

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, County of _____, in Lat. _____, Long. _____, Distance from Sea _____ miles.

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

During the MONTH of January 1870.

The Hours of Observation are of Greenwich Time.

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 Deposition or Elevation of Barometer, Prevailing Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.
	9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.							
	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.	No.	No.	No.					
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.				
	inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°				
1	28.350	47.0	28.456	48.0	37.0	33.0	38.0	28.0					W	0.5	S	0.5	12	0.6	10.0	0					f	1		
2	28.570	49.0	28.660	49.0	41.0	31.0	74.0	23.0					W	0.5	W	0.5			0	6.0					a.	2		
3	28.620	48.6	28.560	48.0	40.1	29.0	73.0	20.0					W	0.5	S	0.5	12	1.0	10.0	3.0					a. l.	3		
4	28.520	46.0	28.520	47.0	38.6	30.0	44.0	22.0					S	0.5	W	0.5			10.0	3					a.	4		
5	28.630	45.0	28.370	44.0	34.5	35.0	52.0	29.0					W	0.5	W	2			8.0	2.0					a.	5		
6	28.610	45.0	28.366	45.0	39.0	32.0	73.0	25.5					S	0.5	S	0.5	12	0.6	10.0	6					f	6		
7	28.085	47.0	28.260	46.0	39.3	34.0	52.0	29.0					W	1.5	W	0.5			10.0	0					h.c.	7		
8	27.860	47.0	28.010	48.4	37.5	32.5	38.0	28.0					S	0.0	W	0.5			10.0	0					f	8		
9	28.466	49.0	28.610	44.0	37.2	32.4	52.0	28.0					W	1.5	W	1			10.0	5.0							9	
10	28.830	43.0	28.970	42.0	34.0	29.6	67.0	23.0					W	1.5	W	0.5			10.0	2.0							10	
11	28.882	43.0	28.486	41.0	35.0	25.0	36.0	19.0					W	0.5	W	1			10.0	0							11	
12	28.465	41.5	28.400	40.0	34.0	29.0	49.0	24.0					W	1	W	2			10.0	2							12	
13	28.788	42.0	28.760	43.4	34.2	28.6	64.0	24.0					W	0.5	S	0.5			10.0	3.0						h.c.	13	
14	28.285	44.2	28.270	43.0	35.0	30.0	62.0	28.0					W	0.5	W	0.5			10.0	6.0						f. h.c.	14	
15	28.626	47.0	28.960	46.0	36.4	26.2	39.2	20.3					W	0.5	W	0.5	12	0.2	10.0	2.0						h.c.	15	
16	29.200	44.0	29.342	48.6	35.0	27.4	37.0	22.0					W	0.5	S	0.5			10.0	0						h.c.	16	
17	29.570	49.0	29.530	49.0	42.0	35.0	42.0	32.0					W	0.5	S	0.5			10.0	0						f	17	
18	29.568	50.0	29.668	49.0	42.2	33.0	62.0	25.0					W	0.5	W	0.5			10.0	2.0							18	
19	29.760	48.0	29.770	41.0	34.0	32.0	35.0	25.5					S	0.5	S	0.5	12	0.2	10.0	0							19	
20	29.688	47.0	29.650	42.0	32.2	27.5	33.5	22.0					W	0.5	S	0.5			10.0	0							20	
21	29.570	48.0	29.488	49.0	33.4	27.0	33.0	23.6					W	0.5	W	0.5			10.0	0							21	
22	29.492	47.0	29.570	48.0	37.5	33.5	39.3	30.0					W	0.5	W	0.5	12	0.2	10.0	0						a.	22	
23	29.620	50.0	29.660	48.0	37.5	30.5	68.0	24.0					W	0.5	W	0.5			10.0	0						h.c.	23	
24	29.600	48.0	29.570	47.4	38.0	27.0	70.0	21.0					W	0.5	W	0.5			10.0	6						h.c.	24	
25	29.585	49.0	29.526	45.0	34.0	30.0	68.0	24.0					W	0.5	W	0.5			10.0	3.0						a.	25	
26	29.450	47.0	29.330	45.0	38.5	27.3	80.0	14.4					W	0.5	W	0.5			10.0	0						a.	26	
27	29.215	43.0	29.180	43.0	37.0	22.0	62.0	14.0					W	0.5	W	0.5			10.0	0						a.	27	
28	29.016	44.6	29.000	42.0	36.0	32.0	43.0	23.0					W	0.5	W	2			10.0	4						a.	28	
29	29.072	44.0	29.065	44.0	35.0	28.0	58.0	21.0					W	1.5	W	1			10.0	2						a.	29	
30	28.962	41.0	28.770	39.3	34.5	27.0	42.5	19.0					S	1.5	S	2.5			10.0	6						a.	30	
31	28.566	40.0	28.660	41.0	36.0	33.0	37.0	30.5					S	3	S	1.5	12	1.0	10.0	0						f	31	
Sums.	897.396	1451.9	897.557	1451.6	1145.6	923.6	1002.5	710.4					24.5	24.5			17	1.36	229	209	96							
Means.	28.948	46.2	28.921	45.7	36.9	29.8	51.6	23.0					0.8	0.8														
+ Total Corrections for Instru- mental Errors.	2.0																											
+ Corrections for Diurnal Range.																												
"Cor- rected Means."	28.948	46.1	28.973	45.1	36.9	29.8	51.6	23.8																				
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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm for Temp. (Col. 2), = 28.903
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4), = 28.901
Mean at Station, corrected, and at 32°, = 28.982
Correction for height, 894 feet, above Mean Sea-level, = 1.004
Mean, reduced to 32°, and Sea-level, = 29.977
Highest Reading, corrected for Index error, on the 19 th, = 29.770
Lowest Do., Do., on the 8 th, = 27.860
Difference, or Monthly Range, = 1.910

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 19 th, = 42.2
Lowest in Month, corrected for Index errors, on the 27 th, = 22.0
Difference, or Monthly Range, = 20.2
"Corrected Mean" of all the Highest, (Col. 5), = 36.9
"Corrected Mean" of all the Lowest, (Col. 6), = 29.8
Difference, or Mean Daily Range, = 7.1
"Calculated Mean Temperature of Month, = 33.3

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 26 th, = 80.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 57.6
Lowest at Night, Black Bulb, (corrected for Index errors), on the 27 th, = 14.0
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 23.8
Difference of above Means or Range ("exposed"), = 27.8

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

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

Computed Temperature of Dew-Point, = _____

Do. Elastic Force of Vapour, = _____

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

Relative Humidity, (Saturation = 100), = _____

RAIN fell on 17 Days; Amount in Inches, = 1.36

WIND.		SUMMARY.									
Direction	No.	NE	E	SE	S	SW	W	NW	Calms or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	2	1	0	0	5	11	8	3	1		
P.M.	4	0	1	0	9	10	15	2			
Mean.	3	1	0	0	7	10	7	2	1		

(Signed) William Bruce

Observations made and Return verified by William Bruce
Bogside, Leckie, Co. Lin.

Field labour is far back, owing to the to the continued frost during the last three months, a considerable amount of stubbles are yet to plough, and few have any be ploughed. Turnips and fodder are plentiful, but the former have suffered much from the hard bare frosts. There has been only 6 fresh night day during the last three months. Severe colds, with influenza have been very prevalent. But the generally healthy.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside Lochet-Cushnie*, County of *Aberdeen*, in Lat. *57° 10' 50"*, Long. *2° 45' 00"*, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *February* 18*70*.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. _____				WIND.				RAIN.		CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS.		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.			0-10.		As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.								
		Barometer. * No.	Attach- ed Ther- mometer.	Barometer. No.	Attach- ed Ther- mometer.	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb. No.	Wet bulb. No.	Dry bulb. No.	Wet bulb. No.	Direction. No.	Force. No.	Direction. No.	Force. No.	Readings of the H-Opt. Anemometer. No.	No. of drops in 10 min.	Amount in inches. No.	Velocity, (0-6), and Direction. No.	Amount, (0-10), and Species. No.	Velocity, (0-6), and Direction. No.		Amount, (0-10), and Species. No.	No. 8 inches.	No. 13 inches.			No. 22 inches.	Temperature of Well at Depth of feet. No.		Temperature at Fathoms and Drasity.	9 A.M. 9 P.M.	Mention the hour at which Storms began and ended.
1	28.830	46.0	28.650	41.5	37.5	36.0	38.0	29.0					SE	0.5	S	2.5		12	0.02	7.5	10.5	1							a.	1					
2	28.590	47.0	28.600	47.0	40.0	37.0	43.0	31.0					SE	0.5	S	0.5		"	10	8.5	10.5	1/2							a.	2					
3	28.734	48.0	28.746	47.0	40.0	34.0	44.0	27.0					SE	0.5	SE	1		"	0.02	10.5	8.5	1							a.	3					
4	28.730	48.0	28.660	44.0	37.0	34.0	38.5	30.0					SE	0.5	S	1.5		"	0.05	10.5	10.5	0							a.	4					
5	28.740	44.0	28.670	46.0	43.0	36.6	63.0	33.0					S	0.5	S	0.5				7.5	6.5	4							a.	5					
6	28.830	45.0	28.670	41.5	37.0	34.0	38.5	32.0					S	3	SE	3	7.5	1.28		10.5	10.5	0							a.	6					
7	28.760	45.0	28.670	44.0	38.0	33.0	41.0	30.0					S	0.5	SE	1.5	7.5	7.0		10.5	10.5	0							a.	7					
8	28.870	42.0	29.150	41.0	33.0	28.0	32.0	26.0					SE	1.5	SE	1.5	7.5	15		10.5	10.5	0							a.	8					
9	29.234	43.4	29.350	44.0	30.0	27.0	32.0	26.0					S	0.5	SE	0.5				10.5	10.5	0							a.	9					
10	29.426	47.0	29.460	46.4	32.0	19.0	58.4	12.0					SE	0.5	SE	0.5		S	13	6.5	10.5	2 1/2							a.	10					
11	29.510	47.3	29.630	47.0	33.0	22.0	52.0	13.0					SE	1	SE	0.5		"	0.02	10.5	4.5	2							a.	11					
12	29.710	45.0	29.736	49.0	33.0	21.5	44.0	13.5					SE	0.5	SE	0.5		"	10	10.5	10.5	2 1/2							a.	12					
13	29.773	49.0	29.730	44.0	31.0	22.0	42.0	17.0					SE	1	SE	0.5		"	0.06	10.5	10.5	3							a.	13					
14	29.725	40.0	29.700	45.0	31.3	22.5	49.0	18.0					SE	1.5	SE	0.5				10.5	10.5	1							a.	14					
15	29.660	46.0	29.572	46.0	36.0	26.0	48.5	14.0					SE	0.5	SE	0.5	7.5	0.03		10.5	10.5	2							a.	15					
16	29.470	47.0	29.440	47.5	34.5	33.0	41.5	31.0					SE	0.5	SE	0.5	7.5	10		10.5	10.5	1							a.	16					
17	29.450	47.6	29.336	47.0	36.7	29.0	57.0	26.0					SE	0.5	SE	0.5		"	0.03	10.5	10.5	3							a.	17					
18	29.210	47.0	29.186	48.0	35.5	32.0	52.0	30.0					SE	0.5	SE	1		"	11	10.5	10.5	2							a.	18					
19	29.180	46.5	29.184	46.0	36.0	31.0	62.0	28.0					SE	1	SE	0.5				6.5	10.5	4							a.	19					
20	28.980	44.0	28.910	47.0	38.5	30.5	53.0	27.0					SE	2.5	SE	2	7.5	14		3.5	5.5	2							a.	20					
21	28.740	41.0	28.720	40.0	26.0	22.0	32.0	17.0					SE	2	SE	1.5		"	17	8.5	10.5	1							a.	21					
22	28.820	38.0	28.722	39.5	31.0	21.5	53.2	17.0					SE	1.5	SE	0.5		"	20	10.5	10.5	4							a.	22					
23	28.530	45.0	28.570	42.0	31.0	17.0	49.0	11.6					SE	0.5	SE	0.5		"	0.02	10.5	10.5	3							a.	23					
24	28.485	44.0	28.570	39.0	31.0	17.5	61.0	13.0					SE	0.5	SE	1.0				10.5	2.5	5							a.	24					
25	28.650	39.0	28.460	37.4	31.5	21.5	39.0	17.0					SE	0.5	SE	0.5				10.5	10.5	4							a.	25					
26	28.370	43.0	28.560	39.5	35.0	20.5	52.0	14.0					SE	1.5	SE	0.5	7.5	22		10.5	10.5	1 1/2							a.	26					
27	28.653	45.0	28.542	46.8	35.0	21.0	40.0	14.5					S	0.5	SE	0.5		"	28	10.5	10.5	0							a.	27					
28	28.270	46.5	28.330	40.0	41.5	31.0	54.0	29.0					S	1.5	SE	1	7.5	10		10.5	8.5	5							a.	28					
29																																29			
30																																30			
31																																31			
Sums.	911.760	1235.8	861.736	1133.1	974.3	753.1	1309.6	624.6					27.5	27.5			4.03			26.5		2.57	56												
Means.	28.991	44.8	28.990	44.0	34.8	26.9	46.8	22.3																											
Total Corrections for Instrumental Errors.																																			
Corrected Means.	28.991	44.8	28.990	44.0	34.7	26.8	46.7	22.3																											
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++ for Temp. (Col. 2), = *28.948*
Corrected Mean of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = *28.950*
Mean at Station, corrected, and at 32°, = *28.949*
Correction for height, 894 feet, above Mean Sea-level, = *990*
Mean, reduced to 32°, and Sea-level, = *29.939*
Highest Reading, corrected for Index error, on the 13th, = *29.773*
Lowest Do., Do., on the 28th, = *28.270*
Difference, or Monthly Range, = *1.503*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 5th, = *43.0*
Lowest in Month, corrected for Index errors, on the 23rd, = *17.0*
Difference, or Monthly Range, = *26.0*
Corrected Mean of all the Highest, (Col. 5), = *34.8*
Corrected Mean of all the Lowest, (Col. 6), = *26.9*
Difference, or Mean Daily Range, = *7.9*
Calculated Mean Temperature of Month, = *30.8*

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index errors), on the 5th, = *63.0*
Corrected Mean, (Col. 7), of Black Bulb, Max. in Sun, = *46.7*
Lowest at Night, Black Bulb, (corrected for Index errors), on the 23rd, = *11.6*
Corrected Mean (Col. 8), of Black Bulb Min. on grass, = *22.3*
Difference of above Means or Range ("exposed"), = *24.4*

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

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

Computed Temperature of Dew-Point, =

Do. Elastic Force of Vapour, =

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

Relative Humidity, (Saturation = 100), =

RAIN fell on 22 Days; Amount in Inches, = *4.03*

WIND.		SUMMARY.									
Direction.	No.	N.	NE.	E.	SE.	S.	SW.	W.	NW.	Calm or Variable.	Mean Force.
A.M.	7	2	1	2	5	3	3	5			1.00
P.M.	6	2	1	5	4	2	3	5			1.00
Mean.	7	2	1	3	4	3	3	5		2	1.00

* Such 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.
† Antelating corrections for both capillarity and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ Practically, though not absolutely a minus correction.
|| These "Exponential Deductions" are calculated from Glaisher's Hypometrical Tables, Second Edition only.
¶ While the Diurnal Range is unknown, the Arithmetic Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
‡‡ Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

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 Bruce*
Bogside, Lochet-Cushnie

(Signed) *William Bruce*

The frost was very severe during the whole month, so that the plough was never at work. The ploughing is very far behind, more so than for many years past. Straw will be plentiful, but turnips is much damaged by the severe frost and will be scarce as many of them is rotting. No disease in the district except a few cases of diarrhoea, one of which proved fatal. Cattle healthy with the exception of a few cases of foot and mouth disease.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a perfect uniformity in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incommensurable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by 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 scale. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

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

Two moderate-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 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 tube-line on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the vernier.

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

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

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

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirably 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 frame separate from the "Maximum." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for

registering the greatest heat from the sun's rays, and the least from radiation during night. Their bulbs have a black coating, the greater or less obscuration of the sky or height (i. e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon, are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds' column, though their appearances and changes ought to be noted among the "Remarks." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is half covered by clouds, 5 is entered as the observation, and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column "Velocity" and Direction, — (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 — (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.

Sketching.—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 6, 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, nothing 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 Suboin'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 S 4, as an ozone entry on the schedule, will indicate that the ozone paper is tinted as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4"; i. e., that it is blowing fresh.

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

Remarks.—The "Remarks" column is too narrow, but unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character of 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 occurrences 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 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.

EDINBURGH, 26th December 1855.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	In Leaf.	Discoloured Leaves.	CROPS.	Sowing in (month) variety.	Planting or above ground.	In Ear or Harvest.	First Cut.
Alter.				Barley.				
Asp.				Bare or Bigg.				
Beech.				Oats.				
Birch.				Wheat.				
Elm.				Beans.				
Larch.				Pears.				
Lime.				Potatoes.				
Oak.				Turnips.				
Sycamore or Plane.				Hy Grass.				

FRUIT.	First in Blossom.	First in Fruit Ripen Generally.	ADULTORY BIRDS.	First in Fruit.	Departure.
Apple.			Cuckoo.		
Black Currant.			Horse-Swallow.		
Cherry.			Lapwing.		
Gooseberry.			Plover.		
Hawthorn.			Sand-Martin.		
Holly.			Starling.		
Lime.			Plum.		
Mezereum.			Bull or Corn Crake.		
Mountain Ash or Rowan.					
Rod Flowering Currant.					
Rhododendron Ponticum.					
Whin.					

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

BOOK-POST.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Mr ALEXANDER BUCHAN,

To

Bagdadi Feb 1870

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside, Loch-bus-line, County of Aberdeen*, in Lat. $57^{\circ}10'50''$, Long. $2^{\circ}45'0''$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *March* 18*70*.

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.				Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.				As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Direction.	Force.			Mention the hour at which Storms began and ended.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
cl.	" cirrus.	ms.	" meteors.
ci-en.	" 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.	" sleet.
f.	" fog.	sc.	" snow.
fr.	" frost.	so. ha.	" solar halo.
h. fr.	" hoar-frost.	sq.	" squall.
h.	" haze.	sq. s.	" squalls.
h. d.	" heavy dew.	th.	" thunder.
hl.	" hail.	th. s.	" thunder-storm.
l.	" lightning.	w.	" wind.
li. d.	" light clouds.	g.	" gale of wind.
li. sh.	" light showers.		
lu. co.	" lunar corona.		
lu. ha.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction $\frac{1}{2}$ for Temp. (Col. 2), = 28.173 = 28.173
"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{1}{2}$ for Temp. (Col. 4), = 28.178 = 28.178
Mean at Station, corrected, and at 32°, = 29.126
Correction for height, 894 feet, above Mean Sea-level, = 980
Mean, reduced to 32°, and Sea-level, = 29.151
Highest Reading, corrected for Index error, on the 6th, = 29.700
Lowest Do., Do., on the 1st, = 28.100
Difference, or Monthly Range, = 1.600

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 19th, = 58.2
Lowest in Month, corrected for Index errors, on the 12th, = 16.5
Difference, or Monthly Range, = 41.7
"Corrected Mean" of all the Highest, (Col. 5), = 42.6
"Corrected Mean" of all the Lowest, (Col. 6), = 31.1
Difference, or Mean Daily Range, = 11.5
* Calculated Mean Temperature of Month, = 36.8

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 28th, = 92.3
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 62.7
Lowest at Night, Black Bulb, (corrected for Index errors), on the 12th, = 14.0
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 26.9
Difference of above Means or Range ("exposed"), = 35.5

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

WITH REMARKS ON THE USE OF INSTRUMENTS.

Hour of Observation.—The clock Greenwich, or other standard time, is 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 computed with a *Standard*.

An excellent barometer is constructed by Mr. J. E. 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 some shorter so as *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 expansion and contraction of the leather the surface of the

When a Barometer having adjustable surties has to be removed from its fastenings, the ivory peg must be served 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 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 *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 reworked.

In taking an *Observation*, the attached Thermometer is first noted; the tube must then be gently tapped and the disarrangement 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 remiter, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observers must be taken quick; and so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate accurate adjustment and reading of the Barometer.

Self Registering Thermometers.—Professor Phillips, in Noyette and Vambra's Patent, "*Maximum*" Thermometers, are recommended, directed for their use may be obtained with each instrument. The "*Maximum*" Thermometer of Rutherford is recommended when graduated on the glass scale, 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.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully compared by comparison with a *Standard Thermometer*. When such Thermometers are *not* graduated on the stem, but merely on an attached scale, uniform repairs, they are very liable to be removed from their position on the Scale, and ought never afterwards to be used without being *re-tested*. The self-registering thermometers, 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 scale) 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 bulbs must (*and can*) be at least an inch or more from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The readings ought to be taken to tenths of a degree, and noted as follows. Thus the thermometer will be read -35.0 , 0.0 , 10.0 , or 40.1 ; again, 40.4 , 40.3 , or 40.6 , according as it indicates a little under, an exact coincidence with, or a little over 40.0 ; or 40.1 , 40.2 , or 40.3 , respectively. So also 40.5 , and 40.6 , or less must be registered 40.2 or 40.3 and 40.7 or 40.8 respectively. In reading Rutherford's *100°*, and *5 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 bulb, must be rapidly taken, being so readily affected by heat from the person of the observer.

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 noon on the 2nd and extending till 9 p.m. on the 3rd.

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.

Rain-ranges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavorable situations 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 columns under the following conditions:—when a Snow shower occurs it must be noted in the "Remarks," and the depth of snow which has fallen since the last observation is affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift or accumulation has occurred; if such a place cannot be observed, and registered in addition to, and as a check upon, the observations made at the gauging station. In the indications of the run-gauge. For wind, rain, and snow, as before, the observer must be too careful to register *observations* only; and nothing that partakes of the nature of deduction or inference.

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column, an entry of $\frac{1}{2}$, (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 4-tenths by lower clouds of the *cumulo-stratus* kind.

[illegible]

Ozone.—Mention whether Schönbien's or Moffatt's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind, at the time of observation, in the following manner:—thus 3', as an *ozone* entry in the schedule, will indicate that the ozone paper is turned as 3' on the scale, that the wind is from the N.W., and that its force on the scale, that the wind is, that it is *blowing fresh* on the scale 0—6 is 4.5'; *i.e.*, that it is *blowing fresh*

The use of contractions ought, therefore, to be taken very advantage of, and a list of such are recognised and in use at Greenwich, and Southampton, are given at the foot of the column.

Besides special and extraordinary observations, great prominence should 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, auroræ boreales, remarkable depressions and snows of the barometer, thunder storms, and remarkable falls of snow, hail, or with the hour of the day, the force and direction of the wind, and the height of storms as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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.

FOREST TREES.					
In Flower.					Alder,
In first buds.					Asb,
In first appear.					Beech,
					Birch,
					Blm,
					Larch,
					Fine,
					Oak,
					Sycamore or Plane,
Divided of Leaves.					
In Leaf.					
CROPS.					
Growing or Planting.					Barley,
Appearing above ground.					Bere or Bagg,
					Oats,
					Wheat,
					Beans,
					Potatoes,
					Turnips,
					Ilye Grass,

Mr. ALEXANDER BUCHAN.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Have the good news also to state any information you may be able to collect relative to the crops of grain, Hay, Potatoes, Turnips, Lemons, etc., whether plentiful, or in perfection; and the agricultural condition of the district generally. From blight, disease, etc. Whether, Epizootics,

[illegible]

FOREST TREES.					
Alber,					
Ash,					
Beech,					
Birch,					
Blm,					
Larch,					
Line,					
Oak,					
Sycamore or Plane,					
In Flower,					
Last buds first appear,					
In Leaf,					
Diseased or Leaves,					
CROPS.					
Growing above ground,					
Planting,					
Barley,					
Bere or Bigg,					
Oats,					
Wheat,					
Beans,					
Potatoes,					
Turnips,					
Ilye Grass,					

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bosside Lochet-Cushnie, County of Abertown, in Lat. $57^{\circ}10'50''$, Long. $2^{\circ}45'0''$, Distance from Sea 28 miles.Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.During the MONTH of April 1870.

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, Frolicent 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.	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.	No. 3 inches.	No. 12 inches.	No. 22 inches.										
		No.	Inches.	No.	Inches.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.								
		Inches.	°	Inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°								
	1	29.370	54.5	29.210	54.0	52.0	37.0	76.0	30.0					W	0.5	W	1			1/2	.03	8 am	6.5 at 2.5	6							1			
	2	29.352	53.0	29.500	55.0	49.0	32.0	80.0	26.0					W	1	W	0.5					4.5	10 at 9.5						so. ha.		2			
	3	29.570	57.0	29.600	55.0	47.0	33.4	75.0	25.5					W	0.5	W	0.0					7.5	3.5 at 6.5						a. m. (large cum. brilliant ruby colour)		3			
	4	29.570	53.0	29.500	55.4	57.0	33.0	94.0	25.0					S	0.5	W	0.0					0	8.5	12								4		
	5	29.442	53.0	29.300	53.0	53.2	37.0	80.0	30.0					SW	1.5	SW	1					6.5 at 9.5	9.5	7.5								5		
	6	29.230	53.0	29.025	55.4	53.0	36.0	79.4	29.5					SW	0.5	SW	1.5					9.5	10.5	10						so. ha., cu. co.		6		
	7	29.570	50.0	29.870	51.0	48.0	33.2	69.0	29.0					W	1.5	SW	0.5					0	10.5	5						so. co.		7		
	8	29.640	51.0	29.570	50.0	49.2	35.0	70.0	27.5					S	1.5	S	1					5.5	6.5 at 4.5	4.5						so. ha.		8		
	9	29.570	50.0	29.582	54.3	47.0	29.4	81.2	21.1					S	0.5	W	0.5					6.5	10.5	8						so. co.		9		
	10	29.670	52.0	29.900	51.6	47.4	32.0	68.5	31.0					SW	1.5	W	1.5					6.5	10.5	6						so. co., cu. co.		10		
	11	29.020	53.0	29.115	52.2	52.0	36.6	81.5	32.0					W	1	SW	0.5					10.5	10.5	8						so. co., cu. co.		11		
	12	29.020	55.0	29.000	53.0	53.0	42.0	67.3	39.0					S	0.5	SW	1					10.5	8.5	2.5						so. ha.		12		
	13	29.100	54.0	29.110	53.0	55.0	39.0	79.0	30.0					W	1.5	SW	1.5					3.5	10.5	11						so. ha. 9.00 am. so. ha. with Pur helius		13		
	14	29.300	51.0	29.355	53.0	51.0	37.0	77.0	33.0					W	0.5	W	0.5					5.5	10.5	6.5									14	
	15	29.415	54.0	29.490	54.5	56.2	41.0	63.0	35.0					SW	1	W	1.5					10.5	2.5	3									15	
	16	29.565	59.0	29.700	57.5	67.0	41.0	102.5	33.0					SW	0.5	W	0.5					1.5	2.5	13.5									16	
	17	29.570	62.0	29.470	63.2	69.0	37.6	97.0	31.0					SW	0.5	W	0.5					0	5.5	13.5									17	
	18	29.400	62.0	29.314	57.0	66.2	41.0	85.0	35.0					SW	0.5	W	1.0					0	4.5	13.5									18	
	19	29.280	53.2	29.200	57.0	58.0	36.0	79.0	34.0					SW	1	S	0.5					10.5	6.5	10.5									19	
	20	29.160	58.0	29.062	59.0	68.0	35.2	89.0	30.0					SW	0.5	S	1.5					0	2.5	13.5							h. a. m. a		20	
	21	29.200	59.0	29.100	54.0	58.0	43.0	92.0	37.0					SW	0.5	S	1.5					7.5	3.5	13.5							h. a.		21	
	22	29.050	53.0	29.960	53.0	55.0	37.0	66.0	33.2					SW	2.5	S	2.5					6.5 at 2.5	10.5	7							a		22	
	23	29.140	50.0	29.195	59.0	57.0	37.0	74.0	34.6					SW	2.5	SW	1.5					2.5	0	13							a		23	
	24	29.100	53.5	29.200	62.0	61.0	39.0	65.0	34.0					SW	1.5	SW	0.5					7.5	10.5	13							a		24	
	25	29.210	57.0	29.100	58.0	64.0	47.0	80.2	42.3					SW	1.5	SW	2					10.5	6.5	6							a		25	
	26	29.030	56.5	29.015	54.0	51.5	38.0	58.0	36.0					W	1.5	W	2					6.5	7.5	8							a		26	
	27	29.200	51.0	29.292	55.0	58.0	32.0	53.0	31.0					SW	2.5	W	2					10.5	10.5	5							a		27	
	28	29.285	50.0	29.270	50.0	41.5	31.0	49.0	30.5					W	1.5	W	0.5					5.5	8.5	5.5							a		28	
	29	29.070	57.0	29.970	52.4	52.0	39.6	64.0	29.6					S	0.5	SW	1.5					10.5	10.5	2									29	
	30	29.560	53.0	29.384	52.3	57.6	39.0	65.4	37.0					SW	1.5	W	1.5					10.5	9.5	5.5							a. l.		30	
	31																																	31
	Sums.	874.942	1623.7	874.219	1660.6	1624.5	1202.0	2268.0	950.3					33	32						1.09	184		224	247									
	Means.	29.166	54.1	29.141	54.6	53.1	40.0	75.6	31.6																									
	Total Corrections for Instrumental Errors.	-0.20		-0.20																														
	Corrections for Diurnal Range.																																	
	"Corrected" Means.	29.160	54.1	29.160	54.6	53.1	40.0	75.6	31.6																									
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction $++$ for Temp. (Col. 2), = 29.100
"Corrected Mean" of Barometer at 9 A.M., minus the Correction $++$ for Temp. (Col. 4), = 29.073
Mean at Station, corrected, and at 32°, = 29.086
Correction for height, 894 feet, above Mean Sea-level, = 960
Mean, reduced to 32°, and Sea-level, = 30.046
Highest Reading, corrected for Index error, on the 16 th, = 29.700
Lowest Do., Do., on the 30 th, = 29.384
Difference, or Monthly Range, = 1316

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 17 th, = 69.0
Lowest in Month, corrected for Index errors, on the 9 th, = 29.4
Difference, or Monthly Range, = 39.6
"Corrected Mean" of all the Highest, (Col. 5), = 54.1 = 57.1
"Corrected Mean" of all the Lowest, (Col. 6), = 36.7 = 40.0
Difference, or Mean Daily Range, = 17.4 = 13.1
** Calculated Mean Temperature of Month, = 46.4 = 46.5

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index errors), on the 16 th, = 102.5
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 75.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 9 th, = 21.1
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 31.6
Difference of above Means or Range ("exposed"), = 44.0

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

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

Computed Temperature of Dew-Point, =

Do. Elastic Force of Vapour, =

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

Relative Humidity, (Saturation = 100), =

RAIN fell on 10 Days; Amount in Inches, = 1.08

WIND.		SUMMARY.									
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	1	0	0	7	5	7	8	2		110	
P.M.	3	0	0	2	5	9	8	1	2	107	
Mean.	2	0	0	4	5	8	8	1	2	108	

(Signed) William Bruce

Observations made and Return verified by William Bruce
Bosside Lochet-Cushnie

The seeds have been put into the ground, ~~under~~ in first rate condition. Oats and barley have branched well, vegetation of all kind have made much progress during the last week of the month. Fodder quite plentiful, but turnips scarce. Stiffness and Rheumatism among cattle prevalent of which a few have died. People healthy.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bosside, Lochet-bus hnie*, County of *Aburden*, in Lat. $57^{\circ}3'58''$, Long. $2^{\circ}45'10''$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *May* 187*0*.

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, including Thunder and Lightning, 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.											
		Barometer. * No.	Attach- ed Ther- mometer	Barometer. No.	Attach- ed Ther- mometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Bulb. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No. of hours in which it fell.	Amount in Inches.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.								
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°						°	°	°
	1	28.550	53.3	28.900	49.5	40.0	33.0	39.0	32.0					N	1.5	N	1.5	10.30	.67		10 m	10 st	1				sl. sn. hl.	1			
	2	29.026	49.0	29.080	49.0	39.0	33.0	53.0	32.0					N	2	W	1.5	1.0	.05		1 st	10 st	1/2				sn.	2			
	3	29.140	50.0	29.235	49.4	38.4	31.0	51.4	28.0					N	2		1				10 st	10 st	4 1/2				a.	3			
	4	29.300	49.0	29.342	51.0	48.4	34.0	68.0	32.0					W	1	W	1.5				10 st	10 st	5				a.	4			
	5	29.360	50.4	29.437	52.0	50.6	41.0	79.0	39.4					N	2	W	1.5	2.75	.00		10 st	10 st	4					5			
	6	29.430	53.0	29.570	52.6	53.0	43.6	73.4	42.0					W	2	W	2				2 m 7 st	4 m 7 st	5				a.	6			
	7	29.493	53.0	29.470	52.4	52.0	41.0	85.0	37.5					N	1	S	0.5				10 st	10 st	4					7			
	8	29.570	60.0	29.470	56.0	60.0	39.3	92.4	36.0					S	0.5	N	0.5				10 st	7 st	6					8			
	9	29.550	59.0	29.262	61.4	65.0	36.0	95.0	32.6					S	1	S	1				0	6 st	7 1/2				h.	9			
	10	29.200	64.0	29.075	60.0	58.0	40.0	80.0	38.0					N	0.0	S	1				10 st	0	8				h.	10			
	11	28.883	57.0	29.550	58.5	46.0	38.5	58.4	38.0					N	1.5	N	1.5	3.30	.20		10 st	10 st	0				N.	11			
	12	28.310	52.0	28.263	52.0	53.0	39.0	57.4	38.0					S	1.5	S	2	2.30	.10		4 m 6 st	10 m	4				N.	12			
	13	28.410	52.0	28.570	55.6	54.2	42.5	71.5	33.5					S	1.5	S	0.5	3.30	.36		10 st	3 m 7 st	4 1/2				t. b. r. hl. very large	13			
	14	28.550	54.7	28.700	58.0	58.0	38.0	86.3	34.0					W	0.5	W	1				1 m 5 st	10 st	8					14			
	15	28.870	59.0	28.880	58.0	56.0	42.0	76.5	37.2					W	1.5	S	0.5				3 m 5 st	7 m 2 st	9					15			
	16	28.862	57.0	28.940	60.0	59.3	43.5	91.6	41.0					S	1	W	0.5				6 m	5 st	8					16			
	17	29.015	59.0	29.030	60.0	57.5	37.6	73.0	32.6					S	1	W	1.5	3.30	.05		10 st	6 m 4 st	5				so. co. a.	17			
	18	29.070	60.0	29.160	57.0	61.0	57.0	75.3	47.0					W	1.5	W	2				7 m	3 m 4 m	9				so. ha, a.m., Partly a P.M.	18			
	19	29.030	57.0	29.830	60.0	58.0	46.5	62.4	41.0					W	1.5	W	3				6 m 2 st	3 m	5					19			
	20	29.010	57.0	29.050	58.4	56.2	46.4	80.0	41.5					W	0.5	W	0.5	7.5	.05		10 st	6 m 2 st	1				so. co.	20			
	21	29.193	58.0	29.020	58.0	58.5	45.0	75.0	40.0					S	0.5	N	0.5	4.30	.29		10 st	10 m	2 1/2				so. ha.	21			
	22	29.070	61.0	29.300	60.4	58.0	43.4	54.0	41.0					W	0.5	W	0.5				10 st	3 m 7 st	0					22			
	23	29.330	61.0	29.250	59.0	52.5	35.0	60.0	32.0					W	1	W	0.5				10 st	10 st	1 1/2					23			
	24	29.145	57.0	29.350	56.0	50.0	44.0	80.0	39.0					W	1.5	N	1.5	3.30	.06		10 st	3 m 4 st	7					24			
	25	29.570	56.0	29.570	57.0	57.0	42.2	94.0	34.0					W	2	W	0.5				8 m	10 st	10					25			
	26	29.520	58.0	29.526	59.0	61.0	46.0	90.5	44.2					W	0.5	N	0.5				7 m	4 st	5					26			
	27	29.510	60.0	29.426	59.0	69.0	46.5	100.0	42.4					S	0.5	N	0.5				8 st	0	11				f.	27			
	28	29.400	60.0	29.320	61.0	61.2	45.0	83.2	41.2					W	0.5	N	0.5				0	7 m 3 m	12				f.	28			
	29	29.236	62.0	29.160	65.0	68.0	43.2	90.0	40.3					S	0.5	S	0.5				2 m 3 m	3 st	12 1/2				f. h.	29			
	30	29.050	62.0	29.880	59.0	59.0	47.0	70.0	41.0					S	0.5	N	1.5	4.15	.13		10 st	10 m	2 1/2				N.	30			
	31	28.660	61.0	28.625	61.0	55.0	47.5	68.0	44.0					S	0.5	W	0.5	4.0	.30		10 st	10 st	2				N.	31			
Sums.		902.013	1768.4	902.081	1774.2	1768.8	1294.7	2303.3	1176.4						33.5	32.5		33.5	2.38		258	243	166								
Means.		29.098	57.4	29.096	57.1	55.3	41.3	74.3	37.9						1.08	1.05															
† Total Corrections for Instrumental Errors.		-0.20		-0.20																											
† Corrections for Diurnal Range.																															
“Corrected Means.”		29.117	57.0	29.116	57.1	55.3	41.3	74.3	37.9																						
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	cirrus.	ms.	micro.
ci-cu.	cirro-cumulus.	n.	nimbus.
cu.	cumulus.	lc.	light 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.	sq.	snow.
h.	haze.	so. ha.	solar halo.
h. d.	heavy dew.	sq.	squall.
h. l.	hail.	sq.	squall.
l.	lightning.	t.	thunder.
li. cl.	light clouds.	t. s.	thunder storm.
li. sh.	light showers.	w.	wind.
li. co.	lunar corona.	g.	gale of wind.
li. ha.	lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† = *29.023* .023
for Temp. (Col. 2), = *29.017* .017
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = *29.020* .020
for Temp. (Col. 4), = *29.014* .014
Mean at Station, corrected, and at 32° = *29.028* .028
Correction for height, 894 feet above Mean Sea-level, = *0.003* .003
Mean, reduced to 32°, and Sea-level, = *29.031* .031
Highest Reading, corrected for Index error, on the 23th, = *29.570*
Lowest Do. Do., on the 12th, = *28.310*
Difference, or Monthly Range, = *1.260*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 27th, = *69.0*
Lowest in Month, corrected for Index errors, on the 3d, = *31.0*
Difference, or Monthly Range, = *38.0*
"Corrected Mean" of all the Highest, (Col. 5), = *56.3*
"Corrected Mean" of all the Lowest, (Col. 6), = *41.3*
Difference, or Mean Daily Range, = *14.0*
** Calculated Mean Temperature of Month, = *48.3*
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 27th, = *100.0*
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = *74.3*
Lowest at Night, Black Bulb, (corrected for Index errors), on the 3d, = *28.0*
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = *37.9*
Difference of above Means or Range ("exposed"), = *36.4*

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

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

†† Computed Temperature of Dew-Point, =

†† Do. Elastic Force of Vapour, =

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

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

RAIN fell on 13 Days; Amount in Inches, = *2.38*

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Mean Force.
A.M.		4	0	0	1	11	5	3	6	1.08
P.M.		5	1	1	4	5	6	5	4	1.05
Mean.		4	0	0	2	8	5	4	5	1.06

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 3d; 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 Bruce*
Bosside Lochet-bus hnie

(Signed) *William Bruce*

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Cats and barley have come up quite thick, but they have been retarded in growth by the severe drought, but the late rains have greatly improved their appearance. Turnips are braiding fine. On several fields hay has a fine appearance. People cattle healthy.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bosside, Leochel-Bushings* County of *Aburdeen* in Lat. $57^{\circ}10'50''$, Long. $2^{\circ}45'$, Distance from Sea 28 miles.Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.During the MONTH of *June* 1870.

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, including Thunder and Lightning, 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. _____	Attach- ed Ther- mometer	Barometer. No. _____	Attach- ed Ther- mometer	Max. No. _____	Min. No. _____	Max. in Sun-rays No. _____	Min. on Grass. No. _____	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No. of hours in which it fell.	Amount in inches. No. _____	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. _____ 8 inches.	No. _____ 12 inches.	No. _____ 22 inches.					
		inches.	inches.																												
	1	28.750	56.0	29.100	56.0	56.2	47.5	74.0	41.0					S	0.5	N	0.5	38795		10st	0	7								1	
	2	29.132	57.0	29.230	57.0	56.0	43.0	80.0	37.5					NW	0.5	N	0.5	74710		7st	5st	11								2	
	3	29.300	55.0	29.380	55.0	47.5	39.0	58.0	34.0					SE	0.5	SE	1	09386	30.03	10st	10st	0								3	
	4	29.460	60.0	29.660	63.0	66.0	45.0	92.0	43.0					E	0.0	NW	0.5	25605		10st	10st	2								4	
	5	29.780	66.0	29.770	68.0	72.0	47.0	104.5	41.0					S	0.5	N	0.5	49965		0	0	13								5	
	6	29.783	68.5	29.800	66.0	75.0	52.0	97.0	45.0					E	0.0	E	0.5	64643		0	10st	9								6	
	7	29.780	62.0	29.660	60.0	66.0	55.0	91.5	50.0					NW	0.5	N	0.5	90490		10st	5st	5 1/2								7	
	8	29.400	66.0	29.100	60.0	71.0	48.0	97.5	42.0					S	0.5	N	1.5	33815		4st	5st	8								8	
	9	28.970	57.0	28.880	57.0	53.2	41.5	84.0	36.0					NW	1.5	NW	1	14850	230	10st	5st	5 1/2								9	
	10	28.784	57.0	28.760	50.0	50.0	37.0	79.0	32.0					N	1	S	0.5	35792	115	10st	10st	4								10	
	11	28.668	58.0	29.000	50.0	53.5	40.0	75.0	35.5					S	0.5	N	0.5	88635	20	10st	2st	8 1/2								11	
	12	29.180	55.0	29.080	50.0	56.0	35.5	92.0	34.0					NW	0.5	S	0.5	18616	30	10st	10st	7								12	
	13	29.115	58.0	29.142	61.0	68.0	43.0	95.0	40.0					N	0.5	N	0.5	71805		10st	10st	5								13	
	14	29.163	61.0	29.220	61.0	68.0	52.0	93.0	45.0					NW	1	NW	0.5	13640		10st	2st	9								14	
	15	29.260	61.0	29.200	59.0	64.0	44.0	86.0	37.5					NW	0.5	S	0.5	54253	70	10st	10st	3								15	
	16	29.160	61.0	29.120	61.0	63.0	49.0	82.0	41.0					S	0.5	N	0.5	72253	20	10st	10st	2								16	
	17	29.110	60.0	29.070	61.0	63.0	48.4	85.0	42.5					N	0.5	E	0.0	92845		4st	4st	5 1/2								17	
	18	29.030	59.5	29.170	57.0	64.5	41.0	87.0	33.4					S	0.5	N	0.5	32765		10st	0	8								18	
	19	29.200	62.0	29.100	62.0	66.0	45.0	90.0	37.0					S	0.5	NW	0.5	74810	30	10st	10st	6								19	
	20	29.140	61.0	29.350	58.0	63.5	49.0	83.0	42.0					NW	1.5	N	0.5	69325		3st	5st	12 1/2								20	
	21	29.400	67.0	29.390	67.0	77.2	57.5	108.4	44.0					NW	0.5	S	0.5	14805		10st	2st	12								21	
	22	29.410	67.0	29.406	63.5	66.0	52.0	95.0	44.0					N	1	N	0.5	60845		0	4st	14 1/2								22	
	23	29.340	62.0	29.270	57.0	58.0	49.0	86.0	31.0					NW	1.5	N	1	36718	20	5st	0	15								23	
	24	29.130	57.0	29.100	53.0	58.0	37.5	86.0	30.0					NW	0.5	NW	1	77070	1430	10st	10st	3								24	
	25	29.190	55.0	29.200	57.0	56.0	42.0	85.0	35.4					NW	1.5	N	0.5	38715	20	5st	10st	5								25	
	26	29.036	59.0	29.015	57.0	57.0	45.4	72.5	42.0					NW	1.5	NW	1	79160	215	2st	5st	3								26	
	27	29.130	62.0	29.230	57.0	56.0	44.0	82.3	42.0					N	1.5	NW	0.5	28460		10st	2st	8								27	
	28	29.260	66.0	29.280	66.0	58.2	43.4	84.0	36.0					N	1.5	NW	0.5	80356		3st	5st	10st	3							28	
	29	29.260	59.0	29.250	57.0	60.0	48.0	80.0	41.0					NW	0.5	NW	0.5	31782	75	4st	3st	7 1/2								29	
	30	29.200	58.0	29.185	59.0	57.2	45.0	87.0	38.0					NW	1	NW	0.5	73205	265	10st	3st	4								30	
	31																													31	
Sums.		877.011	179.0	877.011	179.0	179.0	179.0	179.0	179.0					230	180			770	130	245	191	206									
Means.		29.253	58.6	29.253	58.6	61.5	44.4	86.6	39.0					0.77	0.6																
† Total Corrections for Instrumental Errors.		0.20		0.20																											
† Corrections for Diurnal Range.																															
“Corrected Means.”		29.253	58.6	29.253	58.6	61.5	44.4	86.6	39.0																						
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

BAROMETER, “corrected Mean” at 9 A.M., minus the Correction†† = 29.167 136
for Temp. (Col. 2), = 29.253 58.6
“Corrected Mean” of Barometer at 9 P.M., minus the Correction†† = 29.140 166
for Temp. (Col. 4), = 29.253 58.6
Mean at Station, corrected, and at 32°, = 29.168 151
Correction for height, 894 feet above Mean Sea-level, = 0.53 940
Mean, reduced to 32°, and Sea-level, = 30.121 091
Highest Reading, corrected for Index error, on the 6 th, = 29.800
Lowest Do. Do., on the 11 th, = 28.668
Difference, or Monthly Range, = 1.132

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 21 st, = 77.2
Lowest in Month, corrected for Index errors, on the 12 th, = 35.5
Difference, or Monthly Range, = 41.7
“Corrected Mean” of all the Highest, (Col. 5), = 61.5
“Corrected Mean” of all the Lowest, (Col. 6), = 45.0
Difference, or Mean Daily Range, = 1.65 166
“Calculated Mean Temperature” of Month, = 53.2 53.2
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 21 st, = 108.4
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun, = 86.6
Lowest at Night, Black Bulb, (corrected for Index errors), on the 24 th, = 30.0
“Corrected Mean,” (Col. 8), of Black Bulb, Min. on grass, = 39.0
Difference of above Means or Range (“exposed”), = 47.6

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), =
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), =
†† Computed Temperature of Dew-Point, =
†† Do. Elastic Force of Vapour, =
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), =

RAIN fell on 14 Days; Amount in Inches, = 1.30

WIND.	SUMMARY.										
	Direction.	N	NE	E	SE	S	SW	W	NW	Calif. or Variable.	Mean Force.
A.M.		2	1	0	1	7	4	6	7	2	0.77
P.M.		4	0	1	1	4	2	9	8	1	0.60
Mean.		3	0	0	1	5	3	7	7	4	0.69

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 3d; 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 Bruce*
Bosside, Leochel-Bushings(Signed) *William Bruce*

The month has been very dry, so that vegetation has been greatly checked, the cereals are greatly stunted, and will not be far from the heavy crop that they appeared to be at the beginning of the month. Potatoes are coming into ear, which is rather premature, oats will also soon be in ear. Pastures abundant, Turnips have been very stiff, the fly has done much damage in many cases, so that many have had to sow a second time. Potatoes have a fine healthy appearance, no disease in the district. Battle healthy.

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 attend 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 modes of applying 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 recommended by Mr. A. de 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 hair, 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 *join 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 surface 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 *level*, 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 observer-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 inside, and fixed 4 feet above grass in an exposed position, free from nearly 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-rails, in the centre of the Box, and face the open 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 from the opticians, *Self-registering Thermometers*, Professor Phillips, and Negretti and Zambra Patent "Meteorological" Thermometers are recommended: printed directions for their use may be obtained with each instrument. The "Maximum" 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 a 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 near the top of the tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. 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 station blackened boxes, whose sides protect the bulbs from the sun, wind. The "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are not graduated on a *Standard*, but merely on an attached scale, undergo repairs, they are ought never 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 Meteorological thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the "Hygrometrical Deductions" Observers are specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the manikin must be of medium fineness, and fastened at the neck of the bulb by its cotton, which also supplies it with water. It must be seen to by the observer that the manikin is always *clean* and *wet*; 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. The frame of "Mason's" Hygrometer is highly objectionable. Also supports the water cup underneath. This arrangement must be immediately altered by putting 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 might be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39.9, 40.0, or 40.1; or again, 40.4, 40.5, or 40.6, according as it indicates a little under, an exact coincidence with, or a little over 40° or 40.5° respectively. So also 40.2, 40.7, or 40.8 respectively. In reading Rutherford's "Globe," and "Mini" 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 2d are those of a series of phenomena commencing at 9 P.M. on the 2d, and extending till 9 P.M. on the 3d.

Wind.—A wind-vane ought to be elevated 12 feet at least above surrounding objects. When it oscillates incessantly, the main 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, &c.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, it is earnestly recommended that exact observations 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 recommend that every observer be furnished with a Hemispherical-Cup Anemometer—a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, 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 unfavorable 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 out grass around its mouth. The rain-gauge ought to be on which the rain fall.

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 annexed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indicated in every column, the observer cannot be too careful to register observations only; and nothing that partakes of the nature of deduction or inference.

Climate.—Convenient abbreviations for Luke Howard's

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

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

Sunshine.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil.—its amount and constancy;—the Council recommend that observations in this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to 3, 12, and 22 inches, and the stems above ground, protected from the sun's rays, and fixed 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 soil in which these Thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our climate, a very important branch of Meteorology. The Council, therefore recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At or near the time of high water, on the 5th, 15th, and 20th 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 conveniently extra sea observations might be taken for other and greater depths, noting 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 Meffert'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 N., 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 unfortunately so. Some of the most valuable observations that can be taken are those for which no rules can be given nor forms assigned. The use of Contractions ought, therefore, to be taken every grantage 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 phenomena ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, &c. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

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

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 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.

(B. Ormer) A. B.

EDINBURGH, 19th November 1870.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Leaf Buds First appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Out or Raised.
Alder,					Barley,				
Ash,			6		Bere or Bigg,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Pease,				
Lime,					Potatoes,		8		
Oak,			5		Turnips,				
Sycamore or Plane,					Rye Grass,				

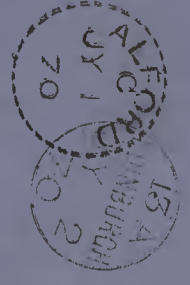
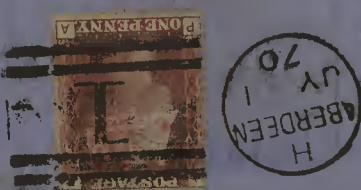
SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe generally.	LABORATORY BIRDS.	First Arrival.	Departure.
Barberry,		Apple,			Cuckoo,		
Bourtree or Elder,		Black Currant,			Curlew,		
Broom,		Cherry,			House-Swallow,		
Hazel,		Gean,			Lapwing,		
Hawthorn,	8	Gooseberry,			Plover,		
Holly,		Peach,			Sand-Martin,		
Laburnum,	4	Pear,			Starling,		
Lilac,		Plum,			Swan,		
Mezereon,		Strawberry,	1		Rail or Corn Crane,		
Mountain Ash or Rowan,	6						
Red Flowering Currant,							
Rhododendron Ponticum,	6						
Whin,							

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

EDINBURGH.

General Post Office Buildings,
Secretary of the Meteorological Society of Scotland.

MR ALEXANDER BUCHAN,



Bookish
from 1870

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bosside, Loch-Bohann*, County of *Aberdeen*in Lat. $57^{\circ}10'50''$, Long. $2^{\circ}45'22''$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *July* 187*0*.

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, including Thunder and Lightning, began and ended.	Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.									
		Barometer.	Atmospheric Thermometer	Barometer.	Atmospheric Thermometer	Max. No.	Min. No.	Max. in Sun-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—10), and Direction.	Amount. (0—10), and Species.	Velocity (0—10), and Direction.	Amount. (0—10), and Species.	No. 1 inches.	No. 2 inches.					No. 22 inches.
		* No.				No.	No.	No.	No.									9 h. A.M.													
		inches.		inches.																											
	1	29.170	57.0	29.190	57.0	57.0	47.0	79.0	39.0					N. 1	2.5	111.05	75	03		4.5	2.5	4							r.	1	
	2	29.170	57.0	29.150	57.0	57.0	47.0	82.2	43.0					N. 1.5	2	88.215				10.5	10.5	8							so. ha.	2	
	3	29.100	56.0	28.620	53.0	53.0	44.0	92.0	39.0					N. 0.5	1	29.980	3.0	16		10.5	6.5	6							r.	3	
	4	28.736	54.0	28.800	60.0	70.0	46.0	92.5	45.0					S. 1	5.5	70.955				10.5	10.5	7.5								4	
	5	28.775	60.0	28.780	58.0	62.0	57.0	88.5	42.0					N. 2	5.5	90.945				1.5	3.5	10								5	
	6	28.830	54.0	29.000	59.0	60.0	46.5	80.0	41.0					S. 1.5	2.5	10.640				10.5	5.5	5								6	
	7	29.150	54.0	29.200	59.0	62.0	48.2	77.0	38.0					N. 1	1	5.44872				8.5	10.5	6								7	
	8	29.150	61.0	29.130	65.0	69.0	47.4	94.5	39.0					S. 5	2.5	5.6045				10.5	10.5	5.5								8	
	9	29.170	68.0	29.120	66.0	72.0	57.0	99.0	57.0					S. 5	2.5	5.95445				7.5	4.5	9								9	
	10	29.100	68.0	29.100	66.0	74.0	52.5	106.0	48.0					N. 5	2.5	5.16065	22			10.5	10.5	6								10	
	11	28.925	66.0	28.920	65.0	67.0	53.0	95.0	50.0					N. 5	2.5	5.22715	6.0	1.30		4.5	10.5	2								11	
	12	28.930	61.0	28.960	57.0	61.0	48.0	94.0	44.0					N. 5	2.5	5.58630				8.5	10.5	4								12	
	13	28.965	63.0	28.970	62.0	66.5	49.0	97.0	48.0					S. 5	2.5	5.73610				10.5	3.5	5								13	
	14	29.080	61.0	29.100	62.0	63.4	50.0	90.0	40.5					S. 0.5	1.5	5.01457				10.5	10.5	4								14	
	15	29.070	63.5	29.060	64.0	64.0	52.0	81.0	23.4					S. 1.5	1.5	5.62125	34			8.5	10.5	4.5								15	
	16	28.960	65.0	29.050	61.0	62.0	52.0	86.5	45.0					N. 5	2.5	5.73585	6.0	3.7		4.5	4.5	5								16	
	17	29.145	66.0	29.160	61.0	66.0	45.0	97.0	41.0					N. 5	2.5	5.96885	2.0	2.6		5.5	4.5	7								17	
	18	29.165	66.0	29.170	66.0	69.0	50.0	100.0	41.0					N. 5	2.5	5.12025				6.5	6.5	6								18	
	19	29.240	66.0	29.400	63.0	70.5	53.0	104.0	48.0					N. 1	2.5	5.77875				3.5	4.5	11								19	
	20	29.410	61.0	29.180	62.0	59.0	47.5	68.0	35.5					S. 5	2.5	5.15800	1.15	0.4		10.5	10.5	11.2								r.	20
	21	29.100	66.0	29.290	64.0	70.0	57.0	94.0	47.0					N. 5	2.5	5.93740				10.5	8.5	10									21
	22	29.370	64.0	29.330	66.0	76.0	47.0	112.3	40.0					S. 0.5	1.5	5.13120				10.5	3.5	10.5									22
	23	29.320	73.0	29.275	73.0	80.0	56.0	111.5	50.0					S. 5	2.5	5.43015				0	2.5	15.5								h.	23
	24	29.300	72.0	29.300	67.0	80.5	60.0	110.5	56.0					S. 5	2.5	5.72180				0	7.5	15								h.	24
	25	29.275	67.0	29.200	66.0	72.2	54.4	98.0	52.0					S. 5	2.5	5.23400				5.5	5.5	14.5									25
	26	29.320	68.0	29.420	59.0	64.0	52.6	78.0	50.0					N. 5	2.5	5.43910				10.5	8.5	4									26
	27	29.480	60.0	29.520	62.0	64.0	50.5	90.5	46.5					N. 5	2.5	5.75090				5.5	3.5	13									27
	28	29.520	62.0	29.520	60.0	63.0	43.4	92.0	40.0					N. 5	2.5	5.09650				8.5	0	10									28
	29	29.570	60.0	29.490	64.0	68.2	40.0	92.5	36.0					N. 5	2.5	5.36390				0	10.5	15.5								so. ha.	29
	30	29.450	66.0	29.380	65.0	70.0	41.0	102.3	35.5					N. 5	2.5	5.36390				0	3.5	15								so. co.	30
	31	29.350	64.0	29.270	68.0	76.0	52.0	111.5	49.0					N. 5	2.5	5.40180				0	0	13								h.	31
Sums.		12129	14	112	14	112	133	123	132					12	14			13													
Means.		29.168	63.4	29.163	62.4	66.7	49.8	93.4	43.9					670	666																
† Total Corrections for Instrumental Errors.																															
† Corrections for Diurnal Range.																															
"Corrected Means."																															
No. of Columns.		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†† = *29.077*
for Temp. (Col. 2), = *29.168* - *0.091*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = *29.075*
for Temp. (Col. 4), = *29.163* - *0.088*
Mean at Station, corrected, and at 32°, = *29.076*
Correction for height, feet above Mean Sea-level, = *930*
Mean, reduced to 32°, and Sea-level, = *30.006*
Highest Reading, corrected for Index error, on the *28*th, = *29.540*
Lowest Do. Do., on the *4*th, = *28.736*
Difference, or Monthly Range, = *0.804*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the *24*th, = *80.5*
Lowest in Month, corrected for Index errors, on the *29*th, = *40.0*
Difference, or Monthly Range, = *40.5*
"Corrected Mean" of all the Highest, (Col. 5), = *66.7*
"Corrected Mean" of all the Lowest, (Col. 6), = *49.8*
Difference, or Mean Daily Range, = *16.9*
** Calculated Mean Temperature of Month, = *58.2*

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the *24*th, = *112.3*
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = *93.4*
Lowest at Night, Black Bulb, (corrected for Index errors), on the *30*th, = *35.5*
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = *43.9*
Difference of above Means or Range ("exposed"), =

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

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

†† Computed Temperature of Dew-Point, =

†† Do. Elastic Force of Vapour, =

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

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

RAIN fell on *8* Days; Amount in Inches, = *2.72*

WIND.		SUMMARY.								
Direction.	N	NE	E	SE	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	14		26	4	9	2	1	0.70		
P.M.	53		23	7	7	3	1	0.66		
Mean.	44.0		24.5	5.3	1	0.68				

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 3d; those from Other Places, not later if possible than the 6th. This Schedule not to be Gimped or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by *William Bruce*
Bosside, Loch-Bohann

(Signed) *William Bruce*
At the beginning of the month, the crops were greatly stunted by the severe drought, they had in many cases a worse appearance than in 1868, but the rain on the 11th and 16th and 17th (2.24 in) has greatly improved the crops in this district. In general they have rather more now a fair crop. Both both of barley and oats. Turnips have improved greatly since the rain, and at present have a fine appearance. Potatoes look well. There has been four cases of inflammation in the neighbourhood herd, in general healthy.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside, Lochiel-bush, County of Aberdeen*, in Lat. $57^{\circ}10'52''$, Long. $2^{\circ}45'0''$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *August* 187*0*.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.		
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.								
		Barometer, No.	Attached Thermometer, No.	Barometer, No.	Attached Thermometer, No.	Max. No.	Min. No.	Max. in Sun, No.	Min. on Grass, No.	Dry bulb, No.	Wet bulb, No.	Dry bulb, No.	Wet bulb, No.	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. 1 inches.	No. 2 inches.	No. 3 inches.						
		Inches.		Inches.																												
	1	29.250	70.0	29.220	67.0	71.0	50.0	99.0	25.0									4.00		6.00	7									h. t.	1	
	2	29.190	70.0	29.200	70.0	77.0	50.5	110.5	45.0									0		3.00	9									h. t. l. r.	2	
	3	29.150	69.0	29.080	63.0	75.0	51.0	97.0	45.0									0		10.00	15										3	
	4	29.045	67.0	28.885	63.0	66.5	53.0	95.0	50.5									10.00		10.00	2										4	
	5	29.800	67.0	28.980	66.0	71.5	53.5	98.0	52.0									10.00		6.00	7										5	
	6	29.080	64.0	29.140	63.0	73.0	51.0	107.5	43.5									5.00		0	15										a. m.	6
	7	29.190	65.0	29.200	66.0	68.0	47.5	98.0	40.0									10.00		6.00	7										7	
	8	29.320	69.0	29.420	66.0	73.0	58.0	98.0	50.0									10.00		0	10										r.	8
	9	29.470	69.0	29.490	68.0	79.0	57.0	120.0	39.0									0		0	15										9	
	10	29.470	68.0	29.450	68.0	77.0	47.0	115.0	38.0									0		0	15										10	
	11	29.460	68.0	29.520	69.0	80.0	49.0	125.0	39.0									0		0	12										11	
	12	29.540	68.0	29.560	66.0	63.0	45.0	81.0	40.0									10.00		0	4										12	
	13	29.580	62.0	29.610	61.0	63.0	40.0	95.0	36.0									4.00		4.00	14										13	
	14	29.615	64.0	29.585	59.0	56.4	49.0	67.0	43.0									10.00		10.00	1 1/2										14	
	15	29.520	61.0	29.450	63.0	66.0	49.0	97.0	47.0									10.00		0	8										15	
	16	29.400	64.0	29.340	64.0	69.0	42.5	107.0	36.0									4.00		10.00	10										t.	16
	17	29.350	64.0	29.262	62.0	70.0	52.0	110.0	50.0									4.00		5.00	8										17	
	18	29.200	60.0	29.160	59.0	56.0	46.0	63.0	40.0									10.00		4.00	1 1/2										r.	18
	19	29.180	58.0	29.230	58.0	58.0	45.0	81.0	39.0									2.00		6.00	7										r.	19
	20	29.260	58.0	29.330	58.0	53.0	45.0	82.0	39.0									10.00		10.00	6										r.	20
	21	29.360	53.0	29.330	53.0	57.0	44.5	86.5	40.0									10.00		7.00	8											21
	22	29.050	53.0	29.070	58.0	62.5	46.4	98.0	42.3									10.00		8.00	5										r.	22
	23	29.085	57.0	29.070	57.0	58.0	48.0	90.0	44.5									10.00		10.00	1 1/2										r. t.	23
	24	29.000	57.0	29.055	57.0	59.0	46.5	94.0	41.0									5.00		3.00	9											24
	25	29.080	57.0	29.050	57.0	60.0	44.0	99.0	37.0									4.00		7.00	4										r.	25
	26	29.135	55.0	29.120	60.0	60.0	43.0	99.0	38.0									5.00		2.00	11											26
	27	29.130	56.0	29.020	58.0	58.0	41.0	86.0	35.0									6.00		10.00	4										r.	27
	28	28.830	55.0	28.930	54.0	50.0	44.0	54.0	39.0									10.00		2.00	0										r.	28
	29	28.980	51.0	29.100	54.0	54.5	41.0	87.0	36.0									3.00		10.00	8										r.	29
	30	29.290	54.0	29.400	53.0	53.0	45.0	86.0	39.0									4.00		6.00	5											30
	31	29.240	52.0	29.110	58.0	66.0	43.0	94.0	36.0									4.00		6.00	12											31
Sums.		7130	1905	906	237	1866	1255	2325	1255									175		20%	186	242										
Means.		29.238	61.4	29.235	61.7	64.4	47.3	70.4	41.3																							
† Total Corrections for Instrumental Errors.		0.20		0.20																												
‡ Corrections for Diurnal Range.																																
“Corrected Means.”		29.250	61.4	29.255	61.1	64.4	47.3	70.4	41.3																							
No. of Columns.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

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

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† = *29.162* *145*
for Temp. (Col. 2), = *29.160* *145*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = *29.165* *147*
for Temp. (Col. 4), = *29.163* *145*
Mean at Station, corrected, and at 32°, = *29.165* *146*
Correction for height, *894* feet above Mean Sea-level, = *936* *936*
Mean, reduced to 32°, and Sea-level, = *30.099* *082*
Highest Reading, corrected for Index error, on the *14* th, = *29.615*
Lowest Do. Do., on the *5* th, = *28.800*
Difference, or Monthly Range, = *815*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the *11* th, = *80.0*
Lowest in Month, corrected for Index errors, on the *27* th, = *21.0*
Difference, or Monthly Range, = *59.0*
"Corrected Mean" of all the Highest, (Col. 5), = *64.6*
"Corrected Mean" of all the Lowest, (Col. 6), = *47.3*
Difference, or Mean Daily Range, = *17.3*
"Calculated Mean Temperature of Month, = *55.8*

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the *11* th, = *125.0*
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = *70.4*
Lowest at Night, Black Bulb, (corrected for Index errors), on the *27* th, = *35.0*
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = *41.4*
Difference of above Means or Range ("exposed"), = *29.1*

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

Bulb, (Cols. 9 and 11), =

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

†† Computed Temperature of Dew-Point, =

†† Do. Elastic Force of Vapour, =

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

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

RAIN fell on *14* Days; Amount in Inches, *1.81* = *1.75*

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		10	3	2	1	3	2	5	5	2	
P.M.		5	1	2	4	0	2	6	7	4	
Mean.		8	2	2	2	2	2	4	6	3	0.45

† 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.
†† Tabulating corrections for both capillarity and Index Errors.
† The Diurnal Range for Scotland is as yet unknown.
†† "Provisionally," though not absolutely a mean correction.
†† These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 6 and 7 will be entered as the "Calculated Mean Temperature."
Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

N.B.—The Sums to be correctly added and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 3d; those from Other Places, not later if possible than the 6th. This Schedule not to be Grammed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by *William Bruce*
Bogside, Lochiel-bush.(Signed) *William Bruce*

The weather was very dry with the exception of the last week, when a good deal of rain which revived vegetation very much, turnips was in great need of rain, they were beginning to rot, but they are much revived by the late rain. They have now the appearance of being a good crop. The harvest is general and a few have done, and the plough was started on the 27th. When was the plough in sun going in a stubble field at that date since 1826. The crops are light in general. There was four cases of inflammation in the neighbourhood during the month. One of them proved fatal. The other ways good. Cattle healthy.

WITH REMARKS ON THE USE OF INSTRUMENTS

from radiation during night, 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 lanced 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 Scale, and ought never afterwards to be used, without being re-tested. The self-regulating, 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

from radiation during night-
time, which may easily be made
out by the use of a black box,
mixture of lamp black and printer's ink. They are placed in
shallow lipped 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.
Shower must be allowed to cover either of these Thermometers;
the sun's heat to affect the Minimum Thermometer by
distillation.

Registration 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 now 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 after-
wards 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 screw 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 appara-
tus are so common, the "*Hygrometrical Deductions*." Observers
are strongly recommended to attend to the following conditions:—

from radiation during night. The bulbs have a glass coating in which may easily be made or mixed by the application of a mixture of lamp black and printer's ink. They are placed in shallow latched 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. 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 removed from their position on the Scale, and might never afterwards be used without being re-tested. The self-regulating, and especially the "Minimum" Thermometers, which frequently have 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 apparatus slightly deviates from the approved and well-tested form of this apparatus, especially the first, "Hygrometrical Predictions." Observations are specially requested to attend to the following conditions:—

The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by a 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 delicacy, and must be made with great care. The bulb must be immersed by immersion from 15 to 30 minutes before the hour

from radiation during night. The sun-bulbs have a special coating in which any easily made or melted wax is applied, so that the bulb is in a mixture of lamp black and printer's ink. They are placed in shallow blacked boxes, whose sides protect the bulbs from the sun, and the "Maximum" should be freely exposed to the sun, while the "Minimum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers, for the sun's heat to affect the Minimum Thermometer by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are not graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being re-tested. The self-registering, and especially the "Minimum" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. As to 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, has occasionally vitiated 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 point on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the muslin must be of a medium fineness, and fastened at the neck of the bulb by a 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-pipe must be made with great care. The bulb must be immersed by immersion from 15 to 30 minutes before the hour commences, and must be taken out of the water at the expiration of observation. From the film of ice thus formed evaporation will proceed as from the moist skin in ordinary circumstances.

One form of "Muslin" 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 defects shall be complied with, as far as possible.

For the use of the *Thermometer* (Great care must be taken to

from radiation during night. The bulbs have a cover containing 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 rely on an attached scale, microscopes, they are very liable to be removed from their position on the Scale, and ought never afterwards to be used, without being re-adjusted. 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 laid, 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 point, on 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 eye only;—in no case under the bulbs—the mastin 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 by the observer that the mastin is always *clean and moist*, and that the water-pipe, in frosty weather observation is a matter of much delicacy, 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 "Mastin" Hygrometers is highly objectionable. The frame of the Thermometers is encased in an air case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the air case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

Reading of the Thermometers.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite to the tip of the index or column of mercury. The readings must be taken to tenths of a degree, and noted in decimals. Thus the thermometer will be read—39.9, 40.0, or 40.1;—not 40.0, 40.4, 40.5, or 40.6, according as it indicates a little *below*, *at*, or *above* exact coincidence with, or a little over 40° or 40.5° respectively. So also 40.3, and 40.5, more or less must be read respectively 40.2 or 40.3, and 40.7 or 40.8 respectively. In reading Fahrenheit's "Max" and "Min" Thermometers, the reading of the *top of the index* which is next to the surface

from radiation during night. The sun-bulbs have a cover, containing 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 Scale, and might never afterwards 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 laid on them, 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 point on which it may be suspended; the water-cap must be covered, and placed under the scale, and a little below the level of the wet bulb,—in case under the bulbs;—the manist 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 manist is always *clean* and *moist*, and that the water-pipe. 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 hourness be observed. From the moist cloth in this formed evaporation, will proceed as from the moist cloth in ordinary circumstances.

One town of "Manist" 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 frame enclosed requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index, or column of mercury. The readings ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will read a degree, 48, 49, 50, or 50, 1, or 50, 2, or 50, 3, or 50, 4, or 50, 5, or 50, 6, or 50, 7, or 50, 8, or 50, 9, or 50, 10, or 50, 11, or 50, 12, or 50, 13, or 50, 14, or 50, 15, or 50, 16, or 50, 17, or 50, 18, or 50, 19, or 50, 20, or 50, 21, or 50, 22, or 50, 23, or 50, 24, or 50, 25, or 50, 26, or 50, 27, or 50, 28, or 50, 29, or 50, 30, or 50, 31, or 50, 32, or 50, 33, or 50, 34, or 50, 35, or 50, 36, or 50, 37, or 50, 38, or 50, 39, or 50, 40, or 50, 41, or 50, 42, or 50, 43, or 50, 44, or 50, 45, or 50, 46, or 50, 47, or 50, 48, or 50, 49, or 50, 50, or 50, 51, or 50, 52, or 50, 53, or 50, 54, or 50, 55, or 50, 56, or 50, 57, or 50, 58, or 50, 59, or 50, 60, or 50, 61, or 50, 62, or 50, 63, or 50, 64, or 50, 65, or 50, 66, or 50, 67, or 50, 68, or 50, 69, or 50, 70, or 50, 71, or 50, 72, or 50, 73, or 50, 74, or 50, 75, or 50, 76, or 50, 77, or 50, 78, or 50, 79, or 50, 80, or 50, 81, or 50, 82, or 50, 83, or 50, 84, or 50, 85, or 50, 86, or 50, 87, or 50, 88, or 50, 89, or 50, 90, or 50, 91, or 50, 92, or 50, 93, or 50, 94, or 50, 95, or 50, 96, or 50, 97, or 50, 98, or 50, 99, or 50, 100, or 50, 101, or 50, 102, or 50, 103, or 50, 104, or 50, 105, or 50, 106, or 50, 107, or 50, 108, or 50, 109, or 50, 110, or 50, 111, or 50, 112, or 50, 113, or 50, 114, or 50, 115, or 50, 116, or 50, 117, or 50, 118, or 50, 119, or 50, 120, or 50, 121, or 50, 122, or 50, 123, or 50, 124, or 50, 125, or 50, 126, or 50, 127, or 50, 128, or 50, 129, or 50, 130, or 50, 131, or 50, 132, or 50, 133, or 50, 134, or 50, 135, or 50, 136, or 50, 137, or 50, 138, or 50, 139, or 50, 140, or 50, 141, or 50, 142, or 50, 143, or 50, 144, or 50, 145, or 50, 146, or 50, 147, or 50, 148, or 50, 149, or 50, 150, or 50, 151, or 50, 152, or 50, 153, or 50, 154, or 50, 155, or 50, 156, or 50, 157, or 50, 158, or 50, 159, or 50, 160, or 50, 161, or 50, 162, or 50, 163, or 50, 164, or 50, 165, or 50, 166, or 50, 167, or 50, 168, or 50, 169, or 50, 170, or 50, 171, or 50, 172, or 50, 173, or 50, 174, or 50, 175, or 50, 176, or 50, 177, or 50, 178, or 50, 179, or 50, 180, or 50, 181, or 50, 182, or 50, 183, or 50, 184, or 50, 185, or 50, 186, or 50, 187, or 50, 188, or 50, 189, or 50, 190, or 50, 191, or 50, 192, or 50, 193, or 50, 194, or 50, 195, or 50, 196, or 50, 197, or 50, 198, or 50, 199, or 50, 200, or 50, 201, or 50, 202, or 50, 203, or 50, 204, or 50, 205, or 50, 206, or 50, 207, or 50, 208, or 50, 209, or 50, 210, or 50, 211, or 50, 212, or 50, 213, or 50, 214, or 50, 215, or 50, 216, or 50, 217, or 50, 218, or 50, 219, or 50, 220, or 50, 221, or 50, 222, or 50, 223, or 50, 224, or 50, 225, or 50, 226, or 50, 227, or 50, 228, or 50, 229, or 50, 230, or 50, 231, or 50, 232, or 50, 233, or 50, 234, or 50, 235, or 50, 236, or 50, 237, or 50, 238, or 50, 239, or 50, 240, or 50, 241, or 50, 242, or 50, 243, or 50, 244, or 50, 245, or 50, 246, or 50, 247, or 50, 248, or 50, 249, or 50, 250, or 50, 251, or 50, 252, or 50, 253, or 50, 254, or 50, 255, or 50, 256, or 50, 257, or 50, 258, or 50, 259, or 50, 260, or 50, 261, or 50, 262, or 50, 263, or 50, 264, or 50, 265, or 50, 266, or 50, 267, or 50, 268, or 50, 269, or 50, 270, or 50, 271, or 50, 272, or 50, 273, or 50, 274, or 50, 275, or 50, 276, or 50, 277, or 50, 278, or 50, 279, or 50, 280, or 50, 281, or 50, 282, or 50, 283, or 50, 284, or 50, 285, or 50, 286, or 50, 287, or 50, 288, or 50, 289, or 50, 290, or 50, 291, or 50, 292, or 50, 293, or 50, 294, or 50, 295, or 50, 296, or 50, 297, or 50, 298, or 50, 299, or 50, 300, or 50, 301, or 50, 302, or 50, 303, or 50, 304, or 50, 305, or 50, 306, or 50, 307, or 50, 308, or 50, 309, or 50, 310, or 50, 311, or 50, 312, or 50, 313, or 50, 314, or 50, 315, or 50, 316, or 50, 317, or 50, 318, or 50, 319, or 50, 320, or 50, 321, or 50, 322, or 50, 323, or 50, 324, or 50, 325, or 50, 326, or 50, 327, or 50, 328, or 50, 329, or 50, 330, or 50, 331, or 50, 332, or 50, 333, or 50, 334, or 50, 335, or 50, 336, or 50, 337, or 50, 338, or 50, 339, or 50, 340, or 50, 341, or 50, 342, or 50, 343, or 50, 344, or 50, 345, or 50, 346, or 5

from radiation during night. The bulbs have a once examined which may be made or made 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 "Minimum" should be freely exposed to the sun, and the "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers are not graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the scale, and ought never afterwards to be used. The self-regulating thermometer wants to be tested by the dry bulb of the Hygrometer, 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 laid on them, by any observer, from the Meteorological Secretary.

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

The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and in place to the side, and a little below the level of the wet bulb,—in no case under the bulbs;—the mastin must be of medium fineness, and fastened at the neck of the bulb by a cotton, which also supplies it with water. It must be seen to by the observer that the mastin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be immersed by immersion from 15 to 20 minutes before the hour of observation. From the film of ice thus formed expartionates, 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 box-wood 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 Thermometers.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The readings ought to be taken to tenths of a degree, and noted in decimals. Thus the thermometer will be read—38.9, 40.0, or 40.1, or 40.5, again, 40.4, 40.5, or 40.6, according as it indicates a little under, under, an exact coincidence with, or a little over 40°, or 40.5°, or 40.6°, respectively. So also 40.1°, and 40.5°, more or less must be registered 40.2 or 40.3°, and 40.7° or 40.8° respectively. In the reading Rutherford's "Max" and "Min." Thermometers, the indication of that-kind of the *index* which is next to the surface of the mercury or alcohol is alone read. *Readings* of the Thermometers, especially of the wet and dry bulbs, must be taken rapidly taken, being so readily affected by heat from the person or the observer.

Hour of observing Temperature.—The *Hygrometer* is read at 9 A.M. and 9 P.M. The self-regulating Thermometers are read at 9 A.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-regulating Thermometers are read, in winter at least, the extremes may occur at any hour; and it is necessary to take their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 8d are those of a series of phenomena commencing at 9 P.M.—A *wind-rose* 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, the direction 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, it is earnestly recommended that extra observations 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 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, *Wind-Vane*—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.

Bar-gauges.—Many causes conspire to produce anomalies in rain terms. They arise, partly, from unremovable 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-gauges; but in all cases the gauges 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.

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

Climate.—Convenient abbreviations for Late Howard's

BOOK-POST.

	In	Leaf Buds	- - -	Divested of	CROPS	Sowing or	Appearing	In Ear	First Cut
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FOREST TREES.	Flower.	First appear.	In Leaf.	Leaves.	Flourishing variety.	Planting.	above Ground.	or Flower.	or Raised.
Alder,					Barley,				17
Ash,					Bere or Bigg, .				6
Beech,					Oats,				13
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Pease,				
Lime,					Potatoes, . . .				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass, . . .				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	Fruit Ripe, generally.	MIGRATORY BIRDS.	First Arrival.	Departure.
Barberry,		Apple,		31	Cuckoo,		
Bourtree or Elder,		Black Currant,			Curlew,		
Broom,		Cherry,			House-Swallow,		
Hazel,		Gean,		16	Lapwing,		
Hawthorn,		Gooseberry,			Plover,		
Holly,		Peach,			Sand-Martin,		
Laburnum,		Pear,			Starling,		
Lilac,		Plum,			Swan,		
Mezeron,		Strawberry,			Rail or Corn Crake,		
Mountain Ash or Rowan,							
Red Flowering Currant,							
Rhododendron Ponticum,							
Whin,							

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

[illegible]

Boylde.
August-1870

EDINBURGH.

Secretary of the Meteorological Society of Scotland,

MR ALEXANDER BUCHAN,

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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside, Loch-bushnie, County of Aberdeen*, in Lat. $57^{\circ} 10' 50''$, Long. $2^{\circ} 45' W$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *September* 187*0*.

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, including Thunder and Lightning, 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.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.											
		Barometer, * No.	Attach- ed Ther- mometer	Barometer, No.	Attach- ed Ther- mometer	Max. No.	Min. No.	Max. in Sun-rays.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.			Readings of the H.C.M. Anemometer, No.	Velocity (0-10), and Species.	Amount (0-10), and Species.	Velocity (0-10), and Species.	Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.						No. 22 inches.			
		inches.		inches.		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.			No.	No.	No.	No.	No.	No.	No.						No.	No.	No.	No.
		* No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.			No.	No.	No.	No.	No.	No.	No.						No.	No.	No.	No.
	1	28.900	54.0	28.680	56.0	55.5	43.0	77.0	41.5					SE	5	SE	5	24.475	11	84	10h	10at	2							r, f, t.	1				
	2	28.400	55.0	28.430	57.0	62.0	48.5	92.0	45.0					W	1	W	5	99.050	1	10	3at	10h	7/2							r.	2				
	3	28.465	53.0	28.760	54.0	57.0	42.4	77.0	37.0					W	1	W	1	73.390	1		10at	2at	6							a.	3				
	4	28.870	53.0	28.800	56.0	55.0	37.0	75.0	32.4					W	5	W	1	40.670	30	10	3at	10at	5							r.	4				
	5	28.590	56.0	28.490	58.0	62.0	50.0	82.0	46.0					W	5	W	5	97.720	1	0.5	4at	10at	4							r.	5				
	6	28.592	55.0	28.570	58.0	63.0	43.0	86.0	36.0					W	5	W	5	36.340			0	4at	9							luco	6				
	7	28.460	58.0	28.500	58.0	62.0	42.0	97.0	35.0					W	5	W	5	59.860	1.30	12	0	5at	8							t.	7				
	8	28.710	54.0	28.765	55.0	54.0	43.0	85.0	35.0					W	1	6	0.0	32.930		0.5	8at	0	10							r.	8				
	9	28.380	53.0	28.200	53.0	55.0	35.0	70.0	30.0					SE	1.5	SE	1.5	49.045	6	5.1	10h	0	3							r, t, b.	9				
	10	28.515	53.0	29.000	52.4	57.0	41.3	71.0	36.0					W	5	W	5	62.875	1.30	14	4at	8at	2							r. a	10				
	11	29.180	49.0	29.160	52.0	56.0	35.5	92.0	29.0					W	5	W	5	16.865			6at	10at	11									11			
	12	28.930	54.0	29.000	54.0	57.0	46.0	77.5	40.0					W	5	W	5	96.460	1.45	12	10at	2at	5							r, Ragnhelia, lu Rain bow	12				
	13	28.925	52.0	28.760	54.0	52.0	41.6	75.0	31.0					SE	5	W	5	27.675	2	87	10at	10at	2							r.	13				
	14	29.150	50.0	29.290	52.0	52.0	40.0	88.0	36.0					W	5	W	5	84.634	9	0	4at	0	8							h. r.	14				
	15	29.144	52.0	29.530	53.0	59.0	37.0	98.0	31.3					W	5	W	5	21.840	1	8.6	0	5at	12							a.	15				
	16	29.570	55.0	29.600	60.0	66.5	43.0	99.5	38.0					W	5	W	5	61.875	30	0.6	10at	5at	5							r.	16				
	17	29.570	58.0	29.520	58.0	61.0	47.4	97.0	40.0					W	5	W	5	00.910			3at	2at	8									17			
	18	29.570	58.0	29.515	58.0	62.0	46.0	109.0	39.0					W	5	W	5	17.035			3at	0	7							a.	18				
	19	29.410	57.0	29.370	61.0	62.6	44.3	99.0	38.0					SE	5	W	1	66.790	1.5	0.3	5at	0	10							a.	19				
	20	29.340	60.0	29.420	61.0	61.0	57.0	90.0	44.0					SE	5	W	5	16.282			10at	5at	6							r.	20				
	21	29.446	61.0	29.570	62.0	67.0	42.4	108.0	35.0					SE	0.0	W	5	37.520			3at	0	12							a.	21				
	22	29.500	61.0	29.570	63.5	68.0	52.5	99.0	37.0					SE	5	6	0.0	53.365			6at	0	12							h.	22				
	23	29.525	61.0	29.545	61.0	66.2	50.0	94.0	43.0					W	5	SE	5	9.0945			3at	5at	12									23			
	24	29.520	61.0	29.200	61.0	62.0	47.0	90.0	41.0					SE	5	W	5	32.665			6at	10at	10							a.	24				
	25	29.530	61.0	29.570	63.0	64.0	50.0	105.0	42.0					SE	5	6	0.0	46.175			4at	9at	11							a.	25				
	26	29.580	59.0	29.430	62.0	66.0	45.0	104.0	37.0					SE	5	6	0.0	70.405			5at	3at	10/2							a.	26				
	27	29.600	59.0	29.580	58.0	56.0	48.0	93.0	43.5					SE	5	SE	5	9.5330			10at	6at	4									27			
	28	29.540	56.0	29.530	62.0	68.2	45.0	102.0	38.0					SE	5	W	5	17.015			0	5at	11							h.	28				
	29	29.550	59.0	29.630	64.0	71.0	46.5	109.0	37.0					SE	5	W	5	45.840			0	3at	10							h.	29				
	30	29.660	61.0	29.710	64.0	69.2	46.0	108.0	38.0					W	5	W	5	65.580			0	5at	11							h. a.	30				
	31																																31		
Sums.		884.163	12	884.101	12	1824.6	1321.4	2725.0	1135.7					170	15.5			43	3.05		16.2	154	233												
Means.		29.484	56.2	29.459	58.1	60.8	44.0	90.8	37.9					0.6	0.4																				
+ Total Corrections for Instrumental Errors.		-1.00		-0.20																															
+ Corrections for Diurnal Range.																																			
"Corrected Means."		29.484	56.2	29.459	58.0	60.8	44.0	90.8	37.9																										
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†† = *29.484* 071
for Temp. (Col. 2), = *29.484* 071
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = *29.459* 072
for Temp. (Col. 4), = *29.459* 072
Mean at Station, corrected, and at 32°, = *29.489* 071
Correction for height, 894 feet above Mean Sea-level, = *0.50* 989
Mean, reduced to 32°, and Sea-level, = *30.039* 011
Highest Reading, corrected for Index error, on the 30 th, = *29.710*
Lowest Do. Do. on the 9 th, = *28.200*
Difference, or Monthly Range, = *1.510*

* 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.
† Enlarging corrections for both capillary and Index Errors.
†† The Diurnal Range for Scotland is as yet unknown.
‡ These "Hygrometric Deductions" are calculated from Glaisher's Hygrometric Tables, Second Edition only.
§ While the Diurnal Range is unknown, the Arithmetic Mean of Cols. 9 and 10 will be entered as the "Calculated Mean Temperature."
|| 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 29 th, = *71.0*
Lowest in Month, corrected for Index errors, on the 9 th, = *35.0*
Difference, or Monthly Range, = *36.0*
"Corrected Mean" of all the Highest, (Col. 5), = *60.8*
"Corrected Mean" of all the Lowest, (Col. 6), = *44.6*
Difference, or Mean Daily Range, = *16.84*
* Calculated Mean Temperature of Month, = *52.86*

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 29 th, = *109.0*
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = *90.8*
Lowest at Night, Black Bulb, (corrected for Index errors), on the 11 th, = *29.0*
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = *37.8*
Difference of above Means or Range ("exposed"), = *53.0*

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

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

†† Computed Temperature of Dew-Point, =

†† Do. Elastic Force of Vapour, =

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

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

RAIN fell on 13 Days; Amount in Inches, = *3.05*

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	3	0	2	3	7	6	6	2	1		
P.M.	0	0	0	2	2	11	10	1	4		
Mean.	2	0	1	2	4	8	8	2	2	0.50	167

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 3d; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by *William Bruce*
Bogside Loch-bushnie.

(Signed) *William Bruce*
The first half of the month was very wet, which was of great advantage to the turnip and potato crops, both of which are an excellent crops. The grain crop is all in the stack yard in excellent order. The bulk in general is below an average. Some few have a better bulk than the bulk last year, while many want a third and some have only about the half of last years bulk. Both straw and grain are of first rate quality. No disease in the district. Cattle healthy.

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

An excellent Barometer's construction by Mr. Ald 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 fluid, scale-mercury can be adjusted to the *zero-point* of the fixed scale; these stems pass freely through the lid and case of the cistern. When the coincidence being indicated by a little ivory float, passes stem 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 *join 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 *sew 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 *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 replaced.

The Barometer should be stepped in a *good bottle*, 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 glass-adjacent 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 inside, 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 it is most desirable, doors are also made to open to the south.

These Boxes may be had from the opticians, Messrs. Negretti and Zambra's Patent "Lath-box" 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 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 near the top of the tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. 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 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, midway repairs, they are very liable to be moved from their position on the Scale, and ought never after-wards 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 coverd on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the mesh must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the mesh is always *clean* and *moist*, and the water pipe. 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 20 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 slightly 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, 40¾, or 40¾. So also 40½, and 40¾, more or less must be registered 40° 2 or 40° 3, and 40° 7 or 40° 8 respectively. In reading Rutherford's "Hygrometer" and "Min." Thermometers, the reading Rutherford's "Hygrometer" 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 2d are those of a series of phenomena commencing at 9 p.m. on the 2d, and extending till 9 p.m. on the 12th.

Wind.—A wind-measure 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, it is earnestly recommended that extra observations be made at every hour of Greenwhich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results.

The Council recommend that every observatory be furnished with a Hemispherical-Cup Anemometer—a self-registering instrument which shows the amount of the Wind at the time 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 *describing* 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.

Snowfalls may, for convenience, be registered in the rain columns, under the following conditions:—when a Snow shower comes, it must be noted in the "Remarks," and the letter S annexed 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-gauges. For wind, rain, and snow, as indeed in every column, the observer must be too careful to register *observations* only; and nothing that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's

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

Observations of the clouds are made at 9 a.m. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 2, W., (for example) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of 2, east, (e.g.) will indicate that the higher 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., 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 heat 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, nothing 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 Schomben'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 8°, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 8° on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4"; i.e., that it is *blowing fresh*.

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

Remarks.—The "Remarks" column is too narrow, but unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks on remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of on storms as have been 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 reared from year to year on a selected piece of ground or farm.

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

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MR ALEXANDER BUCHAN,
Secretary of the Meteorological Society of Scotland,
General Post Office Buildings,
EDINBURGH.



OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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

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

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

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside, Leochel-Cushnie*, County of *Aberdeen*, in Lat. $57^{\circ}10'30''$, Long. $2^{\circ}45'0''$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *October* 187*0*.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms, including Thunder and Lightning, began and ended.		Days of Month.
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs. Ground.		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-rays No.	Min. on Grass. No.	Dry bulb. No.	Wet bulb. No.	Dry bulb. No.	Wet bulb. No.	Direction. Force.	Direction. Force.	No. of hours in which it fell.	Amount in inches. No.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. 1, inches.	No. 2, inches.	No. 3, inches.							
		inches.		inches.																											
	1	29.785	46.0	29.780	61.0	65.0	45.0	69.0	35.0					S	5	SW	5	90855		0	0	11							h. a.	1	
	2	29.785	57.0	29.740	61.0	66.2	42.0	106.0	31.0					S	5	S	5	15905		0	0	11								2	
	3	29.760	61.0	29.760	61.0	62.0	38.0	97.0	29.0					SE	5	SE	5	33335		0	0	11							f.	3	
	4	29.745	60.0	29.715	59.0	65.2	37.0	113.0	28.0					S	5	W	5	46750		0	0	11								4	
	5	29.670	57.0	29.525	57.0	58.0	37.0	58.0	27.6					W	5	S	0.0	58040		10st	10st	0							f.	5	
	6	29.560	54.0	29.200	57.0	47.2	43.0	52.0	38.0					W	5	W	5	71940	1	15	10st	10st	0								6
	7	29.100	50.0	28.850	49.0	45.0	39.0	60.0	35.0					W	5	S	5	94865		10st	9st	1							r.	7	
	8	28.680	44.0	28.440	46.0	45.0	29.5	67.0	22.0					W	5	W	5	32480	2	19	10st	10st	4						r.	8	
	9	28.370	45.0	28.420	44.0	41.2	32.5	76.8	26.5					W	5	W	5	71420	2.30	18	3st	6st	3						r. sh. s. hl.	9	
	10	28.610	42.0	28.770	46.0	45.4	34.0	75.0	26.0					W	5	W	5	35330	1.50	12	7st	6st	4						r. sh. hl. Par helia	10	
	11	28.840	48.0	28.870	44.0	57.0	36.0	85.0	27.2					W	5	W	5	04430	1.30	07	8st	7st	5								11
	12	28.770	47.0	28.380	46.0	45.0	37.0	47.0	30.1					SE	5	S	2.0	62790	10.30	46	10st	10st	0						r.	12	
	13	28.665	48.0	28.020	47.0	46.0	34.0	49.0	24.0					W	1.0	W	5	46720	3.15	43	10st	10st	0						r.	13	
	14	29.200	48.0	29.300	48.0	57.0	31.0	92.0	24.0					W	5	W	5	62495		0	0	10							a.	14	
	15	29.020	49.0	28.790	49.0	57.0	34.0	97.0	25.8					W	5	S	1.5	03385	15	0	6st	4st	5 1/2						Par helia, lu. co.	15	
	16	28.220	49.0	28.050	52.0	57.0	34.0	58.0	36.0					SE	1.5	S	5	70380	4	23	10st	10st	0						r.	16	
	17	28.150	48.0	28.570	47.0	50.0	34.0	60.0	31.0					W	1.5	W	1.0	58380			8st	7st	2						r. g.	17	
	18	28.740	45.0	28.600	48.0	48.0	36.0	78.0	27.0					W	5	SE	1.5	25710	6	46	5ci	10st	8						r. g.	18	
	19	28.340	50.0	28.180	60.0	50.0	44.0	74.0	36.0					W	1.0	SE	1.0	04670	6.45	28	5ci	10st	3						r. g.	19	
	20	28.260	45.0	28.780	50.0	47.0	37.0	57.0	29.0					W	5	W	1.0	53110	7	26	10st	8st	0						r. sh. s. so. ha. a	20	
	21	28.960	50.0	28.940	50.0	63.0	38.0	90.0	28.0					W	5	S	5	99575	2	15	4st	10st	8						so. ha.	21	
	22	28.830	57.0	28.620	57.0	63.0	40.0	80.0	31.0					W	5	W	5	13624	25		8st	2ci	3								22
	23	27.920	46.0	27.715	49.0	57.0	39.0	50.0	30.0					SE	1.5	S	5	66675	12	50	10st	10st	0						r. g.	23	
	24	27.760	48.0	28.000	57.0	46.0	45.0	50.0	35.0					W	5	W	5	97100	1		10st	5st	0						r. f. a.	24	
	25	28.730	47.0	28.440	48.0	48.5	36.0	70.0	28.0					W	1.0	W	1.5	83120			7st	2ci	9						a.	25	
	26	28.440	49.0	28.425	48.0	49.0	36.0	91.0	28.0					W	1.5	W	1.0	34810			8st	10st	6						L.	26	
	27	28.480	48.0	28.625	49.0	48.0	34.0	78.0	25.0					W	5	W	5	62380			8st	10st	5						a.	27	
	28	28.740	48.0	28.985	47.0	47.0	34.0	76.0	25.0					W	5	W	1.5	17445	1.15	09	2st	6st	4						r.	28	
	29	28.960	48.0	28.750	47.0	46.0	34.0	47.0	25.0					S	5	W	1.5	61810	1	05	10st	8st	0						r. a.	29	
	30	28.755	43.0	28.640	48.0	47.6	37.0	82.5	28.0					W	1.0	W	1	51265			0	8st	8								30
	31	28.700	46.0	29.065	48.0	44.5	39.0	66.0	29.0					W	1.0	W	1.5	23680	15	04	3st	5st	5 1/2						r.	31	
Suns.		893.295	1536.0	892.995	1536.0	1533.8	1169.0	2277.5	903.3					13	22.0	20.5	620	376		193	228	141									
Means.		28.87	49.5	28.806	50.0	50.4	37.2	73.5	29.1					0.71	70																
† Total Corrections for Instru- mental Errors.																															
‡ Corrections for Diurnal Range.																															
“Corrected Means”		28.833	49.5	28.826	50.1	50.1	37.4	73.4	29.1																						
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†† = *28.745*
for Temp. (Col. 2), = *28.741*..... *5.3*
“Corrected Mean” of Barometer at 9 P.M., minus the Correction†† = *28.768*
for Temp. (Col. 4), = *28.760*..... *8.8*
Mean at Station, corrected, and at 32°,..... = *28.752*
Correction for height, *894* feet above Mean Sea-level,..... = *961*
Mean, reduced to 32°, and Sea-level,..... = *29.713*
Highest Reading, corrected for Index error, on the 1st day,..... = *29.785*
Lowest Do. Do., on the 23rd day,..... = *27.715*
Difference, or Monthly Range,..... = *2.070*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 2nd day,..... = *66.2*
Lowest in Month, corrected for Index errors, on the 8th,..... = *29.5*
Difference, or Monthly Range,..... = *36.7*
“Corrected Mean” of all the Highest, (Col. 5),..... = *50.14*
“Corrected Mean” of all the Lowest, (Col. 6),..... = *37.22*
Difference, or Mean Daily Range,..... = *12.92*
** Calculated Mean Temperature of Month,..... = *43.8*
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 4th,..... = *113.0*
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun,..... = *73.5*
Lowest at Night, Black Bulb, (corrected for Index errors), on the 8th,..... = *22.0*
“Corrected Mean,” (Col. 8), of Black Bulb, Min. on grass,..... = *29.1*
Difference of above Means or Range (“exposed”),..... = *44.3*

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

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

†† Computed Temperature of Dew-Point,..... =

†† Do. Elastic Force of Vapour,..... =

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

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

RAIN fell on 16 Days; Amount in Inches,..... = *3.76*

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		6	0	1	4	3	7	7	3		0.71
P.M.		4	0	2	3	5	2	4	5		0.78
Mean.		5	0	1.5	3.5	4	4.5	5.5	4		0.75

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 3d; 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 Bruce*
Bogside, Leochel-Cushnie.

(Signed) *William Bruce*

The month has been wet, which retarded potato lifting, so that they were only all lifted about the last day of the month. The crop is excellent and the quality first-rate. Turnips are a fine crop all over the district and they improved much by the rains during the month. No disease in the district except typhus fever in two families, none of the cases have proved fatal. Cattle healthy.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside, Leochel Bushnie* County of *Aberdeen*, in Lat. *57°10'30"*, Long. *2°45'0" W*, Distance from Sea *28* miles.
 Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet. During the MONTH of *November* 1870.
 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, including Thunder and Lightning, 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.	Atta- ched Ther- mometer	Barometer, No.	Atta- ched Ther- mometer	Max. No.	Min. No.	Max. in Sun-rays No.	Min. on Grass, No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Dirrec- tion.	Force	Dirrec- tion.	Force	Readings of the H.C. up Anemometer, No.	No. of hours in which it fell.	No. 4	Velocity (0-10), and Species.	Amount (0-10), and Species.	Velocity (0-10), and Species.	Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.					No. 22 inches.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°					°
	1	29.570	47.0	29.600	47.0	49.5	38.0	88.0	29.0					S	5	S	5	56740				6.00	2.5	5.5	9				so. co., h. co.	1	
	2	29.570	47.0	29.600	47.0	49.0	40.0	61.0	32.0					S	1	S	1	31970				10.0	2.5	10.0	7				Barometria	2	
	3	29.580	49.0	29.630	51.0	57.5	41.5	77.0	30.5					W	5	W	5	72335	0.15	0.2		8.0	2.5	8.0	57.2				r.	3	
	4	29.645	49.0	29.635	50.0	46.0	40.0	50.0	34.0					W	5	W	5	12260				10.0	2.5	10.0	0					4	
	5	29.630	47.0	29.570	50.0	48.0	35.5	80.0	28.0					W	5	W	5	46670				6.0	2.5	6.0	6				so. co., h. co.	5	
	6	29.315	49.0	29.250	50.0	46.0	35.0	75.0	30.0					W	5	W	5	81300	0.15	0.3		6.0	2.5	6.0	2				r.	6	
	7	29.200	46.0	29.190	45.0	42.0	33.0	75.0	29.0					W	5	W	5	14970				10.0	2.5	10.0	3					7	
	8	29.200	45.0	29.300	45.0	42.0	32.0	80.0	28.0					W	5	W	5	64020	0.30	0.5		10.0	2.5	10.0	7				r. a.	8	
	9	29.130	43.0	29.070	43.0	35.0	31.0	57.0	27.0					W	5	W	1	13820	3.30	0.1		4.0	2.5	4.0	2				en.	9	
	10	28.800	39.0	28.910	38.0	36.0	29.0	53.0	24.5					W	1.5	W	1.5	27420	5	0.8		10.0	2.5	10.0	2				en.	10	
	11	28.860	38.0	28.885	40.0	36.0	31.0	57.0	29.0					W	2	W	1	19012	7.30	0.65		10.0	2.5	10.0	1				en.	11	
	12	28.660	38.0	29.520	38.0	37.0	26.0	43.0	24.0					W	5	W	1	85020	5	0.22		10.0	2.5	10.0	0				r. st. en.	12	
	13	28.450	44.0	28.320	45.0	37.4	33.5	65.0	30.0					W	1	W	5	53310				10.0	2.5	10.0	0					13	
	14	28.230	39.0	28.320	39.0	34.0	26.0	37.0	22.0					W	5	W	1	07820				10.0	2.5	10.0	0				a	14	
	15	28.170	39.0	28.300	39.0	38.0	32.0	53.0	30.0					W	5	W	5	64890	4.30	0.40		10.0	2.5	10.0	3				r. st. a.	15	
	16	28.335	39.0	28.400	39.0	36.0	33.0	59.0	30.0					W	5	W	2	59080	30	0.5		10.0	2.5	10.0	4				st. a.	16	
	17	28.520	39.0	29.600	39.0	37.0	34.0	43.0	30.0					W	5	W	1	15420	3.30	0.23		10.0	2.5	10.0	3				st. r. a.	17	
	18	28.700	40.0	28.580	40.0	34.0	34.0	68.0	32.0					W	1	W	5	68980	1			8.0	2.5	10.0	2				st. r. a.	18	
	19	28.400	39.0	28.370	39.0	36.0	30.0	48.0	27.5					W	1	W	5	05700	1	0.2		10.0	2.5	10.0	0				a.	19	
	20	28.335	39.0	28.365	41.0	34.0	32.0	74.0	29.0					S	5	S	1	36970				3.0	2.5	5.0	4					20	
	21	28.300	41.0	28.180	43.0	43.0	37.0	43.0	35.0					W	1	W	5	94475	10	0.51		10.0	2.5	10.0	0				h. r.	21	
	22	28.310	41.0	28.230	42.0	42.0	29.0	79.0	26.0					S	5	W	5	21065				0	2.5	5.0	7				a.	22	
	23	28.190	40.0	28.325	42.0	36.0	27.0	71.0	24.0					W	5	W	5	39260				3.0	2.5	10.0	4				a.	23	
	24	28.335	40.0	28.250	42.0	42.0	30.0	42.0	27.0					W	0.0	W	5	43300	2	0.14		10.0	2.5	10.0	0				f. r.	24	
	25	28.130	44.0	29.370	43.0	46.0	34.0	58.0	36.0					W	1.5	W	4	14535	1			8.0	2.5	0	3				r. g.	25	
	26	28.900	44.0	29.110	45.0	45.0	34.0	80.0	27.0					W	5	W	5	89180				0	2.5	3.0	7					26	
	27	29.300	41.0	29.400	42.0	37.0	29.0	47.0	24.0					W	5	W	5	03910				10.0	2.5	5.0	4				so. co. a.	27	
	28	29.425	41.0	29.440	42.0	39.0	32.0	43.0	27.5					W	5	W	0.0	07765				10.0	2.5	10.0	0				f.	28	
	29	29.460	41.2	29.535	41.0	38.0	30.0	52.0	27.3					S	5	S	5	14380				10.0	2.5	3.0	3.2				f.	29	
	30	29.610	42.0	29.710	41.0	38.0	33.0	42.0	30.0					S	5	S	5	23586	30	0.03		10.0	2.5	10.0	0				f.	30	
	31																													31	
NOTATION USED IN GENERAL REMARKS.																															
a. denotes aurora. m. denotes meteor.																															
ci. cirrus. ms. meteors.																															
ci-cu. cirro-cumulus. n. nimbus.																															
ci-s. cirro-stratus. r. rain.																															
cu-s. 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. lu. solar halo.																															
h. d. heavy dew. sq. squall.																															
hl. hail. squ. squalls.																															
l. lightning. t. thunder.																															
li. cl. light clouds. t. s. thunder storm.																															
li. sh. light showers. w. wind.																															
lu. co. lunar corona. g. gale of wind.																															
lu. lu. lunar halo.																															
TABLE FOR ESTIMATING FORCE OF WIND.																															
Estimated Force, 0-6. Common Designation. Estimated Force, 0-6. Common Designation. Estimated Force, 0-6. Common Designation.																															
0 0.5 1' Calm Very light air Light air 1.5 2' Light breeze Fresh breeze Very fresh 4 5 6 Blowing hard Blowing a gale Violent gale																															
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†† = *28.894*
 for Temp. (Col. 2), = *28.874* - *0.020* = *28.854*
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = *28.933*
 for Temp. (Col. 4), = *28.913* - *0.020* = *28.893*
Mean at Station, corrected, and at 32°, = *28.894*
 Correction for height, *894* feet above Mean Sea-level, = *0.773*
Mean, reduced to 32°, and Sea-level, = *29.667*
 Highest Reading, corrected for Index error, on the *30* th, = *29.710*
 Lowest Do. Do., on the *25* th, = *28.150*
 Difference, or **Monthly Range**, = *1.560*

S.-R. THERMOMETER, (in shade, etc.), **Highest in Month**, (corrected for Index Errors), on the *30* th, = *51.5*
Lowest in Month, corrected for Index errors, on the *14* th, = *26.0*
 Difference, or **Monthly Range**, = *25.5*
 "Corrected Mean" of all the **Highest**, (Col. 5), = *40.7*
 "Corrected Mean" of all the **Lowest**, (Col. 6), = *32.9*
 Difference, or **Mean Daily Range**, = *7.8*
 "Calculated Mean Temperature of Month", = *36.8*
S.-R. THERMOMETER, Black Bulb in Sun, **Highest**, (corrected for Index Errors), on the *1* st, = *88.0*
 "Corrected Mean," (Col. 7), of Black Bulb, **Max. in Sun**, = *59.8*
Lowest at Night, Black Bulb, (corrected for Index errors), on the *14* th, = *22.0*
 "Corrected Mean," (Col. 8), of Black Bulb, **Min. on grass**, = *28.6*
 Difference of above Means or Range ("exposed"), = *31.2*

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of **Dry Bulb**, (Cols. 9 and 11), =
Mean (corrected) A.M. and P.M. Reading of **Wet Bulb**, (Cols. 10 and 12), =
 ‡ Computed **Temperature of Dew-Point**, =
 ‡ Do. **Elastic Force of Vapour**, =
 ‡ Do. **Weight of Vapour in a Cubic Foot of Air**, =
 ‡ **Relative Humidity**, (Saturation = 100), =
RAIN fell on *16* Days; Amount in Inches, *3.44* =

WIND.		SUMMARY.									
Direction.	Force.	N	NE	E	SE	S	SW	W	NW	Mean Force.	Mean Velocity in miles per day.
A.M.		4	0	0	2	6	4	9	4	1	0.66
P.M.		3	0	0	0	5	6	11	4	1	0.82
Mean.		4	0	0	1	5.5	10	4	4	1	0.75

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 3d; 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 Bruce*
Bogside, Leochel Bushnie.

(Signed) *William Bruce*
 The weather at the beginning of the month was very mild and warm. The whins were in full blossom on the first day of the month. Turnips very plentiful, but straw will not be so before grass. No disease in the district except a very severe cold which has been some on the aspect. Stock healthy healthy.

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

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

An excellent Barometer is constructed by Mr. Aile 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 horn, 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; 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 upperside. 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 observer 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 inside, and fixed 4 feet above ground in an exposed position, free from merely local influences. The lids forming the sides and doors of the Boxes are arranged so as to afford ventilation of the interior. The instruments are to allow a complete ventilation of the interior. The instruments are suspended on cross-sticks, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had from the opticians.

Self-registering Thermometers.—Professor Phillips's, and Xagretti 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 near the top of the tube and must be dislodged from there 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 shadow blackened boxes, whose sides protect the bulbs from the sun, and the *"Maximum"* should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes, till it has been *carefully tested* by comparison with a *Standard Thermometer*. When such Thermometers as are *not graduated* on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the *"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 Society.

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 hang the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case must the bulbs;—the mist must be of medium fineness, and inserted 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 mist 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 most cold in ordinary circumstances, it will proceed as from the most cold in ordinary circumstances.

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

Reading of the Thermometers.—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 site the tip of the index or column of mercury. The reading should be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·9, 40°·0, or 40°·1; or 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 Kärstner's *"Kraus"* and *"Maas"* Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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, &c.

Careful observations ought to be made on the changes in the direction of the wind; and during storms it is earnestly recommended that exact observations 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 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 unfavorable 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 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 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 overhead (*i.e.*, within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the *clouds* column, though their appearances and changes ought to be noted among the *"Remarks."* The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is *completely 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." $\frac{2}{4}$, (for example) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (average) speed of the former. Again, in the second "Cloud" column, an entry of $\frac{2}{4}$, (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further observed 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 consistency—the Council recommend that observations in this interesting department be made at 9 A.M. by thermometers placed in the earth, their bulbs being sunk to 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 the flow of river water. At or near the time of high water, on the 5th, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air and the hour of observation; and continuing to observe for particular depths.

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

Ozone.—Mention whether Schloffen's or Moffat's papers are used. The paper is annexed 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 8 $\frac{1}{2}$, as an example, the schedule will indicate that the ozone paper is tinted as 8 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 unfortunately so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich, and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, &c. Remarks ought to be made on the occurrence of mists, mists, mists, remarkable depressions and elevations of the barometer; thunder storms, and remarkable falls of snow, hail, or rain, the hour of 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 purposes, from that headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner or on the side-margin. Additional remarks may be made on the margin.

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

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

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

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

(By Order) A. B.

Edinburgh, 20th November 1870.

BOOK-POST.

EDINBURGH.

General Post Office Buildings,
Secretary of the Meteorological Society of Scotland.

MR. ALEXANDER BUCHAN,

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OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Leaf Buds First appear.	In Leaf.	Divested of Leaves.	CROPS, mentioning variety.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Out or Raised.
Alder,					Barley,				
Ash,				8	Bore or Bigg,				
Beech,				6	Oats,				
Birch,				14	Wheat,				
Elm,				1	Beans,				
Larch,				14	Pease,				
Lime,				4	Potatoes,				
Oak,				14	Turnips,				
Sycamore or Plane,				4	Rye Grass,				

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

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

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Boja de Lochet-kushnie, County of Aberdeen, in Lat. 57°10'50", Long. 2°43'00", Distance from Sea 28 miles.

Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.

During the MONTH of December 1870

The Hours of Observation are of Greenwich Time.

[illegible]

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction +†,	<u>29. 04 1</u>
for Temp. (Col. 2), = <u>29. 17 4</u> — .021	<u>29. 04 5</u>
"Corrected Mean" of Barometer at 9 P.M., minus the Correction +†,	<u>29. 04 4</u>
for Temp. (Col. 4), = <u>29. 12 1</u> — .024	<u>29. 02 0</u>
Mean at Station, corrected, and at 32°,	<u>29. 04 5</u>
Correction for height, <u>824</u> feet above Mean Sea-level,	<u>995</u>
Mean, reduced to 32°, and Sea-level,	<u>30. 040</u>
Highest Reading, corrected for Index error, on the <u>1st</u> ,	<u>29. 770</u>
Lowest Do. Do., on the <u>14th</u> ,	<u>28. 000</u>
Difference, or Monthly Range,	<u>1. 770</u>

S.-R. THERMOMETER , (in shade, etc.), Highest in Month , (corrected for Index Errors), on the <u>19</u> th.....	=	<u>44.0</u>
Lowest in Month , corrected for Index errors, on the <u>23</u> rd	=	<u>12.0</u>
Difference, or Monthly Range ,	=	<u>32.0</u>
"Corrected Mean " of all the Highest , (Col. 5),	=	<u>34.0</u> 33.6
"Corrected Mean " of all the Lowest , (Col. 6),	=	<u>26.1</u> 26.0
Difference, or Mean Daily Range ,	=	<u>07.9</u> 7.6
** Calculated Mean Temperature of Month,	=	<u>30.0</u> 29.6

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Error), on the 4th = **71.4**

“Corrected **Mean**,” (Col. 7), of **Black Bulb, Max. in Sun**..... = **44.4**

Lowest at Night, Black Bulb, (corrected for Index errors), on the **23rd**, = **8.0**

“Corrected **Mean**,” (Col. 8), of **Black Bulb, Min.** on grass, = **22.5**

Difference of above Means or Range (“exposed”), = **21.9**

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

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

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## Computed Temperature of Dew-Point, ..... =

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Do. Elastic Force of Vapour, =

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

Relative Humidity, (Saturation = 100), =

RAIN fell on 18 Days; Amount in Inches, = 5.95

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	5	2	1	3	1	8	4	1	0.73	
P.M.	7	2	4	1	2	4	9	2	0	0.81	
Mean.	6	3	3	1	2	2	8	3	1	0.77	214

Observations made and
Return verified by { William Bruce
Bogside, Leo Chuk-Bus hnic.

(Signed) William Brown,

A very cold frosty month, more rain fell in this month than in any during the year. Stack yard are getting fast empty, straw most be sown upon grass, but turnips are very plentiful, the crop being excellent. Severe colds very prevalent, no disease in the district except gastric fever in one family. Stock healthy.

