When *servies, 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 *graduated* setting will 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 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 laths 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-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, 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 derangements, both of which must be guarded against, and may be easily remedied by an observer. When the *columns* 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 that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

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Dalziel &

Dec 1867

To

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

SHERBDS, ETC.		FRUITS.		CROPS.		MIGRATORY BIRDS.		First Arrival.		First Departure.	
Barberry,	Bortree or Elder,	Apple,	Black Currant,	Cherry,	Gooseberry,	Teach,	Laburnum,	Lily,	Measey,	Mountain Ash or Rowan,	Red Flowering Currant,
Whin,	Rhododendron Ponticum,	Strawberry,	Plum,	Swan,	Starling,	Rail or Corn Cuckoo,					

FOREST TREES.		In Leaf.		Dressed of Leaves.		In Ear.		First Cut or Mashed.	
Alder,	Asch,	Beech,	Birch,	Elm,	Larch,	Lime,	Oak,	Sycamore or Plane,	

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 plentifully or in perfection; whether any have suffered from blight, disease, etc. Whether Hay, Potatoes, disease prevails among cattle; and the Agricultural condition of the district generally.