

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, County of *Edinburgh*, in Lat. *55° 56' N* Long. *3° 40' W*, Distance from Sea *one* miles.
Height of Cistern of the Barometer above Mean Sea-level *40* feet, above Ground *4* feet. During the MONTH of *January* 18*68*.
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.		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.									
		Baromete r 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—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.							
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°						
		No.	°	No.	°	No.	°	No.	°	No.	°	No.	°	No.	°	No.	°	No.	°	No.	°	No.	°	No.	°	No.					°
1		30.20	53	30.20	57	37	33			34	33	35	33	SE	1	S	1										fine Lunar Halo on the 9 th	1			
2		30.34	48	30.40	58	37	26			34	33	30	29	E	1	ENE	1										Aurora on the 13 th 20 th 27 th 28 th	2			
3		30.38	47	30.30	58	32	20			27	26	25	24	ENE	1	ENE	1										Shooting Stars on the 21 st	3			
4		30.24	46	30.20	53	36	32			32	31	34	33	ENE	2	NNE	1										Lowest of Barom. on the 18 th at 5 1/2 P.M.	4			
5		30.20	45	30.21	58	36	33			34	33	35	34	E	1	E	1										on 28.40	5			
6		30.20	46	30.19	59	38	34			37	36	35	35	SE	1	ENE	1										Strong gales on the 15 th 16 th 17 th	6			
7		30.15	47	30.18	54	38	34			38	38	37	37	ENE	1	ENE	2										30 th 31 st	7			
8		30.22	50	30.22	54	38	33			36	35	36	35	SE	1	SE	1										Thunder on the 24 th it commenced	8			
9		30.23	49	30.22	58	37	24			35	34	27	27	SE	1	SE	1										To blow a strong gale at 5 o'clock	9			
10		30.12	40	29.90	56	29	28			26	25	28	28	SE	1	SE	1										in the morning and continued	10			
11		29.70	45	29.62	53	34	34			33	32	34	33	S	1	S	1										with less or more violence till 12	11			
12		29.60	47	29.53	53	45	35			40	39	40	39	SE	1	SE	2										o'clock when it blew a perfect	12			
13		29.48	47	29.24	53	48	40			38	38	47	46	SE	1	SE	1										Thunder till about 3 o'clock	13			
14		29.12	53	29.04	56	53	37			50	50	43	42	SE	4	SE	4										P.M. with biting hail showers	14			
15		29.40	54	29.74	53	42	36			38	38	40	39	SE	4	SE	5										it then continued to blow a	15			
16		29.78	51	29.40	56	47	43			44	43	43	41	SE	5	SE	5										gale till next morning with	16			
17		29.40	57	29.40	57	50	39			48	47	44	43	SE	5	SE	4										a falling Barom as follows	17			
18		29.23	51	28.45	56	47	39			46	45	42	41	SE	4	SE	2										on the 23 rd at 9 P.M. the Barom	18			
19		28.75	52	29.10	59	43	31			41	40	37	35	SE	1	SE	1										registered 30.10	19			
20		29.34	50	29.54	56	32	24			32	30	28	27	SE	1	SE	1										24 th 9 A.M. 29.80	20			
21		29.54	44	29.42	51	30	23			28	27	26	25	SE	1	SE	1										12 noon 29.60	21			
22		29.30	47	29.50	53	32	29			31	30	31	30	SE	1	SE	1										2 P.M. 29.30	22			
23		29.80	44	30.10	54	32	25			30	29	27	27	SE	1	SE	1										4 - - 29.20	23			
24		29.80	43	29.14	54	33	32			29	28	36	34	S	5	S	6										7 - - 29.15	24			
25		29.03	44	29.70	51	41	31			39	38	36	35	SE	4	SE	2										9 - - 29.14	25			
26		30.02	45	30.16	54	42	39			35	33	40	39	SE	1	SE	1										12 night 29.06	26			
27		29.90	50	29.92	53	50	42			44	42	46	44	SE	2	SE	2										there has been little or no damage	27			
28		29.80	50	29.90	53	47	31			44	43	42	40	SE	4	SE	2										done in this Hughbownhoor	28			
29		29.98	51	30.06	53	43	32			39	37	34	33	SE	3	SE	1												29		
30		29.73	50	29.53	56	47	44			45	43	45	43	SE	4	SE	5												30		
31		29.10	55	28.83	62	54	39			52	49	44	43	SE	5	SE	5												31		
Sums.		23	26	23	16	12	9			22	19	19	16	68	64			34	5												
Means.		29.755	48.4	29.753	55.3	40.4	33.0			37.3	36.3	36.4	35.3	2.2	2.1																
† Total Corrections for Instru- mental Errors.																															
† Corrections for Diurnal Range.																															
† "Cor- rected 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 \pm = *29.701*
for Temp. (Col. 2), = *29.755* - *0.53* = *29.225*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm = *29.681*
for Temp. (Col. 4), = *29.753* - *0.72* = *29.033*
Mean at Station, corrected, and at 32°, = *29.691*
Correction for height, feet, above Mean Sea-level, = *102*
Mean, reduced to 32°, and Sea-level, = *29.793*
Highest Reading, corrected for Index error, on the 2th, = *30.400*
Lowest Do., Do., on the 18th, = *28.450*
Difference, or Monthly Range, = *1.950*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 3rd th, = *54.0*
Lowest in Month, corrected for Index errors, on the 3rd th, = *20.0*
Difference, or Monthly Range, = *34.0*
"Corrected Mean" of all the Highest, (Col. 5), = *40.4*
"Corrected Mean" of all the Lowest, (Col. 6), = *23.0*
Difference, or Mean Daily Range, = *7.4*
** Calculated Mean Temperature of Month, = *26.7*

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = *36.9*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = *35.8*
†† Computed Temperature of Dew-Point, = *34.3*
†† Do. Elastic Force of Vapour, = *199*
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = *91*
RAIN fell on 17 Days; Amount in Inches, = *3.40*

WIND.		SUMMARY.									
Direction		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		2	1	5	2	7	4	1			2.2
P.M.		4	2	3	1	8	7	5			2.1
Mean.		3	2	4	2	8	7	4	1		2.15

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

Wm. M. Anderson

(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 inoperative, may arise from dissimilarity in the position or shelter of instruments differently constructed 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 their 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 absolute comparableness among the several Returns, without which the Society's Reports must inevitably fall in delivering 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; 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-tubes* 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 ivory float. 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 *cistern*.

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

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

In taking an *Observation*, the attached Thermometer is first noted; the tube must then be gently tapped and the cistern-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.

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 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 instrument. This Thermometer is liable to two demerits, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks, it may be re-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, the greater or less observation of the sky *on cloud* (i. e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the *clouds* column, though their appearance and changes ought to be noted among the *Remarks*. The amount of cloud is entered 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," 6, S. W. 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 $\frac{1}{2}$, (*ext.*) 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.

Sketches.—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 concurrent 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 Schönbien'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:—this $\frac{3}{4}$, as an *ozone* entry in the schedule, will indicate that the ozone paper is tinted as $\frac{3}{4}$ on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is $\frac{4}{5}$; 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 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 6 A.M. and 9 P.M. ought to be registered, either in two columns, other vice unimpeded, 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 fully 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 day 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.

Enacted, 20th December, 1855.

homoculture of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less observation of the sky *on cloud* (i. e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the *clouds* column, though their appearance and changes ought to be noted among the *Remarks*. The amount of cloud is entered 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.

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(By Order) A. B.

Enacted, 20th December, 1855.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Leaf buds first appear.	In Leaf.	Threshed or Hayed.	CRUS. mentioning variety.	Barley.	Bere or Bigg.	Oats.	Wheat.	Beans.	Peas.	Potatoes.	Turnips.	Haye Grass.
Alder.														
Ash.														
Beech.														
Birch.														
Elm.														
Larch.														
Lime.														
Oak.														
Sycamore or Plane.														

SCOTTISH METEOROLOGICAL SOCIETY.

Barometer, "corrected mean" at 9 A.M., <i>minus</i> the Correction $\frac{1}{11}$	=	29.733
for Temp. (Col. 2), = ..29.794... - ..0.06...)		
Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction $\frac{1}{11}$	=	29.760
for Temp. (Col. 4), = ..29.830... - ..0.70...)		
Mean at Station, corrected, and at 32°,	=	29.746
Correction for height, feet, above Mean Sea-level,	=	101
Mean, reduced to 32°, and Sea-level,	=	29.847
Highest Reading, corrected for Index error, on the 1 st th,	=	30.360
Lowest Do., Do., on the 1 st th,	=	28.430
Difference, or Monthly Range,	=	1.930

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 17 th,.....	=	56.0
Lowest in Month, corrected for Index errors, on the 8 th,	=	25.0
Difference, or Monthly Range,	=	31.0
" Corrected Mean " of all the Highest, (Col. 5),	=	46.6
" Corrected Mean " of all the Lowest, (Col. 6),	=	36.6
Difference, or Mean Daily Range,	=	10.0
** Calculated Mean Temperature of Month,	=	41.6

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),.....	=	41.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),.....	=	39.3
## Computed Temperature of Dew-Point ,.....	=	36.9
## Do. Elastic Force of Vapour ,	=	.219
## Do. Weight of Vapour in a Cubic Foot of Air ,	=	
## Relative Humidity , (Saturation = 100),	=	85
RAIN fell on /4 Days; Amount in Inches,	=	2.47

WIND.		SUMMARY.									
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Vel in miles p.h.
A.M.	2				3	17	7			3.0	
P.M.	2				3	12	12			3.2	
Mean.	2	0	0	0	3	14	10	0	0	3.1	

William Maulsland

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 incompatible, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns an accuracy and value commensurate with the labour and pains involved in making them; and for the Tables published by the Society an entire concordance among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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

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

Two moderate-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 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 cistern.

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 ascending 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 adjusted: the tube must then be gently tapped and the cistern-nut 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 Zambra's Patent "Marine" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Marine" Thermometer of Rutherford is recommended when graduated on the gas stem and affixed to a frame separate from the glass stem. 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 sticking 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, the greater or less observation of the sky or cloud (*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 edit just to take them into account in the cloud 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 4 p.m., 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 "Cloudy," S. W.,

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 —, (*i. e.*, 2) 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, taken 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 in particular depths.

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

Ozone.—Mention whether Solonben'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 3rd, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 4th 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 Magnetometer 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 as storms 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.

For 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; 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;—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.

Forwrded, 4th Decrbr, 1863.

amount of cloud in the atmosphere ought to be estimated from 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 edit just to take them into account in the cloud 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.

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(By Order) A. B.

Forwrded, 4th Decrbr, 1863.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Alder.	Ash.	Beech.	Elm.	Larch.	Time.	Oak.	Sycamore or Plane.
In Flower.								
Leaf Blasts first appear.								
In Leaf.								
Placed of								
Leaves.								
Barley.								
Bare or Migs.								
Wheat.								
Beans.								
Peas.								
Turnips.								
Hy Cress.								

SHRUBS, ETC.	Barberry,	Broom,	Hazel,	Hawthorn,	Holly,	Laburnum,	Lilac,	Mazoeon,	Mountain Ash or Rowan,	Red Flowering Currant,	Rhododendron Ponticum,	Whin,
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SCOTTISH METEOROLOGICAL SOCIETY.

Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.

During the MONTH of March 1868

The Hours of Observation are of Greenwich Time.

BAROMETER,	"Corrected Mean" at 9 A.M., <i>minus</i> the Correction $\frac{+}{+}$	=	29.672
	for Temp. (Col. 2), = 74.739..... - 0.67.....		
"Corrected Mean" of Barometer at 9 P.M.,	<i>minus</i> the Correction $\frac{+}{+}$	=	29.679
	for Temp. (Col. 4), = 74.757..... - 0.73.....		
Mean at Station, corrected, and at 32°,		=	29.676
Correction for height,	feet, above Mean Sea-level,	=	100
Mean, reduced to 32°, and Sea-level,		=	29.776
Highest Reading, corrected for Index error, on the	28 th ,	=	30.550
Lowest Do.,	Do., on the 11 th ,	=	28.900
Difference, or Monthly Range,		=	1.750

S.-R. THERMOMETER, (in shade, etc.), **Highest in Month,** (corrected for Index Errors), on the 9th, = 58.0

Lowest in Month, corrected for Index errors, on the 24th, = 26.0

Difference, or **Monthly Range,** = 32.0

“ **Corrected Mean** ” of all the **Highest,** (Col. 5), = 50.0

“ **Corrected Mean** ” of all the **Lowest,** (Col. 6), = 37.3

Difference, or **Mean Daily Range,** = 12.7

** Calculated **Mean Temperature** of Month, = 43.6

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),.....	=	42.7
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),.....	=	40.5
‡‡ Computed Temperature of Dew-Point ,.....	=	37.9
‡‡ Do. Elastic Force of Vapour ,	=	.2
‡‡ Do. Weight of Vapour in a Cubic Foot of Air ,	=	
‡‡ Relative Humidity , (Saturation = 100),	=	84
RAIN fell on 00 Days ; Amount in Inches,	=	.204

WIND.	SUMMARY.											
	Direction	N	NE	E	SE	S	SW	W	NW	Gauge or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	-	1	-	-	7	11	10	2			1.97	
P.M.	2	1	-	-	5	12	10	1			2.16	
Mean.	1	1	0	0	6	11	10	2			2.06	

Observations made and
Return verified by

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

Oxide 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 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 required to mark opposite every reading at what time it was taken, if not at 9 o'clock. **Barometer.**—If *Waller's* 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; 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 screws, *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 *seize* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern 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 *deep 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 pegs, and gently tapping it); and if this Placid 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.

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

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Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maximum*." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks it may be reunited by striking the instrument repeatedly against the palm of the hand; when part of the spirit descends by high temperature, it will be found in the upper lobe, and must be disengaged 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 from radiation during night. Their bulbs have a black coating, the greater or less obscuration of the sky *overhead* (i. e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the *clouds'* column, though their appearance and changes ought to be noted among the "*Remarks*." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky *overhead* is *half* covered by clouds, 5 is entered as the *observation*, and so on.

Observations of the clouds are made at 9 a.m. and at sunset, as illustrations of 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 (these 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*" (e.g.) will indicate that the higher regions are covered to the "*anion*" 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.

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 bottom 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 Mollat'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" 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 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, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

Clouds.—Convenient abbreviations for Luke Howard's

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(By Order) A. B.

EDINBURGH, 30th December, 1862.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	CROPS.	PLANTING.	SEEDING.	APPEAREING.	IN LEAF.	IN BLOSSOM.	IN FRUIT.	IN SEED.	IN WINTER.
Alder,	Barley,	Planting or above ground.	Seeding or above ground.	Appeareing in flower.	In leaf.	In blossom.	In fruit.	In seed.	In winter.
Asch,	Bare or Bigg,								
Birch,	Oats,								
Deech,	Wheat,								
Larch,	Beans,								
Lim,	Potatoes,								
Oak,	Turnips,								
Sycamore or Plane,	Rye Grass,								

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.
Barberry,	Apple,								
Bourtree or Elder,	Black Currant,								
Brown,	Cherry,								
Hazel,	Gooseberry,								
Laithorn,	Plum,								
Lilly,	Strawberry,								
Mezeon,	Swan,								
Mountain Ash or Rowan,	Sand-Martin,								
Red Flowering Currant,	Starling,								
Rhododendron Ponticum,	Swan,								
Viburn,	Rail or Corn Crake,								

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

BOOK-POST.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Mr. ALEXANDER BUCHAN,

Immed.
March 1868.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55° 50' 28", Long. 3° 2' 40" W, Distance from Sea one miles.

Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.

During the MONTH of April 1868

The Hours of Observation are of Greenwich Time.

BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction $\uparrow\uparrow$		=	
for Temp. (Col. 2), =	<u>29.753</u>	-	<u>0.71</u>
			<u>29.782</u>
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction $\uparrow\uparrow$		=	
for Temp. (Col. 4), =	<u>29.837</u>	-	<u>0.67</u>
			<u>29.770</u>
Mean at Station, corrected, and at 32°;		=	<u>29.776</u>
Correction for height,	feet, above Mean Sea-level,	=	<u>100</u>
Mean, reduced to 32°, and Sea-level;		=	<u>29.876</u>
Highest Reading, corrected for Index error, on the 1 st th,.....		=	<u>30.370</u>
Lowest Do.,	Do., on the 21 st th,.....	=	<u>28.840</u>
Difference, or Monthly Range,		=	<u>1.530</u>

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the <u>16</u> th,	=	<u>65.0</u>
Lowest in Month, corrected for Index errors, on the <u>10</u> th,	=	<u>30.0</u>
Difference, or Monthly Range,	=	<u>35.0</u>
" Corrected Mean " of all the Highest, (Col. 5),	=	<u>53.3</u>
" Corrected Mean " of all the Lowest, (Col. 6),	=	<u>39.8</u>
Difference, or Mean Daily Range,	=	<u>13.5</u>
** Calculated Mean Temperature of Month,	=	<u>46.6</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),.....	=	46.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),.....	=	42.8
‡‡ Computed Temperature of Dew-Point ,.....	=	38.9
‡‡ Do. Elastic Force of Vapour ,	=	238
‡‡ Do. Weight of Vapour in a Cubic Foot of Air ,	=	
‡‡ Relative Humidity , (Saturation = 100),	=	77
RAIN fell on 15 Days ; Amount in Inches,	=	2.90

WIND.										SUMMARY.		
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day	
A.M.	5	3	2	2	2	11	5			1.50		
P.M.	3	5	2	1	2	11	4	2		1.80		
Mean.	3	4	2	2	2	9	7	1		1.65		
	4	4	2	2	2	11	4	1		2.72		

Observations made and
Return verified by

Wm. Maustane

(Signed).

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SCOTTISH METEOROLOGICAL SOCIETY.

The Hours of Observation are of Greenwich Time.

BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction $\frac{+1}{1}$ for Temp. (Col. 2), =	29.809
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction $\frac{+1}{1}$ for Temp. (Col. 4), =	29.813
Mean at Station, corrected, and at 32°,	29.811
Correction for height, feet, above Mean Sea-level,	099
Mean, reduced to 32°, and Sea-level,	29.910
Highest Reading, corrected for Index error, on the 5 th ,	30.200
Lowest Do., Do., on the 24 th ,	29.380
Difference, or Monthly Range,	0.920

S.-R. THERMOMETER,	(in shade, etc.), Highest in Month, (corrected for	
Index Errors), on the <u>29</u> th.....	=	<u>71.0</u>
Lowest in Month, corrected for Index errors, on the <u>5</u> th,	=	<u>30.0</u>
Difference, or Monthly Range,	=	<u>41.0</u>
" Corrected Mean " of all the Highest, (Col. 5),	=	<u>61.8</u>
" Corrected Mean " of all the Lowest, (Col. 6),	=	<u>44.8</u>
Difference, or Mean Daily Range,	=	<u>17.0</u>
** Calculated Mean Temperature of Month,	=	<u>52.3</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),	=	53.0
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),	=	49.7
†† Computed Temperature of Dew-Point ,	=	46.4
†† Do. Elastic Force of Vapour ,	=	314
†† Do. Weight of Vapour in a Cubic Foot of Air ,	=	
†† Relative Humidity , (Saturation = 100),	=	78
RAIN fell on 14 Days ; Amount in Inches,	=	1.96

WIND.		SUMMARY.									
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	3	3		1	7	10	5	2		158	
P.M.	4	2	1	1	10	8	3	2		205	
Mean.	4	2	1	1	8	9	4	2		181	

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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 *scrape* 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.

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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.

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

Remarks.—The "Remarks" column is too narrow, but unavoidable. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of 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 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 periotic 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;—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.
Institution, 24, December 1855.

nomencature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated on a greater or less obscuration of the sky overhead (as within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds' column, though their appearance and changes ought to be noted among the "Remarks." The amount of cloud is 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" 8, S. W. (for example,) will indicate that the upper strata of clouds travel with *zephyre* 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 column, an entry of —, (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 11th, 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, when practicable, to be taken, and the depth of the well and of the water noted.

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(By Order) A. B.
Institution, 24, December 1855.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	In leaf.	Leaves.	CHROPS.	Planting or sowing.	Appearance or above ground.	In leaf or flower.	First Cut
Alder.				Bare or Bigger.				
Beech.				Oaks.				
Birch.				Wheat.				
Larch.				Beans.				
Lin.				Peas.				
Maple.				Potatoes.				
Oak.				Turnips.				
Sycamore or Plane.				Eye Grass.				

SHRUBS, ETC.	First in blossom.	FRUITS.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.
Baberry.		Apple.		Cuckoo.		Curlew.		Swallow.
Bearberry or Elder.		Black Currant.		House Sparrow.		Lapwing.		Swallow.
Blossom.		Cherry.		House Sparrow.		Plover.		Swallow.
Holly.		Gooseberry.		Swallow.		Sand Martin.		Swallow.
Laburnum.		Holly.		Swallow.		Swallow.		Swallow.
Lilac.		Laburnum.		Swallow.		Swallow.		Swallow.
Mountain Ash or Rowan.		Laburnum.		Swallow.		Swallow.		Swallow.
Myrtle.		Laburnum.		Swallow.		Swallow.		Swallow.
Rhododendron Ponticum.		Laburnum.		Swallow.		Swallow.		Swallow.
Red Flowering Currant.		Laburnum.		Swallow.		Swallow.		Swallow.
White.		Laburnum.		Swallow.		Swallow.		Swallow.

Have the goodness also to state any information you may be able to collect from Blight, disease, etc. Whether Heavy, Potatoes, Turnips, Peas, etc., whether planted, or in perfection; and the agricultural condition of the district generally.

BOOK-POST.

Mr ALEXANDER BUCHAN.

Secretary of the Meteorological Society of Scotland.

EDINBURGH.

Inverness
May 1868.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Edinburgh, County of Edinburgh, in Lat. 55° 56' 5", Long. 3° 2' 40" W, Distance from Sea one mile.
Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet. During the MONTH of June 18 68.
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. <i>Mention the hour at which Storms began and ended.</i>	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulb.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H Cup Anemometer No. _____		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
		Baromet. * No. _____	Attach- ed Ther- mometer	Baromet. 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.	No. _____	Amount, (0—10), and Species.			Velocity, (0—10), and Direc- tion.	Amount, (0—10), and Species.	Velocity, (0—10), and Direc- tion.	No. _____	No. _____	No. _____																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.	0 h. A.M.

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" "	ms.	" "
ci-cu.	" cirro-cumulus.	n.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" scud.
fr.	" frost.	sl.	" sleet.
h. fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. h.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sp.	" spout.
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. h.	" 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 \pm for Temp. (Col. 2), = 29.958
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4), = 29.936
Mean at Station, corrected, and at 32°, = 29.947
Correction for height, feet, above Mean Sea-level, = 0.97
Mean, reduced to 32°, and Sea-level, = 30.044
Highest Reading, corrected for Index error, on the 30th, = 30.430
Lowest "Do., "Do., on the 3th, = 29.630
Difference, or Monthly Range, = 0.800

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 20th, = 81.0
Lowest in Month, corrected for Index errors, on the 17th, = 40.0
Difference, or Monthly Range, = 41.0
"Corrected Mean" of all the Highest, (Col. 5), = 67.1
"Corrected Mean" of all the Lowest, (Col. 6), = 48.5
Difference, or Mean Daily Range, = 18.6
** Calculated Mean Temperature of Month, = 57.8

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), = 57.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 52.4
† Computed Temperature of Dew-Point, = 48.0
† Do. Elastic Force of Vapour, = 33.5
† Do. Weight of Vapour in a Cubic Foot of Air, =
† Relative Humidity, (Saturation = 100), = 71
RAIN fell on 6 Days; Amount in Inches, = 0.50

WIND.	SUMMARY.									
	Direction	N	NE	E	SE	S	SW	W	NW	Caln or Variable.
A.M.	6	-	-	-	-	14	6	2		1.57
P.M.	4	-	-	-	-	14	6	2		1.70
Mean.	5	1	0	0	2	14	6	2		1.63

2.66

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

William M. Austen

(Signed)

WITH REMARKS ON THE USE OF INSTRUMENTS.

Hour of Observation.—The Council recommended 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.—*Walter 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*.

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 joint to the cistern. Then *seize* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a perfect vacuum; in this 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 frightening the ivory peg), and gently tapping it; and if this plain 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 sun's direct rays nor the heat of a fire.

Self Registering Thermometers—Professor Phillips's, and Negretti and Zamboni's Patent "*Machinon*." Thermometers are now so constructed; printed directions for their use may be obtained with each instrument. The "*Machinon*," Thermometer of Negretti and Zamboni is recommended when graduated on the grass stem and affixed to a frame separate from the "*Machinon*." 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 the *column* of 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 could be hung horizontally.

catron, which also supplies it with water. It may be seen to the observer that this machine is always *glanz* and *wassig*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bath must be immediately immersed 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 "Nason'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.

Hour of observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometer is 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 Thermometer is 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.

Rain-gauges.—Many causes conspire to produce anomalies in rain-gauges. Their use, 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 densest cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day when the rain fell.

Snow-falls may, for convenience, be registered in the rain column, under the following conditions—when a Snow shower occurs it must be noted in the "Remarks" and the letter S prefixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift has accumulated. The rain-gauge must be used in addition to, and not instead 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.

WITH REMARKS ON THE USE OF INSTRUMENTS.

and Direction," 2, W. 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 "loc" will indicate that the higher

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

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

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.

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.

[illegible]

The Council recommend that *term day* observations be taken;—viz., on the 21st days of March, June, September, and December*.

(2) C_{10}H_8

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[illegible]

SHRUBS, ETC.	Barberry,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Black Currant,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Rhododendron Ponticum,	Broom,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Mountain Ash or Rowan,	Boutee or Elder,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Red Flowering Currant,	Cherry,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Rhododendron Ponticum,	Gooseberry,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Holly,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Hazel,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Laburnum,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Lilac,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Mazoe,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Mountain Ash or Rowan,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Red Flowering Currant,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Rhododendron Ponticum,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.
Willow,	Willow,	Black Currant,	Apple,	FRUITS.	Rised in Blossom.	Rised in generaly.	CRUCIFEROUS PLANTS.	First in Arrival.	Departure.

(2) C_{10}H_8

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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55° 56' 0" N, Long. 3° 2' 40" W Distance from Sea one mile.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.During the MONTH of July 1868.

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 occurrences 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.		Readings of the H-Cap Anemometer No. —		No. of hours in which it fell.		Amount in inches.		9 A.M.		P.M.						9 h. A.M.		9 h. P.M.		SUNSHINE.																																																																																																																																																																																																																								
		Barometer.	Atmos- phere.	Barometer.	Atmos- phere.	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.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.					Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	Velocity, (0—10), and Species.	Amount, (0—10), and Species.	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NOTATION USED IN GENERAL REMARKS.

a.	detached aurore.	m.	under meteor.
ci.	cirrus.	ms.	meteos.
ci. cu.	cirro-cumulus.	n.	nimbus.
ci. s.	cirro-stratus.	r.	rain.
cu.	cumulus.	h. r.	heavy rain.
cu. s.	cumulo-stratus.	e. 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.	so. h. haze.
h. d.	heavy dew.	sq.	squall.
h. l.	hail.	sq.	squalls.
l.	lightning.	t.	thunder.
li. cl.	light clouds.	t. s.	thunder storm.
li. sh.	light showers.	w.	wind.
li. co.	light cumulus.	g.	gale of wind.
li. h.	light haze.		

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 $\uparrow\uparrow$ = 29.979
for Temp. (Col. 2), = 30.093, - 1.04...
"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\uparrow\uparrow$ = 29.977
for Temp. (Col. 4), = 30.086... - 1.09...
Mean at Station, corrected, and at 32°, = 29.978
Correction for height, feet, above Mean Sea-level, = 27
Mean, reduced to 32°, and Sea-level, = 30.075
Highest Reading, corrected for Index error, on the 14th, = 30.500
Lowest Do., Do., on the 18th, = 29.500
Difference, or Monthly Range, = 1.000

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 14th, = 86.0
Lowest in Month, corrected for Index errors, on the 24th, = 44.0
Difference, or Monthly Range, = 42.0
"Corrected Mean" of all the Highest, (Col. 5), = 72.7
"Corrected Mean" of all the Lowest, (Col. 6), = 52.0
Difference, or Mean Daily Range, = 20.7
** Calculated Mean Temperature, = 62.4

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 14th, = 86.0
Lowest in Month, corrected for Index errors, on the 24th, = 44.0
Difference, or Monthly Range, = 42.0
"Corrected Mean" of all the Highest, (Col. 5), = 72.7
"Corrected Mean" of all the Lowest, (Col. 6), = 52.0
Difference, or Mean Daily Range, = 20.7
** Calculated Mean Temperature, = 62.4

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), = 55.3
† Computed Temperature of Dew-Point, = 50.8
† Do. Elastic Force of Vapour, = 372
† Do. Weight of Vapour in a Cubic Foot of Air, =
† Relative Humidity, (Saturation = 100), = 71
RAIN fell on 4 Days; Amount in Inches, = 0.37

WIND.		SUMMARY.									
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	6	8	1	1	2	10	3			127	
P.M.	7	6	2	1	1	10	3	1		134	
Mean.	6	7	1	1	2	10	3	1		130	

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

John Maunsell

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55° 48' N Long. 3° 24' W Distance from Sea one miles)
Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet. During the MONTH of August 18 68.
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.		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.										
		Barometre * No.	Attach- ed Ther- mometer	Barometre. 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.	Readings of the H-Cup Anemometer No.	No. of hours in which it fell.	Amount in inches. No.	Velocity, (0—5), and Direc- tion.	Amount, (0—10), and Species.	Velocity, (0—10), and Direc- tion.	Amount, (0—10), and Species.	No. 3 inches.	No. 13 inches.					No. 22 inches.	
		inches.		inches.		No.	No.	No.	No.									0 h. A.M.														
	1	30.24	64	30.22	71	77	55			61	56	64	59	W	2	W	1												The first 5 days of this month has been unusually hot	1		
	2	30.20	70	30.20	74	85	58			70	64	72	64	N.E.	1	S.E.	1													2		
	3	30.15	71	30.04	75	84	60			72	64	64	58	S.	1	S.	1													The thermometer as high on the 2 nd in June 134°	3	
	4	30.02	73	29.90	75	86	65			73	63	70	64	S.	1	S.	2														4	
	5	29.80	76	29.80	76	88	61			74	65	67	61	S.	2	S.	2													3 rd do 120°	5	
	6	29.70	72	29.59	72	70	52			67	64	66	60	S.W.	1	S.W.	1		40											4 th do 132°	6	
	7	29.50	70	29.53	68	67	53			62	58	57	54	S.W.	3	S.W.	4		01												5 th do 117°	7
	8	29.60	68	29.84	67	66	52			59	53	55	57	S.W.	4	S.W.	4														Thunder with Lightning on the 6 th 10 th & 15 th	8
	9	30.02	67	29.98	69	70	50			58	54	56	50	S.	2	S.	2															9
	10	30.00	68	29.90	67	70	54			62	57	58	55	S.	2	S.	1		10												Rainbow on the 29 th	10
	11	29.80	64	29.58	66	64	54			57	56	57	56	S.W.	2	S.W.	1		63												Strong winds on the 7 th & 8 th	11
	12	29.40	65	29.70	66	64	52			58	54	58	56	S.W.	2	S.W.	2		04													12
	13	29.71	66	29.69	64	60	56			57	56	58	56	S.E.	2	E.	2		60													13
	14	29.70	66	29.84	70	72	57			60	57	62	59	S.W.	1	S.W.	1		24													14
	15	29.90	67	30.	69	67	55			60	57	58	57	S.W.	1	S.	1		64													15
	16	30.04	68	30.04	68	64	53			60	58	57	55	S.W.	1	W.	1															16
	17	29.95	64	29.93	69	70	54			58	54	60	57	S.W.	1	W.	1															17
	18	29.84	63	29.93	67	66	53			62	58	57	55	S.E.	1	S.E.	1		40													18
	19	30.	66	30.06	67	65	52			56	54	56	52	S.E.	1	S.E.	1															19
	20	30.	67	29.95	66	64	51			57	53	57	53	S.	1	S.W.	1															20
	21	29.90	68	29.80	65	65	53			61	55	56	53	S.W.	2	S.W.	1		04													21
	22	29.40	67	29.22	64	56	50			53	53	53	57	N.E.	1	N.E.	2		114													22
	23	29.26	64	29.42	63	63	50			52	52	52	50	S.W.	2	W.	3		60													23
	24	29.47	61	29.62	61	58	49			53	57	54	57	W.	2	W.S.W.	2															24
	25	29.78	61	29.90	64	60	52			52	57	58	53	W.	2	W.S.W.	2															25
	26	29.84	62	29.50	68	60	50			58	53	54	57	S.W.	2	S.W.	2		60													26
	27	29.70	61	29.72	65	68	47			53	48	52	49	S.W.	4	S.W.	4		16													27
	28	29.81	60	30.03	62	57	48			52	49	53	50	S.W.	4	S.W.	2															28
	29	30.15	60	30.09	65	63	56			54	52	58	54	S.W.	1	S.W.	2															29
	30	30.	64	30.06	64	67	46			64	60	50	47	S.W.	2	S.W.	3															30
	31	30.	62	29.88	68	58	54			56	53	56	53	S.W.	2	S.W.	2															31
Suns.		25	13	18	25	18	23	22	10	30	18	25	14					55	56													
Means.		29.834	66.1	29.831	67.6	67.2	53.3			59.8	55.9	58.1	54.6	1.80		1.90																
† 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 †† = 29.733
for Temp. (Col. 2), = 29.634... - 1.01...
"Corrected Mean" of Barometer at 9 P.M., minus the Correction †† = 29.726
for Temp. (Col. 4), = 29.631... - 1.05...
Mean at Station, corrected, and at 32°, = 29.730
Correction for height, feet, above Mean Sea-level, = 97
Mean, reduced to 32°, and Sea-level, = 29.827
Highest Reading, corrected for Index error, on the (1) th, = 30.240
Lowest Do., Do., on the (22) th, = 29.220
Difference, or Monthly Range, = 1.020

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S." and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† Barometric corrections for both capillarity and Index Errors.
† The Diurnal Range for Scotland is as yet unknown.
† Practically, though not absolutely a minus correction.
* While the Diurnal Range is unknown, the Arithmetic Mean of Col. 5 and 6 will be entered as the "Calculated Mean Temperature."
Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the (5) th, = 88.0
Lowest in Month, corrected for Index errors, on the (24) th, = 46.0
Difference, or Monthly Range, = 42.0
"Corrected Mean" of all the Highest, (Col. 5), = 67.2
"Corrected Mean" of all the Lowest, (Col. 6), = 53.3
Difference, or Mean Daily Range, = 13.9
** Calculated Mean Temperature of Month, = 60.2

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), = 59.0
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 55.3
†† Computed Temperature of Dew-Point, = 52.0
†† Do. Elastic Force of Vapour, = 388
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = 78
RAIN fell on (4) Days; Amount in Inches, = 5.60

WIND.	SUMMARY.										Mean Velocity in miles per day.
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	
A.M.			2	1	3	8	11	3	3		1.80
P.M.			2	2	2	9	10	6			1.80
Mean.		0	2	2	2	9	10	4	2		3.24

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 William McEwen

(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 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, in accuracy and value, commensurate with the labour and pains expended in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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

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

Two moderate-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 coincidences 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 *adjustment* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *aneroid*.

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 *seven* 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 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 *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 Norelli 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 globe, 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 or *cloud* (i. e. within 20° or 30° of the zenith). The state of clouds that appear near the horizon are viewed obliquely; and thus, being unable to *reach* of their amount, we ought not to take them in account in the *clouds* column; though their appearances and changes ought to be noted among the *"Remarks"*. The amount of *clouds* is estimated from a scale of 0 to 10; thus, when the sky *appears* to be 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 $\frac{2}{4}$, (*ex.*) 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 thermometers 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 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. **Corn.**—Mention whether Solomon'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 $3\frac{1}{4}$, as an *example* entry in the schedule, will indicate that the ozone paper is tinted as $3\frac{1}{4}$ on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is $4\frac{1}{2}$; 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 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 a single one 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; 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;—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.

Eninburgh, 6th December 1872.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	First report.	In leaf.	Leaves.	GROPS.	Showing or mentioning variety.	Planting or sowing.	Appearance or flowering.	In leaf or flower.	Direct cut.
Alder,					Barley,					
Beech,					Oats,					
Birch,					Wheat,					
Elm,					Beans,					
Larch,					Pears,					
Lime,					Turnips,					
Oak,					Mye Grass,					
Sycamore or Plane,										

SHRUBS, ETC.	First in blossom.	Apples.	Black Currant.	Cherry.	Gem.	Gooseberry.	Leach.	Pear.	Plum.	Swan.	Rail or Corn Crake.	First in blossom.	First in blossom.	First in blossom.
Barberry,														
Bomtree or Elder,														
Broom,														
Hazel,														
Hawthorn,														
Holly,														
Laburnum,														
Lime,														
Mazewood,														
Mountain Ash or Rowan,														
Red Flowering Currant,														
Rhododendron Ponticum,														
Whip,														

Have the goodness also to state any information you may be able to collect from blight, disease, etc. Whether Hay, Potatoes, Turnips, Prunus, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc. Whether Hay, Potatoes, Turnips, Prunus, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc.

BOOK-POST.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Mr. ALEXANDER BUCHAN,

To

James
August 1868



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inverkeithing, County of Midlothian, in Lat 55° 50' 00" N, Long. 3° 22' 40" W, Distance from Sea one miles.Height of Cistern of the Barometer above Mean Sea-level 40 feet, above Ground 4 feet.During the MONTH of September 1868.

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.			Temperature of WELL at Depth of feet. No.	SEA. Temperature at 1 fathom, and Drift.	OZONE. 0—10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. <i>Mention the hour at which Storms began and ended.</i>	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.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.			9 h. A.M.								
		Baromete * No.	Attache d Ther- mometer	Baromete. No.	Attache d 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.			Velocity, (0—6), and Direc- tion.	Amount, (0—10), and Species.	Velocity, (0—6), and Direc- tion.	Amount, (0—10), and Species.		No. 8 inches.	No. 13 inches.	No. 22 inches.						
																																	9 h. A.M.
				inches.		inches.																											
	1	29.93	65	20.13	60	62	50			56	53	54	52	WN	2	W	2														Rainbow on the 1 st	1	
	2	30.24	66	20.15	60	62	50			59	56	54	52	W	1	SW	-														great flood on the 6 th Thoms	2	
	3	30.24	66	20.04	67	62	46			60	57	58	55	WN	1	SW	1			.08											in shade 82°	3	
	4	30.02	64	20.04	67	64	59			59	55	61	57	W	-	W	1														Thunder on the 27 th no Lightning	4	
	5	30.10	70	20.14	67	76	60			67	61	61	58	SW	1	SW	1														Thunder on the 29 th with Lightning	5	
	6	30.15	73	20.06	68	62	57			75	70	65	60	SW	1	SW	2																
	7	30.05	72	20.15	69	69	45			66	60	54	49	SW	1	W	1			.01													
	8	30.30	64	20.40	63	64	38			53	48	45	42	WN	1	WN	1																
	9	30.50	60	20.38	60	65	45			52	48	53	49	W	1	SE	1																
	10	30.22	64	20.10	63	67	54			55	49	52	49	WN	1	SW	1																
	11	30.13	64	20.14	67	59	49			57	55	53	51	SE	1	E	1			.06													
	12	30.24	60	20.24	64	56	42			50	48	45	43	SE	1	SE	1																
	13	30.16	60	20.16	61	57	38			58	51	42	39	SE	1	SE	1																
	14	30.10	60	20.10	62	53	47			50	47	51	48	SE	1	SE	1																
	15	30.12	60	20.10	63	54	44			51	47	50	47	SE	1	SE	1																
	16	30.06	61	29.98	60	55	46			50	47	48	46	SE	1	SE	1			.01													
	17	29.93	60	29.84	61	53	47			48	46	50	48	SE	1	SE	1			.03													
	18	29.83	60	29.78	63	56	52			53	50	54	53	SE	1	SE	1			.04													
	19	29.70	61	29.68	62	54	50			53	53	52	51	SE	4	SE	4			1.24													
	20	29.70	62	29.80	65	60	53			56	54	55	53	SE	1	E	1																
	21	29.86	65	29.90	65	64	53			57	56	54	52	SE	1	SE	1																
	22	29.90	62	29.90	64	56	50			55	53	54	52	SE	1	SE	1																
	23	29.70	60	29.61	62	56	50			54	51	53	53	WN	1	W	1			.25													
	24	29.61	61	29.70	62	55	47			51	51	52	51	W	1	W	1			.18													
	25	29.70	60	29.50	60	55	45			53	52	50	49	E	1	E	2																
	26	29.67	60	29.60	62	56	48			47	46	53	52	E	1	E	1			.25													
	27	29.40	60	29.20	64	62	50			55	53	52	51	S	1	S	1			.37													
	28	29.20	61	29.14	62	60	46			55	53	51	49	SW	2	SW	1			.10													
	29	29.03	62	29.03	63	62	50			55	52	53	52	SW	1	SW	1			.34													
	30	29.20	60	29.60	62	54	42			50	49	47	45	SE	4	SE	4			1.04													
	31																																
	Suns.	26	8	26	8	11	25			158	71	79	10	35	38																		
	Means.	29.87	62.8	29.88	63.9	60.4	44.4			55.3	52.4	52.6	50.3	1.17	1.27																		
	† 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		

NOTATION USED IN GENERAL REMARKS

a.	aurora.	m.	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.	c. h. r.	continued heavy rain.
d.	depos.	s.	stratus.
f.	fog.	sc.	scud.
fr.	frost.	sl.	sleet.
h-fr.	hoar-frost.	sn.	snow.
h.	haze.	so. h.	solar halo.
h. d.	heavy dew.	sq.	squall.
h.	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 \ddagger = 29.800
for Temp. (Col. 2), = 29.892 - .092
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \ddagger = 29.791
for Temp. (Col. 4), = 29.886 - .095
Mean at Station, corrected, and at 32°, = 29.796
Correction for height, feet, above Mean Sea-level, = 58
Mean, reduced to 32°, and Sea-level, = 29.894
Highest Reading, corrected for Index error, on the 5th, = 30.500
Lowest Do., Do., on the 24th, = 29.030
Difference, or Monthly Range, = 1.470

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 6th, = 82.0
Lowest in Month, corrected for Index errors, on the 8th, 13th, = 38.0
Difference, or Monthly Range, = 44.0
"Corrected Mean" of all the Highest, (Col. 5), = 60.4
"Corrected Mean" of all the Lowest, (Col. 6), = 48.4
Difference, or Mean Daily Range, = 12.0
** Calculated Mean Temperature of Month, = 54.4

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 1st, = 117.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 117.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1st, = 117.0
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 117.0
Difference of above Means or Range ("exposed"), = 117.0

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 54.0
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 51.4
†† Computed Temperature of Dew-Point, = 48.9
†† Do. Elastic Force of Vapour, = .344
†† Do. Weight of Vapour in a Cubic Foot of Air, = 1.27
†† Relative Humidity, (Saturation = 100), = 82
RAIN fell on 14 Days; Amount in Inches, = 3.92

SUMMARY.											
WIND.								Mean Force.			
Direction.	N	NE	E	SE	S	SW	W	Calms or Variable.	Mean Force.	Mean Velocity in miles per day.	
A.M.	9	3	1	4	7	1			1.17		
P.M.	10	4	2	3	5	6			1.27		
Mean.	0	9	5	2	3	5	6	1	1.22	1.48	

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

Wm. McIndoe

(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 incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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

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

Two instrument-precise 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-ends* are not true inches but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the *cistern* are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; when 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 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 ivory strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air in 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 replaced.

The Barometer should be suspended in a good light, which may be improved by putting a piece of white paper behind the tube. Its direct rays pass over the seat 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, 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; 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 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 Zambra's Patent "Maximum" Thermometers are recommended; primed directions for their use may be obtained with each instrument. The "Minimum" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum". This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit discolors by high temperature it will be found in the upper loop, and must be discolored from thence by heating that part over a lamp; the alcohol will evaporate and again condense in being horizontal.

The above remarks apply equally to the Thermometers for

registering the greatest heat from the sun's rays, and the least from radiation during night. Their bulbs have a black coating, which may easily be made, or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "Maximum" should be freely exposed to the sun, and the "Minimum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the 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 Scales, 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 melting ice. For comparison of Thermometers, 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 five 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 a board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb,—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed, evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which 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 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 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 at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

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

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every observatory be furnished with a Hemispherical-Cup Anemometer—a self-registering instrument which shows the amount of Wind that passes 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 defective nature of the instruments used. It is indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass, around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

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

Clouds.—Convenient abbreviations for Luke Howard's

Ensmann, 5th December 1865.

(By Order)

A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

POLESTAR TREES.	Flower.	Leaf buds first appear.	In Leaf.	Devised of	CROPS.	Planting or sowing.	Harvesting or reaping.	In the field or in the garden.	Time of cutting or threshing.
Alder.					Barley.				
Aspen.					Beech or Birch.				
Birch.					Wheat.				
Elm.					Beans.				
Larch.					Peas.				
Lime.					Potatoes.				
Oak.					Turnips.				
Sycamore or Plane.					Hay Grass.				

SHRUBS, ETC.	First in Blossom.	Fruits.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.
Barberry.										
Battle of Elders.										
Broom.										
Burns.										
Cherry.										
Hazel.										
Hawthorn.										
Holly.										
Laurum.										
Lilac.										
Mezereum.										
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, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc. Whether any Epidemic disease prevails among cattle; and the Agricultural condition of the district generally.

BOOK-POST.

Mr. ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Received
Apr 1868

To

MUSSELSBURGH
APR 1868

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inverish, County of Edinburgh, in Lat 55° 50' 00" N, Long 3° 2' 40" W, Distance from Sea one mile.
Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet. During the MONTH of October 1868.

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.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.									
		Barometer * No.	Atmos- phere inches.	Barometer. No.	Atmos- phere inches.	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the Li-Cup Anemometer No. _____	No. of hours in which it fell.	Amount in inches.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	No. _____ 3 inches.	No. _____ 12 inches.					No. _____ 22 inches.
		inches.	°	inches.	°	No.	No.	No.	No.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°					°
	1	29.90	60	30.06	61	55	38			47	46	46	45	88	2	88	2		.02										gales of Wind occurred over the 6 th & 28 th	1	
	2	30.10	62	30.12	60	53	42			43	42	47	46	SW	1	SW	1		-										Shooting Stars on the 15 th	2	
	3	30.10	56	29.80	59	53	42			45	44	50	48	S	1	S	1		.02										Norona on the 19 th 22 nd & 24 th	3	
	4	29.60	56	29.80	57	52	40			47	44	46	45	W	1	SW	1		.04										Rainbows seen on the 15 th 16 th & 26 th	4	
	5	29.80	60	29.90	60	54	38			48	47	43	41	W	1	W	1		-										Wild fire seen on the roof of the 16 th & 23 rd	5	
	6	29.64	57	29.78	60	56	41			52	50	47	45	SW	5	SW	-		.10												6
	7	29.80	57	29.82	58	54	42			47	44	47	45	SW	2	SW	1		-												7
	8	29.90	55	29.82	58	55	50			48	46	50	47	SW	2	SW	2		-												8
	9	29.73	60	29.84	59	57	38			53	52	47	45	S	2	SW	1		.36												9
	10	30.04	56	30.07	60	58	43			41	40	47	45	SW	1	SE	1		-												10
	11	30.10	60	30.01	61	58	42			48	46	47	45	SW	1	SW	1		-												11
	12	29.96	63	29.93	62	58	50			47	45	53	52	SW	1	SW	1		-												12
	13	29.96	59	30.10	58	56	34			51	48	49	45	W	1	W	1		-												13
	14	30.14	54	29.90	58	52	45			37	35	49	47	W	1	W	1		-												14
	15	29.40	58	29.40	59	50	41			50	49	47	45	SW	4	SW	4		.10												15
	16	29.30	57	29.25	59	47	35			45	43	40	37	W	3	SW	4		.02												16
	17	29.30	56	29.40	56	44	33			40	37	38	35	SW	2	SW	2		-												17
	18	29.56	53	29.58	50	42	29			36	33	30	28	SW	2	SW	1		-												18
	19	29.60	50	29.44	51	40	27			36	35	32	31	SW	1	S	2		-												19
	20	29.93	45	29.62	50	45	37			32	31	40	39	S	1	S	1		.20												20
	21	29.60	50	29.80	51	45	37			41	40	39	38	SW	1	W	1		.07												21
	22	29.88	50	29.70	62	44	42			41	40	39	38	W	1	W	1		-												22
	23	29.50	54	29.48	60	47	33			43	41	37	35	SW	2	SW	1		-												23
	24	29.44	50	28.80	58	43	38			36	35	40	39	S	1	S	4		.25												24
	25	29.40	54	29.60	55	45	36			42	40	37	36	SW	1	SW	1		-												25
	26	29.60	50	29.70	53	42	33			42	40	37	36	SW	2	SW	1		.18												26
	27	29.90	50	30.10	53	41	33			38	37	38	37	SW	1	SW	1		-												27
	28	30.18	50	29.80	52	47	38			38	37	41	40	SW	1	SW	2		.38												28
	29	29.48	50	29.73	51	44	38			41	40	40	38	SW	2	SW	1		-												29
	30	29.90	50	29.90	54	50	46			43	41	48	45	SW	2	SW	2		-												30
	31	29.94	56	29.80	59	57	55			52	48	57	55	S	3	S	2		-												31
Sums.		2356	95	2346	124	3013	2813			1113	116	1058	73		52	48			174												
Means.		29.76	56.8	29.75	56.9	49.9	39.2			43.6	41.8	43.5	41.7		168	155															
+ 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 $\frac{1}{2}$ for Temp. (Col. 2), = 29.691
"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{1}{2}$ for Temp. (Col. 4), = 29.682
Mean at Station, corrected, and at 32°, = 29.686
Correction for height, feet, above Mean Sea-level, = 100
Mean, reduced to 32°, and Sea-level, = 29.786
Highest Reading, corrected for Index error, on the 14th, = 30.140
Lowest Do., Do., on the 24th, = 28.800
Difference, or Monthly Range, = 1.340

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 11th, = 58.0
Lowest in Month, corrected for Index errors, on the 19th, = 27.0
Difference, or Monthly Range, = 31.0
"Corrected Mean" of all the Highest, (Col. 5), = 49.9
"Corrected Mean" of all the Lowest, (Col. 6), = 39.2
Difference, or Mean Daily Range, = 10.7
"Calculated Mean Temperature of Month, = 44.6

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 11th, = 58.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 58.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 19th, = 27.0
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 39.2
Difference of above Means or Range ("exposed"), = 31.0

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 43.5
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 41.7
Computed Temperature of Dew-Point, = 39.6
Do. Elastic Force of Vapour, = 2.44
Do. Weight of Vapour in a Cubic Foot of Air, = 86
Relative Humidity, (Saturation = 100), = 86
RAIN fell on 12 Days; Amount in Inches, = 1.74

WIND.	SUMMARY.										Mean Force.	Mean Velocity in miles per day.
	Direction	N	NE	E	SE	S	SW	W	NW	Calms or Variables.		
A.M.		1	1	1	1	1	1	1	1		1.68	
P.M.		2	2	1	1	1	1	1	1		1.55	
Mean.		2	1	1	0	4	1	3	8	2	1.61	

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 Gunmed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by

William Mearns

(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 incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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

Barometer.—Whether 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; 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. In *great* instances are not rare 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; the stem passes freely through the lid and case of the cistern. When their convenience 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 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 *venier*.

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 *sever* 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 adjusted carefully made. By raising and lowering the eye it must be brought into the plane of the back and front of the index,—usually the lower edge of the *venier*, 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 Thermometer.—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 the ground in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as to once to "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 Ruthven 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 marked, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Maximum*" should be freely exposed to the sun, and the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by dissipation.

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 covered, and placed to the side, and a little below the level of the wet bulb,—in no case under the bulb;—the reading 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 usin is always *clean and moist*, and the water pure. In frosty weather observation is a matter of much delicacy; and must be made with great care. The bulb must be immersed by immersion, from 15 to 30 minutes before the hour of observation. From the film of too thin formed evaporation will proceed as from the moist cloth in ordinary circumstances. One form of Mison's Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the *thermo-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—39.49, 40.40, or 40.41; or, under, 40.4, 40.5, or 40.6, according as it indicates a little under, an exact coincidence with, or a little over 40°; or 40°, respectively. So also 40.3 and 40.7 or 40.8 respectively. In reading Ruthven'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 at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd, above surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always when the wind is feebly, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every observatory be furnished with a Hemispherical-Cup Anemometer,—a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Land'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 in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily; and the readings entered in the returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—When a Snow shower occurs it must be noted in the "Remarks," and the depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, included in every column, the observer cannot be too careful to register *observations only*; and noting that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's nomenclature, and the following abbreviations for Luke Howard's nomenclature, are given in the "Remarks," and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, included in every column, the observer cannot be too careful to register *observations only*; and noting 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 observation of the sky *or clear* (i. e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds column, though their appearance and changes ought to be noted among the "*Remarks*." The amount of cloud is entered on a scale of 0 to 10; thus, when the sky *overhead* is half covered by clouds, 5 is entered as the *description*, and so on.

Observations of 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, (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 observed to the extent of 2-tenths by lower clouds of the *cumulostratus* kind.

Shading.—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 fixed with sloping tin collars, to prevent water being stirred to the bulbs by the stems; wooden frames, being set by the side 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 9th, 15th, and 24th 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 Schönbien'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 3rd, 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 ordinary 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 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 reaped 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.

Forw. Sec. of the Society, 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.		Flower.	In Leaf.	First buds first appear.	In Leaf.	Divided or Leaves.	GROPS.	Barley.	Oats.	Wheat.	Beans.	Potatoes.	Turnips.	Lye Grass.	MIGRATORY BIRDS.				First in Blossom.	First in generally.	Cuckoo, Curlew, House-Swallow, Plover, Sand-Martin, Starling, Swan, Rail or Corn Crane.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
Alder.	Asb.	Decb.	Dirch.	Elm.	Larch.	Time.	Oak,	Sycamore or Plane,																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inverclevy, County of Edinburgh, in Lat 55° 56' 0" N Long. 3° 2' 40" W Distance from Sea one mile.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.During the MONTH of November 1868.

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, &c. 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.		Readings of the H-Can Anemometer No. _____		No. of hours in which it fell.	Amount in inches. No. _____	9 A.M.		P.M.		9 h. A.M.			Temperature of WELL at Depth of _____ feet. No. _____					Temperature at 1 fathom and Density.	0-10.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		Barometer. * No.	Atmos- phere Ther- mometer	Barometer. No.	Atmos- phere 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.	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.	9 A.M.							9 P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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NOTATION USED IN GENERAL REMARKS.

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

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-4.	Common Designation.	Estimated Force, 0-4.	Common Designation.	Estimated Force, 0-4.	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 \pm for Temp. (Col. 2), = 29.896
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4), = 29.901
Mean at Station, corrected, and at 32°, = 29.899
Correction for height, feet, above Mean Sea-level, = 101
Mean, reduced to 32°, and Sea-level, = 30.000
Highest Reading, corrected for Index error, on the 12 th, = 30.640
Lowest Do., Do., on the 21 th, = 29.860
Difference, or Monthly Range, = 1.780

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 1 th, = 62.0
Lowest in Month, corrected for Index errors, on the 6 th, = 25.0
Difference, or Monthly Range, = 37.0
"Corrected Mean" of all the Highest, (Col. 5), = 42.6
"Corrected Mean" of all the Lowest, (Col. 6), = 34.2
Difference, or Mean Daily Range, = 8.4
** Calculated Mean Temperature of Month, = 38.4

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 1 th, =
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1 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), = 38.2

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 36.9

† Computed Temperature of Dew-Point, = 35.1

† Do. Elastic Force of Vapour, = 204

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

† Relative Humidity, (Saturation = 100), = 89

RAIN fell on 7 Days; Amount in Inches, = 2.16

WIND.	SUMMARY.										Mean Force.	Mean Velocity in miles per day.
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.		
A.M.		5	1	1	1	7	4	4	3		1.48	
P.M.		6	1	1	1	5	4	4	3		1.80	
Mean.		5	1	1	1	6	4	4	3		1.64	

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 Glimmed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Returns verified by

William Muirhead

(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 the 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 comprehensiveness 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; if properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr. Adair of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-ticks* 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* of this little piston-valve is brought by the adjusting screw, to form one straight line with those of the ivory float, the surface of the mercury is then at the exact height from which the setting must be made with scrupulous accuracy; 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 *vernier*, which must be index,—usually the lower edge of the back, 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 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 repaired by striking the instrument repeatedly against the palm of the hand; when the 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 the face of these Thermometers; the sun's heat to affect the Minimum Thermometer by disfiguring its face.

Ventilation 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 "*Hygrometric*" 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 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 that 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 cap 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 foregoing 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 to indices a little under, an exact coincidence with, or a little over 40; or 40.4, 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, and a mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

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

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

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

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—When a Snow shower occurs it must be noted in the "*Remarks*," and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift of the snow 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 soiling that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Linke 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 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*," 2 W., 4 S.W., (for example,) will indicate that the upper strata of clouds travel with *average* 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, cist., 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.

Temperatures 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.

Temperatures 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.

Observations on the State of the Atmosphere.—The Council recommend that the papers of the Meteorological Society be 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 5 4; as an *azone* entry, in the schedule, will indicate that the *azone* paper is filled as "5 4," on the scale, that the wind is from the N.W.; and that its force on the scale 0-6 is 4 4; i. e., that it is *blowing 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 recognized and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

Bushmount, 14th December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

POWERS TREES.	Flowers.	In first appearance.	Least fruit.	Divided of leaves.	CHOPS.	Soiling or above ground.	Planting.	In leaf or flower.	Wet out or dried.
Ash.	Barley.	Bare or Biggs.	Oats.	Wheat.	Beans.	Potatoes.	Turnips.	Rye Grass.	
Beech.									
Birch.									
Blm.									
Larch.									
Lin.									
Oak.									
Sycamore or Plane.									

SHRUBS, ETC.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.
Barberry.	Apple.	Black Currant.	Cherry.	Gooseberry.	Holly.	Lahmum.	Lilac.	Mazey.	Mountain Ash or Rowan.	Red Flowering Currant.
Rhododendron Potpourri.	Whin.									

Have the goodness also to state any information you may be able to collect relative to the Corps of Grain, Hay, Potatoes, Turnips, Prunes, etc., 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.

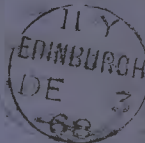
Mr ALEXANDER BUCHAN.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Imresh
Nov. 1868.

To



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat 55° 50' 0" N, Long. 3° 2' 40" W, Distance from Sea one miles.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.During the MONTH of December 1868.

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.		9 h. P.M.		Protected in Shade, & feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.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.	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.	c. h. r.	continued heavy rain.
d.	dew.	s.	stratus.
f.	fog.	sc.	scud.
fr.	frost.	sl.	sleet.
h. fr.	hoar-frost.	so.	snow.
h.	haze.	so. ha.	solar halo.
h. d.	heavy dew.	sq.	squall.
h. l.	hail.	sq.	squid.
l.	lightning.	t.	thunder.
li. cl.	light clouds.	t. s.	thunder storm.
li. sh.	light showers.	w.	wind.
lu. co.	lunar corona.	5.	gale of wind.
lu. ha.	lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 1-4.	Common Designation.	Estimated Force, 5-6.	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 $\frac{1}{100}$ for Temp. (Col. 2), = 29.302 - 0.57 = 29.245
"corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{1}{100}$ for Temp. (Col. 4), = 29.323 - 0.66 = 29.257
Mean at Station, corrected, and at 32°, = 29.251
Correction for height, feet, above Mean Sea-level, = 101
Mean, reduced to 32°, and Sea-level, = 29.352
Highest Reading, corrected for Index error, on the 9 th, = 30.100
Lowest Do., Do., on the th, = 28.350
Difference, or Monthly Range, = 1.750

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 10th, = 56.0
Lowest in Month, corrected for Index errors, on the 29th, = 26.0
Difference, or Monthly Range, = 30.0
"Corrected Mean" of all the Highest, (Col. 5), = 45.5
"Corrected Mean" of all the Lowest, (Col. 6), = 36.6
Difference, or Mean Daily Range, = 8.9
** Calculated Mean Temperature of Month, = 41.0

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 40.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 38.6
†† Computed Temperature of Dew-Point, = 36.5
†† Do. Elastic Force of Vapour, = 216
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = 87
RAIN fell on 8 Days; Amount in Inches, = 3.81

WIND.		SUMMARY.									
Direction		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		1	2	1	1	8	16	1	1		1.71
P.M.		2	1	2		13	16	3			1.68
Mean.		1	2	1	1	10	13	2			1.70

2.89

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

Wm. McArthur

(Signed)

