

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Pallat, County of Hadden, in Lat. 54° 22' N, Long. 2° 12' W, Distance from Sea 43 miles.Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 108 feet.During the MONTH of January 18 69.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. _____				WIND.				RAIN.		CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression of Barometer, Epidemic 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.	Attach- ed Ther- mometer	Barometer.	Attach- ed Ther- mometer	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Dirac- tion.	Force	Dirac- tion.	Force	Readings of the H Cup Anemometer No. _____	No. of hours in which it fell.	Amount in inches.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.		Amount, (0-10), and Species.	No. _____	No. _____					No. _____																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm for Temp. (Col. 2), = 29.005
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4), = 28.989
Mean at Station, corrected, and at 32°, = 28.997
Correction for height, feet, above Mean Sea-level, = 746
Mean, reduced to 32°, and Sea-level, = 29.741
Highest Reading, corrected for Index error, on the 17th, = 29.630
Lowest Do., Do., on the 18th, = 27.780
Difference, or Monthly Range, = 1.850

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 17th, = 52.8
Lowest in Month, corrected for Index errors, on the 24th, = 49.0
Difference, or Monthly Range, = 43.8
"Corrected Mean" of all the Highest, (Col. 5), = 39.7
"Corrected Mean" of all the Lowest, (Col. 6), = 28.5
Difference, or Mean Daily Range, = 11.2
** Calculated Mean Temperature of Month, = 34.1

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 17th, = 52.8
Lowest at Night, Black Bulb, (corrected for Index errors), on the 24th, = 49.0
"Corrected Mean" (Col. 7), of Black Bulb Max. in Sun, = 39.7
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 28.5
Difference of above Means or Range ("exposed"), = 11.2

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 34.7
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 33.9
† Computed Temperature of Dew-Point, = 32.7
† Do. Elastic Force of Vapour, = .186
† Do. Weight of Vapour in a Cubic Foot of Air, = 5.82
† Relative Humidity, (Saturation = 100), = 92
RAIN fell on 20 Days; Amount in Inches, = 4.09

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		1	3	2	1	1	11	8		4
P.M.		1	3	1	1	1	10	9		2
Mean.		1	3	1	1	1	9	9		6

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

J. W. Patterson
Pallat

(Signed) J. W. Patterson

137
131
137
415

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Ballater, County of Shetland, in Lat. 57° 22' N., Long 2° 12' W., Distance from Sea 1 3 miles.
Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 103 feet. During the MONTH of February 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. —				WIND.				RAIN.		CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Deposition, or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.				
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.			9 h. A.M.										
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.			Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.		No.	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.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°			°	°	°	°		°	°	°					°	°	°	°
1	28.84	47.3	28.49	45.5	47.5	34				37	36	36	33	N.	3	N.	2			12	5th. 10. 3th. 10. 3th.									Dr. this & next in hills low Bar. Mild & clear. 2					
2	28.73	43.5	28.76	43	37	30				35.5	34	24.5	33.5	"	3	"	2			10	4. Rain. 3. 5.									Storm & cold - heavy on this night. 3					
3	28.74	42	29.18	41	37	28				33	31	30	29	SW.	2	"	2			17	5th. 10. 3th. 10. 3th.									acc on this. Clear & frost. 4					
4	28.50	40.5	29.22	42	39	28				37	35	38	35.5	N.	11	"	2			4th. 7. Large										Stormy & clear. Shows Dr. man has gone with ice. 5					
5	28.70	44.5	28.90	44	48	34				47	43	36.5	34	"	6	"	11			28	6th. 7. 3th. 10. 3th.									very fall for Dr. man's night. 6					
6	29.20	43	29.39	43.5	43	31.5				39	35	33.4	32	"	4	"	0.5			10	4. 3. 2. 10.									Dr. man's night. 7					
7	28.80	44	28.80	45	45.5	32.5				43	41.5	37	35	SW.	3	SW.	1			06	4. 10. 3th. 10. 3th.									Stormy & wet. Shows Dr. man's night. 8					
8	29.18	42	29.52	46	38	28				32	31	29.5	28.5	SW.	15	"	0			03	3th. 10. 3th. 10. 3th.									fresh & clear. Shows Dr. man's night. 9					
9	29.46	40	29.30	44	47	25				33	32	47	45	SW.	2	SW.	2														Dr. man's night. 10				
10	29.37	47	29.46	49	52.3	40				49	45.4	41.5	36.5	"	3	SW.	2			06	4. 8. 1. 7. 2.									fresh & clear. Shows Dr. man's night. 11					
11	29.55	46	29.70	46.5	43	38				40	36	42	39	SW.	2	"	2														cold and clear. Shows Dr. man's night. 12				
12	29.67	46	29.70	47	45	36				39.6	37.8	42	40	SW.	0.5	SW.	0.5			08	5th. 10. 3th. 10. 3th.									fine & clear. Shows Dr. man's night. 13					
13	29.30	48	29.30	49	57	40				47	45	41	41	"	15	"	0														Dr. man's night. 14				
14	29.06	50	29.38	50.5	50	38				46	44	45	42.5	"	2	SW.	1														acc & clear. Shows Dr. man's night. 15				
15	29.10	47	29.10	46	45	32				36.5	33.5	38	34	SW.	2	SW.	2														sharp & clear. Shows Dr. man's night. 16				
16	29.30	46	29.10	47	46	33				43	39	44	40	SW.	3	SW.	3														clear & fine. Shows Dr. man's night. 17				
17	29.15	48	29.30	47	45.3	35				39.5	38.5	38	36	N.	15	N.	15														Dr. man's night. 18				
18	29.13	46.5	28.96	48	43.5	36.5				41.5	40	42.5	40.5	SW.	4	SW.	3			17	4. 5. 3th. 10. 3th.									clear & fine. Shows Dr. man's night. 19					
19	29.18	46	29.10	46	43.5	30				34	33	31	30	"	1	"	1														sharp & clear. Shows Dr. man's night. 20				
20	28.90	44.5	28.50	49	48.5	30				39	37	48	47	SW.	11	SW.	5			28	6th. 10. 3th. 10. 3th.									very fine. Shows Dr. man's night. 21					
21	28.92	48	28.50	47	48.5	36				39.8	37	41	39	"	2	"	2			08	0										acc & clear. Shows Dr. man's night. 22				
22	28.50	46	29.16	46	43	33				37	35	36	35	"	11	"	11			19	0										Dr. man's night. 23				
23	29.42	44	29.00	46	48	29				36.5	34	48	46	SW.	2	SW.	3			01	0										clear & fine. Shows Dr. man's night. 24				
24	29.20	49	29.08	54	55	46				48.5	45.5	52	50	"	3	"	1														fine & clear. Shows Dr. man's night. 25				
25	29.26	55	29.30	56	57.5	49				53	51.5	57	47	"	2	"	4															fresh & clear. Shows Dr. man's night. 26			
26	29.20	54.5	28.94	55	56	47				50.3	46	50	46	"	3	"	4															fresh & clear. Shows Dr. man's night. 27			
27	29.66	52.3	28.74	51.5	50.5	36				43.6	41.3	37	36.7	"	0	"	0			30	10. 4. 2th. 10. 3th.									acc & clear. Shows Dr. man's night. 28					
28	29.82	46	28.80	46	44	34				36.5	36	38	37	"	0	"	0															acc & clear. Shows Dr. man's night. 29			
29	28.57	46	28.54	46	46	33				38.5	36.8	35	32.5	SW.	2	SW.	1			03	2th. 10. 3th. 10. 3th.										showers & clear. Shows Dr. man's night. 30				
30																																			
31																																			
Sums.	842.282	15.5	84.333	20	134.5	109.5				1	137	9	22		68		54.5			226															
Means.	29.044	46.4	29.081	47.0	46.4	36.6				40.5	38.3	40.1	37.8		238		188																		
† Total Corrections for Instrumental Errors.										+2		+2																							
‡ Corrections for Diurnal Range.																																			
"Corrected Means."																																			
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++
for Temp. (Col. 2), = 28.998
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++
for Temp. (Col. 4), = 29.043
Mean at Station, corrected, and at 32°, = 29.020
Correction for height, feet, above Mean Sea-level, = 730
Mean, reduced to 32°, and Sea-level, = 29.750
Highest Reading, corrected for Index error, on the 11 th, = 29.710
Lowest Do., Do., on the 1 th, = 27.844
Difference, or Monthly Range, = 1.866

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
+ Embracing corrections for both capillarity and Index Errors.
+ The Barometer Range for Scotland is as yet unknown.
+ Practically, though not absolutely a minus correction.
+ These "Hygrometric Deductions" are calculated from Glaisher's Hygrometric Tables, Second Edition only.
+ While the Barometer Range is unknown, the Arithmetic Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
+ Any observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 25th, = 57.5
Lowest in Month, corrected for Index errors, on the 9 th, = 25.0
Difference, or Monthly Range, = 32.5
"Corrected Mean" of all the Highest, (Col. 5), = 46.4
"Corrected Mean" of all the Lowest, (Col. 6), = 34.6
Difference, or Mean Daily Range, = 11.8
** Calculated Mean Temperature of Month, = 40.5

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 40.5
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 38.0
+ Computed Temperature of Dew-Point, = 34.8
+ Do. Elastic Force of Vapour, = 2.02
+ Do. Weight of Vapour in a Cubic Foot of Air, =
+ Relative Humidity, (Saturation = 100), = 80

RAIN fell on Days; Amount in Inches, =

SUMMARY.											
Direction	N	NE	E	SE	S	SW	W	NW	Caln or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.						13	12		4	2.38	
P.M.						9	13	1	6	1.08	
Mean.	0	0	0	0	0	11	12	1	5	2.13	

4.53

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

Observations made and Return verified by

James P. Paterson
Ballater

(Signed)

Dr. Paterson

WITH REMARKS ON THE USE OF INSTRUMENTS.

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 modified by the application of a mixture of lamp black and printer's ink. They are placed in shallow blacked boxes, which serve to protect the bulbs from the wind. The *ex-Hanlin* should be freely exposed to the sun, and the *ex-Minimim* 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 the Thermometers, and the sun's heat to affect the Minimim Thermometer dissipation.

Perforation 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 *ex-Minimim* Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. Their 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 hygro and *well-tested form* of this apparatus seriously vitiate the 'Hygrometric Deductions,' Observers are especially 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 may be seen to the observer that the mink 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 the flow of feces thus formed before the bulb is observed. From the film of feces thus formed evaporation will proceed as usual, and the thermometer will be cooled as usual.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite to 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: 39°·0, 40°·0, 40°·1, or 40°·4; or, 39·0, 40·0, 40·1, or 40·4; according as it indicates a little under, an exact coincidence with, or a little over 40° or 40·0° respectively. So also 40°·3, and 40°·6 more or less must be registered 40·2 or 40·3, and 40·7 or 40·8 respectively.

reading Rutlerfont's *Tmax*, and a *Tmin*. Thermometers, placed at the 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 using the instrument.

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

on the *3rd* are those of a series of phenomena commencing at 9 P.M. on the *2nd*, and extending till 9 P.M. on the *3rd*. *Wind*.—A wind-rain ought to be elevated 12 feet at least above surrounding objects. When it oscillates incessantly, then mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

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

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

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavorable situations for observation and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain unexcep-

tionable 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 crust grass around its mouth. The rain-gauge ought to be day and night, and the readings entered in the returns on the day on which the rain fell.

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

BOOK-PO

Secretary of the
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Metecological Society of So
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EDINBURGH.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Alider, . . .	Shymore of Ma
Breb, . . .	Barberry, . . .
Deech, . . .	Boutree or Ma
Elm, . . .	groom, . . .
Larch, . . .	
Linng, . . .	
Oak, . . .	

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

SHRUBS, ETC.	FRUITS.	Plant in Blossom.	Bruit line generally.	MINOR QUANTITIES.	First Arrival.	Departure.
Barberry,	Apple,			Cuckoo,		
Bountee or Elder,	Black Currant,			Curtew,		
Broom,	Cherry,			House-Swallow,		
Hazel,	Gean,			Lapwing,		
Hawthorn,	Gooseberry,			Plover,		
Holly,	Deach,			Sand-Martin,		
Laburnum,	Pear,			Starling,		
Lilac,	Plum,			Swan,		
Mountain Ash or Rowan,	Strawberry,			Rail or Corn Crane,		
Muscadin,						
Rhododendron Louthum,						
Willow,						

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

MR. ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland.

EDINBURGH.

BOOK-POST.

MR 6

Н. 54.081 Н. 1.0 Н. Р. Н. 3 М. Р.

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MR 6

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Meteorological: So

EDINBURGH.

To

Ballato
Feb 1868

817

88
MAY 5
EXPLORER

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RECEIVED
MR
68

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Ballata, County of Arundell, in Lat. 57° 12' Long 2° 28' Distance from Sea 1.3 miles.
Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 103 feet. During the MONTH of March

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.		Readings of the H Cup Anemometer.		No. of hours in which it fell.		9 A.M.		P.M.		9 h. A.M.		Temperature of WELL at Depth of feet. No.		Temperature at 1 fathom and Drift.		0—10.			As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, &c.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		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.	Wet bulb.	Dry bulb.	Wet bulb.	Dirrec- tion.	Force	Dirrec- tion.	Force	No.	Amount in inches.	Velocity (0—10), and Direction.	Amount (0—10), and Species.	Velocity (0—10), and Direction.	Amount (0—10), and Species.	No.	Amount in inches.	No.	Amount in inches.	No.	Amount in inches.	No.	Amount in inches.	No.	Amount in inches.		Mention the hour at which Storms began and ended.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°		°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°

BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction $\uparrow\uparrow$		
for Temp. (Col. 2), =	<u>29.033</u>	<u>- 0.5</u>
		<u>28.982</u>
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction $\uparrow\uparrow$		
for Temp. (Col. 4), =	<u>29.050</u>	<u>- 0.5</u>
		<u>28.998</u>
Mean at Station, corrected, and at 32°,		<u>28.990</u>
Correction for height, feet, above Mean Sea-level,		<u>730</u>
Mean, reduced to 32°, and Sea-level,		<u>29.720</u>
Highest Reading, corrected for Index error, on the 28 th ,		<u>29.888</u>
Lowest Do., Do., on the 8 th ,		<u>27.964</u>
Difference, or Monthly Range ,		<u>1.924</u>

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 30th ,.....	=	61.5
Lowest in Month, corrected for Index errors, on the 25th ,	=	21.0
Difference, or Monthly Range ,	=	40.5
" Corrected Mean " of all the Highest , (Col. 5),	=	48.3
" Corrected Mean " of all the Lowest , (Col. 6),	=	34.5
Difference, or Mean Daily Range ,.....	=	13.8
** Calculated Mean Temperature of Month,	=	41.4

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

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

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

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

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb , (Cols. 9 and 11),.....	=	44.5
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),.....	=	39.2
†† Computed Temperature of Dew-Point ,.....	=	36.3
†† Do. Elastic Force of Vapour ,	=	2.73
†† Do. Weight of Vapour in a Cubic Foot of Air ,	=	
†† Relative Humidity , (Saturation = 100),	=	83
RAIN fell on 18 Days ; Amount in Inches,	=	2.25

WIND.	SUMMARY.											
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.	
A.M.	-	-	-	-	2	5	16	3	5	1.66		
P.M.	1	-	-	-	2	8	9	5	8	1.63		
Mean.	1	0	0	0	2	7	12	3	6	1.65		

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

Emending corrections for both capabilities and Index Entries.

The Diurnal Range for Scotland is as yet unknown.

Practically, though not *absolutely* a mean correction.

These "Hymenometrical Deviations" are calculated from Glaisher's *Hymenometrical Tables*, Second Edition *only*.

While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."

As the "Calculated Mean Temperature" is not entered in the heading, the Directors on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. *See over.*

Observations made and
Return verified by

(Signed)

WITH REMARKS ON THE USE OF INSTRUMENTS.

The above remarks apply equally to the Thermometers for

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.										In Flower.	In Leaf buds fresh appear.	In Leaf.	Dropped or Leaves.	CROPS mentioning variety.	Sowing or Planting.	Growing or above ground.	In Ear or Flower.	Fruit Cut or blazed.
Albany.	Ash.	Beech.	Birch.	Blm.	Larch.	Potatoes.	Turnips.	Rye Grass.										

SHRUBS, &c.	First in Blossom.	FLOWERS.	First in Blossom.	First in Fruit generally.	MILK-PRODUCING HERDS.	First Arrival.	Departure.
Banberry,	Apple, . . . . .	.	.	Cheekoo,	8. 27. 6	.
Bountice or Elder,	Black Currant, . . . . .	.	.	Curlew,	8. 3. 1	.
Broom,	Cherry, . . . . .	.	.	Horse-Bayonet,	8. 3. 1	.
Harzel,	Gean, . . . . .	.	.	Lapwing,	8. 3. 1	.
Lawthorn,	Gooseberry, . . . . .	.	.	Plover,	8. 3. 1	.
Lofty,	Teach, . . . . .	.	.	Sand-Martin,	8. 3. 1	.
Laurumn,	Pear, . . . . .	.	.	Starling,	8. 3. 1	.
Lilac,	Plum, . . . . .	.	.	Swan,	8. 3. 1	.
Mountain Ash or Rowan,	Strawberry, . . . . .	.	.	Rail or Corn Crake,	8. 3. 1	.
Red Flowering Currant,
Mockorange Pondeum,
Wing,

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Ballater, County of Highland, in Lat. 57° 42' N, Long. 2° 21' W, Distance from Sea 13 miles.
Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 103 feet. During the MONTH of April 18 68.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.				
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H. Cup Anemometer No. 9 h. A.M.		9 A.M.		P.M.		9 h. A.M.										
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No. of hours in which it fell.	Amount in inches.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.								
	1	29.678	59	29.734	56.3	57	38			53	52.5	46	44	AM. 2	0					3.0	SE. 10.	15.	SE. 10.							light, wind chilly. P.M. milder	1			
	2	29.710	59	29.782	57.5	59	35			48.2	45.3	47	43.5	0	11.	1				0	11.	10.								very fine. P.M. cloudy, chilly	2			
	3	29.496	57	29.346	56.5	55	42			49.5	45	48	45	0	2	5				2.	SE. 10.	35.	10.								dull, hazy. C.P. fine. P.M. off.	3		
	4	29.236	56	29.236	59.5	60	45			57	47	48.5	46	2	2	2				2.	10.	2.	10.								fine. P.M. off.	4		
	5	29.178	56	28.976	57	54	45			49	46.5	51.5	49.5	2.	1	5				35.	10.	38.	10.								fine. P.M. off.	5		
	6	29.050	56	29.154	52	53.5	40			45.3	43.5	41	39	0	3	0				19	3.	2.	10.								fine. P.M. off.	6		
	7	29.106	45	29.134	42	41	31.5			39	38	42.3	32.3	0	3	0				64	3.	2.	10.								fine. P.M. off.	7		
	8	29.160	43	29.224	40	37	31			35.5	34.5	32.5	32	3	2	2				65	3.	2.	10.								fine. P.M. off.	8		
	9	29.246	41	29.366	42	39.5	31.5			36	35	37	35.5	0	2	2				62	3.	2.	10.								fine. P.M. off.	9		
	10	29.400	48	29.396	46	49	32			44	40.5	33.5	33.5	0	15	0				2.	1.	1.	8.								fine. P.M. off.	10		
	11	29.400	49	29.376	48	49	25			40	38	39	37	0	0	0				10.	10.	10.	8.								fine. P.M. off.	11		
	12	29.324	49	29.342	49	45	29			41.3	38.3	42	41	0	1	0				22	3.	2.	10.								fine. P.M. off.	12		
	13	29.414	57	29.500	52	50	36			46.8	44	40.5	39	0	15	15				10.	10.	10.	10.								fine. P.M. off.	13		
	14	29.540	55	29.412	53	53.3	44			48	44	47	43.8	0	15	2				0	10.	10.	10.								fine. P.M. off.	14		
	15	29.546	57	29.492	58	59.7	45.5			55.2	50.8	53.6	50.3	0	15	15				3.	10.	10.	10.								fine. P.M. off.	15		
	16	29.474	62	29.426	61	63.5	51			62.5	55.5	59	50.5	0	3	0				28	2.	10.	10.								fine. P.M. off.	16		
	17	29.330	55	29.308	53	55	42			45.5	43.5	43	41	0	3	0				07	3.	2.	10.								fine. P.M. off.	17		
	18	29.268	55.5	29.168	52.5	48.5	32			44	41	41	39.8	0	5	2				07	3.	2.	10.								fine. P.M. off.	18		
	19	28.894	49	28.826	47	43	38.5			42	40.8	43	42	0	3	4				150	45.	10.	4.	10.								fine. P.M. off.	19	
	20	28.366	49	28.436	49	46	41.5			44.3	44	43	43	0	3	15				33	4.	10.	10.								fine. P.M. off.	20		
	21	28.158	57	28.488	52.5	53.5	39			45	44	45	43	0	15	2				02	2.	10.	10.								fine. P.M. off.	21		
	22	28.768	53	28.738	53	55	43			52	47	48.5	42.5	0	3	0				40	1.	10.	10.								fine. P.M. off.	22		
	23	28.722	52.5	28.925	53	57	39			45.8	44	41.3	40	0	0	0				4.	10.	2.	10.								fine. P.M. off.	23		
	24	28.980	59	29.161	52	54.5	39.5			57.3	46.2	41.3	41	0	15	0				74	1.	10.	10.								fine. P.M. off.	24		
	25	29.288	57	29.400	57	59.5	34.5			43	40	42.3	41	0	1	0				2.	10.	10.	10.								fine. P.M. off.	25		
	26	29.388	55	29.348	55.5	57.5	34			50	45	46	44	0	15	2				2.	10.	10.	10.								fine. P.M. off.	26		
	27	29.210	58	29.190	55	57	36			57	45	45	43	0	15	2				08	10.	10.	10.								fine. P.M. off.	27		
	28	29.182	57	28.878	54	54.2	34.3			48.5	43	45.8	45	0	1	3				11	4.	10.	10.								fine. P.M. off.	28		
	29	28.838	56	28.800	52	49.2	36			45.4	43	43	41.5	0	4	3				26	5.	10.	10.								fine. P.M. off.	29		
	30	29.612	55	29.250	54	55	37			50	45	45	42.5	0	3	0				03	3.	10.	10.								fine. P.M. off.	30		
	31																																fine. P.M. off.	31
Sums.		8752.3810		8752.406		1672.11285				14023.3666	13038.12509			48	375					2419														
Means.		29.181	53.6	29.195	52.1	52.2	37.6			46.7	43.9	43.5	41.7		1.60	1.25																		
Corrections for Diurnal Range.										+2	+2																							
"Corrected Means."																																		
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
cl.	" cirrus.	ms.	" meteoric shower.
ci.	" cirro-cumulus.	n.	" nebula.
ci.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu.	" cumulo-stratus.	e. h. r.	" continued heavy rain.
d.	" dew.	s.	" sleet.
f.	" fog.	sc.	" snow.
fr.	" frost.	sl.	" sleet.
h. fr.	" hard-frost.	sh.	" snow.
h.	" haze.	so. h.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
h.	" hail.	sq.	" squall.
l.	" lightning.	t.	" thunder.
ll. cl.	" light clouds.	t. s.	" thunder storm.
l. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	z.	" gale of wind.
lu. h.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-11.	Common Designation.	Estimated Force, 0-11.	Common Designation.	Estimated Force, 0-11.	Common Designation.
0	Calm	1-5	Light breeze	4	Blowing hard
0.5	Very light air	6	Refresh breeze	5	Blowing hard
1	Light air	7	Very fresh	6	Blowing hard

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm for Temp. (Col. 2), = 29.116
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4), = 29.114
Mean at Station, corrected, and at 32°, = 29.115
Correction for height, feet, above Mean Sea-level, = 722
Mean, reduced to 32°, and Sea-level, = 29.837
Highest Reading, corrected for Index error, on the (th), = 29.734
Lowest Do., Do., on the 21th, = 28.188
Difference, or Monthly Range, = 1.546

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 16th, = 65.5
Lowest in Month, corrected for Index errors, on the (th), = 25.0
Difference, or Monthly Range, = 40.5
"Corrected Mean" of all the Highest, (Col. 5), = 52.2
"Corrected Mean" of all the Lowest, (Col. 6), = 37.6
Difference, or Mean Daily Range, = 14.6
** Calculated Mean Temperature of Month, = 44.9

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the (th), = 65.5
"Corrected Mean" (Col. 7), of Black Bulb, Max. in Sun, = 52.2
Lowest at Night, Black Bulb, (corrected for Index errors), on the (th), = 37.6
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 37.6
Difference of above Means or Range ("exposed"), = 14.6

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 45.4
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 42.7
Computed Temperature of Dew-Point, = 39.6
Do. Elastic Force of Vapour, = 244
Do. Weight of Vapour in a Cubic Foot of Air, = 81
Relative Humidity, (Saturation = 100), = 81
RAIN fell on 18 Days; Amount in Inches, = 4.19

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	5	1	1	3	8	5	16	0	5	
P.M.	4	2	1	6	4	1	12	5	12	12	
Mean.	1	4	1	1	5	6	3	14	2	8	

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 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

James W. Paterson
Ballater

(Signed)

James W. Paterson

WITH REMARKS ON THE USE OF INSTRUMENTS.

Self-Registering Thermometers.—Professor Phillips 5, and Negretti and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass 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 reunited by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper tube, and must be discoloured 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.

tionable position for the rain-gauge: but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—when a Snow shower occurs it must be noted in the "Remarks," and the letter S affixed to the depth of water received in place. 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 indeed in every column, the observer cannot be too careful to register *observations* only; and nothing that partakes of the nature of deduction or inference.

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.

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Approved under the Freedom of Information Act 2000. The information is being released under the provisions of the Act.

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Approved under the Freedom of Information Act 2000. The information is being released under the provisions of the Act.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Kallater, County of Merdeen, in Lat. 57° 12', Long. 2° 12', Distance from Sea 43 miles.

Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 103 feet.

During the MONTH of May 1868.

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.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Motions, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.		Days of Month.			
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.			0 A.M.		P.M.			9 h. A.M.								Temperature of Wells at Depth of feet.	Temperature at 10 fathoms and Density.	0-10.
		Barometer.	Atmos- phere.	Barometer.	Atmos- phere.	Max.	Min.	Max. in Sun's rays.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.		Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.		No. 3 inches.	No. 13 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.								
		29150	58	29298	58	59	41			58.2	49	56	40	Sw. 2	on	3			0		0										Sharp breeze west.	1		
		29444	58	29316	58.5	57	41			57	44.5	47.5	45	W. 2	S.	0.5			30 sec		35	10 sec.									oncast shower at 3 P.M.	2		
		28950	61	29200	57.5	58	41			58	45.0	47.5	39	W. 6	SW.	3			0		40 sec										fine, with gale, heavy, in aft. On water	3		
		29386	58.5	29514	49.5	48.5	37.5			45.4	40.4	40	36.5	W. 2	W.	1			20 sec		20 sec										Clear & sharp but cold this.	4		
		29646	48.5	29672	46	45	32.5			38.3	34.5	36.5	33.5	W. 1.5	W.	0.5			20 sec		10 sec										Cold and windy, with occasional	5		
		29388	58.5	29420	52	50.5	27.5			44.5	39.5	42	40	0	W.	0.5			10 sec		10 sec										oncast, dull & chilly	6		
		29286	58.5	29208	56.5	61.3	40.3			52.7	48.5	49.5	47	0	0				10 sec		10 sec										hot sun in early p.m., but quiet	7		
		29100	57	29104	58	57.5	46			58.3	48	50	48.6	SW. 0.5	SW.	0.5			10 sec		10 sec										Sharp fresh in aft.	8		
		29174	63	29216	58.5	64	42			60.5	52.8	50.5	49	S. 0.5	W.	1			10 sec		10 sec										very fine, light sun.	9		
		29194	58.5	29246	58.5	62.7	47			51.5	49.2	50	48	W. 2	W.	1			10 sec		10 sec										castly breeze fine this	10		
		29166	54	29066	58	60	43			46.7	46	46	45	W. 2	0				10 sec		10 sec										fine on hill & chilly and	11		
		29150	61.8	29200	58.5	58	41			56.5	52.5	50	48	SW. 1.5	SW.	2			10 sec		10 sec										the breeze, heavy, this in aft.	12		
		29266	64	29234	59	60	38			57	50.5	52.5	49.5	SW. 2	W.	3			10 sec		10 sec										occ. light	13		
		29426	61.5	29584	59	61	44			65	48	48.5	42	W. 3	W.	2			10 sec		10 sec										very dry & strong breeze	14		
		29516	56	29422	58	58	38.5			60.5	46.4	48	46	W. 2	W.	0.5			10 sec		10 sec										heavy, this till noon	15		
		29380	61	29386	59	60.8	38.5			55	48	49.5	44.5	W. 1	W.	0.5			20 sec		20 sec										very fine this	16		
		29572	62	29522	60	63	34			55	47	49.5	44.7	W. 0.5	W.	1			20 sec		10 sec										light & so	17		
		29458	58	29456	60	58	45			52.3	49.5	50	46	W. 1	0				10 sec		10 sec										lightning flashes	18		
		29320	63	29346	64	65	46			61	57	55	53	0	W.	0.5			10 sec		10 sec										light hill, heavy, & from 2 P.M.	19		
		29196	66.5	29180	62	71	49			62	59	57	46.5	W. 1.5	SW.	2			10 sec		10 sec										mid of best cuts with S.W. breeze	20		
		29110	64	29100	60	58	48			58	49.5	52.5	50	SW. 3	W.	2			10 sec		10 sec										oncast & fresh at noon On land fine	21		
		29174	58	28750	58	58	44			46	45	50.2	47.5	W. 2	S.W.	0.5			10 sec		10 sec										oncast this. On off P.M.	22		
		28660	59	28818	57	60.3	42.5			58	53	44.5	40	W. 1.5	W.	3			10 sec		10 sec										open hills, & chilly	23		
		28724	62.5	28723	58.5	58	43			55	50	48	45	SW. 4	SW.	2			10 sec		10 sec										mid shower, occ. sun, heavy, &	24		
		28726	62	28666	59	58.8	48			56	57	49.5	46.5	SW. 3	W.	2			10 sec		10 sec										thunder heavy at 12 & 2 P.M.	25		
		29030	59	29038	59	59	48			50.2	48	50.5	47.7	W. 3	SW.	3			10 sec		10 sec										after with fresh in train	26		
		29132	61	29134	59.5	61	46			53.5	49.5	50.3	46	W. 3	W.	1			10 sec		10 sec										storm, with this	27		
		29450	63	29436	62	64	46.5			59	57	57	52	W. 2	SW.	1.5			10 sec		10 sec										light strong mid	28		
		29308	68	29340	65	70	47			61.8	53.8	55.5	57.5	W. 2	W.	2			10 sec		10 sec										so in aft.	29		
		29142	65.5	29324	63	60	46			58	50	50	46	W. 3	W.	0.5			10 sec		10 sec										sunny heavy this at 7 P.M.	30		
		29400	67.5	29378	65	66	42			57	50.5	52	49.5	W. 0.5	SW.	0.5			10 sec		10 sec										light bluish P.M. better fine	31		
																																After very wind colder & off P.M. quiet times		
Sums.		906174	33	906502	33.5	184	2120.88			16688	1503.2	15716	14133																			NOTATION USED IN GENERAL REMARKS.		
Means.		29.231	60.1	29.242	58.4	59.5	42.2			53.8	48.6	48.8	45.6																			a. denotes aurora.		
																																	m. denotes mist.	
																																	ci. cirrus.	
																																	ci. cu. cirro cumulus.	
																																	ci. s. cirro stratus.	
																																	cu. cumulus.	
																																	cu. s. cumulo-stratus.	
																																	d. dew.	
																																	f. fog.	
																																	fr. frost.	
																																	h. fr. hoar-frost.	
																																	h. haze.	
																																	h. d. heavy dew.	
																																	h. l. hail.	
																																	l. lightning.	
																																	li. cl. light clouds.	
																																	li. sh. light showers.	
																																	lu. co. lunar corona.	
																																	lu. ha. lunar halo.	
																																	m. mist.	
																																	n. nimbus.	
																																	r. rain.	

BAROMETER, "corrected mean" at 9 A.M., <i>minus</i> the Correction ++}	=	29.149
for Temp. (Col. 2), = 29.31..... - 0.82.....}		
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction ++}	=	29.164
for Temp. (Col. 4), = 29.24..... - 0.8.....}		
Mean at Station, corrected, and at 32°,	=	29.157
Correction for height, feet, above Mean Sea-level,	=	714
Mean, reduced to 32°, and Sea-level,	=	29.871
Highest Reading, corrected for Index error, on the 5 th ,	=	29.672
Lowest Do., Do., on the 23 rd ,	=	28.610
Difference, or Monthly Range ,	=	1.062

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the <u>20</u> th,	=	<u>71.0</u>
Lowest in Month, corrected for Index errors, on the <u>6</u> th,	=	<u>27.5</u>
Difference, or Monthly Range,	=	<u>43.5</u>
" Corrected Mean " of all the Highest, (Col. 5),	=	<u>59.5</u>
" Corrected Mean " of all the Lowest, (Col. 6),	=	<u>42.2</u>
Difference, or Mean Daily Range,	=	<u>17.3</u>
** Calculated Mean Temperature of Month,	=	<u>50.8</u>

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb , (Cols. 9 and 11),.....	=	57.3
Mean (corrected) A.M. and P.M. Reading of Wet Bulb , (Cols. 10 and 12),.....	=	47.6
## Computed Temperature of Dew-Point ,.....	=	42.7
## Do. Elastic Force of Vapour ,	=	27
## Do. Weight of Vapour in a Cubic Foot of Air ,	=	
## Relative Humidity , (Saturation = 100),	=	72
RAIN fell on /6 Days; Amount in Inches,	=	1.3

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	2	2	1	2	6	3	1	3	1.84	
P.M.	1	3		1	1	13	8	1	3	1.53	
Mean.	1	2	1	1	2	14	6	1	3	1.68	

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.

Embodying corrections for both capability and Index Errors.

The Diurnal Range for Scotland is as yet unknown.

Practically, do not absolutely a minute correction.

These "Hygro-metrical Deductions" are calculated from Glaisher's Hygro-metrical Tables, Second Edition *only*.

While the "Least Range" is under the assumed Mean of Cook's, 35 and 5 will be entered as the "Coldest" and "Mean Temperature."

Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. *See over.*

Observations made and
Return verified by

(Signed)

WITH REMARKS ON THE USE OF INSTRUMENTS.

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*.

When a Barometer having adjustable surfaces has to be removed, from its fastenings, the ivory peg must be secured so as to form a *light plug* to the cistern. Then *serve up* the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury seeks 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.

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

The above remarks apply equally to the Thermometers for

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes unless 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 removed from their position on the scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "*Minimum*" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing-point of each Thermometer (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

the scales and frame to which these are attached;—in a frame many feet high, the scales are suspended by a chain, and are to 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 placed at the end of the tube, and the tube must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

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 should be taken at the same distance from the thermometer, and ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read $-39^{\circ}.9$, $40^{\circ}.0$, or $40^{\circ}.1$; a little under, $40^{\circ}.4$, $40^{\circ}.5$, or $40^{\circ}.6$, according to it indicates a little under, an exact coincidence with, or a little over 40° ; or $40^{\circ}.1$, respectively. So also $40^{\circ}.2$, and $40^{\circ}.3$; and $40^{\circ}.7$ and $40^{\circ}.8$ respectively. In reading Rutherford's *a Max.*,² and *a 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 or the observer.

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-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from the defective nature of the apparatus used, and partly from the unfavourable situation for observation. 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.

Clouds.—Convenient abbreviations for Luke Howard's

WITH REMARKS ON THE USE OF INSTRUMENTS.

column, an entry of _____, (e.g.) will indicate that the higher
2, cu-st.

Underground Thermometers.—As the germination and height of cropseed plants greatly depend on the temperature of the soil, its amount and constancy,—the Comal recommends that observations in this interesting department be made at least to 3, 2, 1, and 0 ft. deep, above ground, protected from the thermometer placed in the stems, above ground, protected from the rays of the sun, and fired 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 Wells.—The temperature of the water at the bottoms of wells ought, when practicable, to be taken, and the depth of the well and of the water noted.

Electricity.—Too much importance cannot be attached to the scale 0—6 = 12, which it is *usually* presumed on the scale 0—10 = 20, and it is *usually* presumed.

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 the headed "Remarks." It is intended that observations by the Electrometer may 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 seasons, possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reaped from year to year in a selected piece of ground or farm."

(By Order) A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit Ripen.	ALGAE, ETC.
Barberry,	Apple,		Cuckoo,	
Bourtree or Elder,	Black Currant,		Caribwey,	
Brown,	Cherry,		House-Swallow,	
Hazel,	Gean,		Lapwing,	
Hawthorn,	Gooseberry,		Plover,	
Mock,	Teach,		Sand-Martin,	
Laburnum,	Pear,		Starling,	
Lilac,	Plum,		Sparrow,	
Mountain Ash or Rowan,	Strawberry,		Rail or Corn Creeper,	
Nectarine,				
Red Flowering Currant,				
Rhododendron Ponticum,				
Willow,				

Turnips, Truits, etc., whether plentiful, or in perfection; whether any have suffered from blight, diseases, etc. Whether Epizootic disease prevails among cattle; and the Agricultural condition of the district generally.

To

Secretary of the Meteorological Society of Scotland.

EDINBURGH.

BOOK-POST

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BALLATER
JUL 7
68

A circular library stamp from Edinburgh. The text "EDINBURGH" is curved along the bottom inner edge. The date "1871" is stamped in the center. The number "68" is at the top, and "7" is at the bottom.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Ballater, County of Aberdeen, in Lat. 57° 12' N., Long. 2° 12' W., Distance from Sea 4 3/4 miles.
Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 102 feet.

During the MONTH of May June 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. —				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H. Cup Anemometer No. —		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.					Temperature of WELL at Depth of feet. No.	Temperature at 1 foot, and Drift.	9 A.M. 10 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 Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity (0-10), and Direction.	Amount, (0-10), and Species.			Velocity (0-10), and Direction.	Amount, (0-10), and Species.	No. 9 inches.	No. 13 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm = 29.274
for Temp. (Col. 2), = 29.379 - 1.105 = 28.274
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm = 29.298
for Temp. (Col. 4), = 29.394 - 0.096 = 29.298
Mean at Station, corrected, and at 32°, = 29.286
Correction for height, feet, above Mean Sea-level, = 696
Mean, reduced to 32°, and Sea-level, = 29.982
Highest Reading, corrected for Index error, on the 29th, = 29.750
Lowest Do., Do., on the 22nd, = 29.000
Difference, or Monthly Range, = 0.750

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 19th, = 81.5
Lowest in Month, corrected for Index errors, on the 3th, = 34.0
Difference, or Monthly Range, = 47.5
"Corrected Mean" of all the Highest, (Col. 5), = 66.0
"Corrected Mean" of all the Lowest, (Col. 6), = 45.1
Difference, or Mean Daily Range, = 20.9
** Calculated Mean Temperature of Month, = 55.6

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 19th, = 81.5
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 66.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 3th, = 34.0
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 45.1
Difference of above Means or Range ("exposed"), = 20.9

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 56.5
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 50.2
†† Computed Temperature of Dew-Point, = 44.4
†† Do. Elastic Force of Vapour, = 29.3
†† Do. Weight of Vapour in a Cubic Foot of Air, = 6.4
†† Relative Humidity, (Saturation = 100), = 64
RAIN fell on 7 Days; Amount in Inches, = 0.61

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	1	2	1	1	1	10	3		202				
P.M.	1	2	1				13	5	2	6	143			
Mean.	1	2	1	1	1	1	12	3	3	174				

* 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.
† The Diurnal Range for Scotland is as yet unknown.
†† These "Hygrometric Deductions" are calculated from Glashier's Hygrometric Tables, Second Edition only.
‡ While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
§ Any 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
Returned verified by

James P. Patterson
Ballater

(Signed)

James P. Patterson

174
122

175

WITH REMARKS ON THE USE OF INSTRUMENTS.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock. (Greenwich or Railway Time) 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*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the very first must be screwed so as to form a tight plug to the cistern. Then *reverse* 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 seeks the top of the tube, a *sharp top* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails the instrument must be repaired.

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

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

Self-Registering Thermometers.—Professor Phillips's, and Mr. Negretti and Zambra's Patent "*Maximum*" Thermometers are the most 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 will be re-united by striking the instrument repeatedly against the palm of the hand; when the part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating the instrument part over a lamp; the alcohol will evaporate and again condense in contact with the liquid. These instruments should be hung horizontally.

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

the sea is not only in itself, but in its relations to that of our

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 time to the end of the day. It is intended that observations, so designated "Remarks," be entered in this manner on the side-barometer sheet. 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 Comd will direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reaped from year to year.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

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

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Pallater, County of Aberdeen, in Lat. 57° 12' N Long. 2° 20' W, Distance from Sea 4.3 miles.
Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 102 feet. During the MONTH of July 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.						
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.														
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	No.	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.				
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°			
	1	29.600	69	29.700	60	77	58			71	61	61	57	ct.		ct.																	Cloudy & very sultry	1		
	2	29.650	69	29.650	73	80.5	48.5			70	60	60	50	ct.		ct.																	Sultry	2		
	3	29.550	69	29.500	68	66	45			59	53	54	50	ct.		ct.																	Cloudy & cold approx. of rain	3		
	4	29.450	64	29.500	65	65	47			57.5	46	52.5	47	ct.		ct.																	Dr. heavy & cold	4		
	5	29.350	63.5	29.350	67	61	47.5			60	58	58	57	ct.		ct.																			5	
	6	29.400	64	29.375	67.5	57	48			57	49	61	52	ct.		ct.																		clear & fair. Breeze	6	
	7	29.350	66	29.275	69	69	48			64	56	63	57	ct.		ct.																		Dr. Cloudy	7	
	8	29.300	70	29.350	72	78	48			70	63	60	58	ct.		ct.																		dull & cloudy	8	
	9	29.550	68	29.700	67	68	53			57.5	53	55	50.5	ct.		ct.																		Dr.	9	
	10	29.570	68	29.650	68	68	50			64	55	50	47	ct.		ct.																		Clear & calm	10	
	11	29.650	66	29.650	69	68	53			67.5	61	67	58	ct.		ct.																		Dr.	11	
	12	29.600	68	29.700	70	76	46			68	59	57	57	ct.		ct.																		Dr.	12	
	13	29.650	65	29.600	69	73	39			65	57	63	50	ct.		ct.																		high & sunny. Breeze	13	
	14	29.500	64	29.400	73	83	50			70.5	60	67	58	ct.		ct.																		Dr.	14	
	15	29.300	70	29.176	75	83	42.5			77	63	77	63	ct.		ct.																		Dr. Cloudy	15	
	16	29.216	73	29.400	68	71	53			63.3	62.5	54	54	ct.		ct.																		Heavy p.m. Breeze. Showy. Windy. In the night	16	
	17	29.370	66	29.370	70	72	46			57.5	54	59	53	ct.		ct.																		wind & quiet. occ. show. bright but hot	17	
	18	29.276	67	29.138	68	65	50			62	55	59	56	ct.		ct.																			so cloudy, but occ. Breeze	18
	19	29.232	67	29.218	68	67	48			66	56	60	56	ct.		ct.																			Cloudy, & frosty	19
	20	29.060	67	29.260	70	74	57			63	56	62	57	ct.		ct.																			dark. rough wind. Breeze till noon. Breeze	20
	21	29.288	70	29.332	72	80	58.5			70	62	67	61.5	ct.		ct.																			weat. wind. very sultry. but Breeze	21
	22	29.280	73	29.472	68	79	57			71	64	52	52.5	ct.		ct.																			very warm. Breeze. Cloudy & drizzling	22
	23	29.692	66	29.844	66	63	49			54	47	52	47	ct.		ct.																			Cold wind, hot sun occ.	23
	24	29.904	66	29.822	67	69.5	38.5			61	58.5	55	51	ct.		ct.																			light & warm	24
	25	29.780	67	29.762	69	78	43			69	59	58	53	ct.		ct.																			Dr. Breeze	25
	26	29.576	69	29.380	70	77	41			63.5	56.5	54	57	ct.		ct.																			full. so cool breeze. but Breeze	26
	27	29.296	69.5	29.200	72	80	44			71.3	61	61	59	ct.		ct.																			Dr. warm	27
	28	29.080	72	28.910	71	78	50			78	69.5	67	60	ct.		ct.																			Dr. Breeze	28
	29	28.954	72	29.106	72	80	58			69	59	63	58	ct.		ct.																			Dr.	29
	30	29.278	70	29.118	71	70	55.5			57	54.5	60	53	ct.		ct.																			Cloudy & sultry air	30
	31	29.336	69	29.588	67	65	41			50.5	50	47	44	ct.		ct.																			black & cold wind. cloudy	31
Sums.		912236	252	912796	25	2241	1482.5			12	1381	219	27	105																						
Means.		29.427	68.8	29.445	69.1	72.3	47.8			64.4	57.1	58.8	53.4																							
† 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 $\frac{1}{100}$ for Temp. (Col. 2), = 29.323
"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{1}{100}$ for Temp. (Col. 4), = 29.338
Mean at Station, corrected, and at 32°, = 29.331
Correction for height, feet, above Mean Sea-level, = 698
Mean, reduced to 32°, and Sea-level, = 30.029
Highest Reading, corrected for Index error, on the 24th, = 29.904
Lowest Do., Do., on the 28th, = 28.954
Difference, or Monthly Range, = 0.994

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 14th, = 83.0
Lowest in Month, corrected for Index errors, on the 24th, = 38.5
Difference, or Monthly Range, = 44.5
"Corrected Mean" of all the Highest, (Col. 5), = 72.3
"Corrected Mean" of all the Lowest, (Col. 6), = 47.8
Difference, or Mean Daily Range, = 24.5
** Calculated Mean Temperature of Month, = 60.0
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 14th, = 83.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 72.3
Lowest at Night, Black Bulb, (corrected for Index errors), on the 24th, = 38.5
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 47.8
Difference of above Means or Range ("exposed"), = 24.5

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 61.6
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 55.3
† Computed Temperature of Dew-Point, = 49.7
† Do. Elastic Force of Vapour, = 3.59
† Do. Weight of Vapour in a Cubic Foot of Air, = 66
† Relative Humidity, (Saturation = 100), = 66
RAIN fell on 4 Days; Amount in Inches, = 0.60

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

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

Observations made and
Return verified by

James M. Paterson
Ballater

(Signed)

J. M. Paterson

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Pallater, County of Aberdeen, in Lat. 57° 12' N. Long. 2° 22' W. Distance from Sea 43 miles.Height of Cistern of the Barometer above Mean Sea-level 666 feet, above Ground 4 feet.During the MONTH of August 18 65.

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.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.					
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.			9 A.M.		P.M.			9 h. A.M.											
		Barometer.	Atta- ched Ther- mometer	Barometer.	Atta- ched Ther- mometer	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force		Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.		No. 3 inches.	No. 12 inches.	No. 22 inches.									
		* No.		No.		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	No.	No.		No.	No.	No.					No.	No.	No.		
	1	29.534	67	29.550	70	79	45			65	60	62	58	W.	1	W.	0.3			2 m.	8 m.	1 m.	6 m.							acc. light breeze, the sun	1				
	2	29.539	71	29.564	73	84	54			78	66	68	64	S.W.	0.5		0.5			1 m.	2 m.	1 m.	2 m.							extremely hot & dry, but	2				
	3	29.544	71	29.500	71	77	50			75	63	63	58	Var.	1	S.	0.2			2 m.	4 m.	3 m.	3 m.							light warm P.M. cloudy & wind	3				
	4	29.408	72	29.320	74	80	58			69	60	63	57			S.W.	0.3			2 m.	2 m.	2 m.	2 m.									4			
	5	29.236	73	29.150	76	80	52			76	62	62	57							1 m.	1 m.	4 m.	4 m.									5			
	6	29.040	73	28.934	73	71	60			63	62	62	58							1 m.	1 m.	4 m.	4 m.									6			
	7	28.828	71	28.808	69	65	51			63	56	54	48	S.W.	1.5	S.W.	3			4 m.	5 m.	2 m.	3 m.									heavy P.M. somewhat of fresh breeze & cloudy	7		
	8	28.900	69	29.238	65	64	52			61	56	52	50			W.	3			4 m.	5 m.	2 m.	3 m.									8			
	9	29.364	65	29.328	66	68	49			56	57	55	53	S.W.	2					3 m.	3 m.	0										overcast & rough	9		
	10	29.306	65	29.328	68	68	45			59	53	53	50							3 m.	3 m.	0										acc. obs.	10		
	11	29.200	66	28.806	65	55	41			52	52	53	55							1 m.	1 m.	6 m.	10 m.									windy, fast P.M. & am. calm	11		
	12	28.774	65	29.060	62	60	51			53	50	51	51							1 m.	1 m.	2 m.	10 m.									fine, the P.M. off.	12		
	13	29.186	67	29.150	62	55	48			50	49	55	54							2 m.	2 m.	2 m.	10 m.									drizzle, the P.M.	13		
	14	29.008	64	29.276	65	68	50			62	58	51	49	S.W.	1					3 m.	3 m.	0										fine, the P.M.	14		
	15	29.340	62	29.410	65	68	44			55	54	60	58							1 m.	1 m.	2 m.	5 m.									fine, the P.M.	15		
	16	29.422	65	29.380	67	72	48			64	59	58	56							1 m.	1 m.	0											light fine	16	
	17	29.332	66	29.288	67	72	44			68	61	56	55	S.W.	0.5					1 m.	1 m.	1 m.	5 m.									very fine, the P.M.	17		
	18	29.368	66	29.320	64	59	50			57	55	51	49							1 m.	1 m.	2 m.	10 m.										heavy P.M. during day	18	
	19	29.400	61	29.450	61	56	50			52	50	51	50							2 m.	10 m.	1 m.	10 m.									fine, the P.M.	19		
	20	29.360	60	29.292	62	62	42			55	52	54	53	S.W.	1	S.W.	1			2 m.	3 m.	1 m.	3 m.										fine, the P.M.	20	
	21	29.190	61	29.140	62	64	42			61	54	51	50							0.3	2 m.	3 m.	0											light P.M. breeze	21
	22	28.566	61	28.676	62	55	47			55	53	51	49							0.8	3 m.	10 m.	3 m.										very wet from rain	22	
	23	28.626	61	28.648	61	55	50			53	52	52	48	S.W.	2	S.W.	3			6 m.	10 m.	4 m.	3 m.										heavy P.M. during day	23	
	24	28.728	59	28.880	59	60	48			56	49	49	46							0.2	5 m.	10 m.	0										light P.M. breeze	24	
	25	29.156	59	29.216	59	59	46			57	47	57	47							0.3	4 m.	8 m.	3 m.	8 m.									fine, the P.M. off.	25	
	26	29.088	61	28.804	61	61	50			58	53	58	56							0.2	1 m.	5 m.	4 m.	10 m.									acc. obs. fresh breeze, the P.M.	26	
	27	28.900	58	28.856	58	60	47			53	46	48	46							1 m.	0	4 m.	10 m.										cloudy, fresh breeze, P.M. with rain	27	
	28	29.040	57	29.360	58	62	44			53	47	52	47	S.W.	3	S.W.	3			5 m.	5 m.	3 m.	10 m.									light P.M. breeze	28		
	29	29.484	58	29.422	60	68	47			56	52	54	51							0.6	3 m.	8 m.	1 m.	8 m.									fine, the P.M.	29	
	30	29.290	61	29.386	60	71	34			63	58	48	43	S.W.	1	S.W.	0.8			1 m.	1 m.	1 m.	2 m.										cloudy, mild & very fine, the P.M.	30	
	31	29.296	59	29.120	59	58	58			57	47	57	54							2 m.	10 m.	4 m.	10 m.										drizzle, the P.M. off.	31	
	Sums.	904637		904680		20412	14955																												
	Means.	29.181		29.183		64.3	65.8			59.6	54.6	55.3	52.6																						
	Total Corrections for Instrumental Errors.																																		
	Corrections for Diurnal Range.																																		
	"Corrected Means."																																		
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm for Temp. (Col. 2), = 29.181 - 0.93 = 29.088
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4), = 29.183 - 0.93 = 29.090
Mean at Station, corrected, and at 32°, = 29.089
Correction for height, feet, above Mean Sea-level, = 69.6
Mean, reduced to 32°, and Sea-level, = 29.785
Highest Reading, corrected for Index error, on the 2th, = 29.564
Lowest Do., Do., on the 23th, = 28.626
Difference, or Monthly Range, = 0.938

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 2th, = 84.0
Lowest in Month, corrected for Index errors, on the 31th, = 39.0
Difference, or Monthly Range, = 46.0
"Corrected Mean" of all the Highest, (Col. 5), = 65.8
"Corrected Mean" of all the Lowest, (Col. 6), = 48.2
Difference, or Mean Daily Range, = 17.6
** Calculated Mean Temperature of Month, = 56.0

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 57.4
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 53.6
Computed Temperature of Dew-Point, = 50.1
Do. Elastic Force of Vapour, = 363
Do. Weight of Vapour in a Cubic Foot of Air, =
Relative Humidity, (Saturation = 100), = 77
RAIN fell on 14 Days; Amount in Inches, = 5.88

WIND.	SUMMARY.									
	Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		1	3			1	9	4	6	7
P.M.			2	4		1	5	7	5	7
Mean		1	1.3	0	1	7	6	5	7	1.35

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

Lance M. Patterson
Pallater

(Signed)

L. M. Patterson

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WITH REMARKS ON THE USE OF INSTRUMENTS.

Plan of Observation.—The Council recommend that Observations be made precisely at 9 o'clock (Greenwich or Royal Time) only twice a-day for some, and once (morning or evening) for other instruments as specified, in the following remarks, and 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 to 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*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight joint to the cistern. Then *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 upmost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp top* is produced. If this is prevented by air it enters the cistern, and goes 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.

Self Registering Thermometers.—Professor Phillips, and Negretti and Zambra's Patent "*Microman*," Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Microman*," Thermometer of Rotherford is recommended when graduated on the glass scale, and affixed to a frame separate from the "*Microman*." This Thermometer is liable to *in vivo* derangements, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper globe, and must be discoloured 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 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 alter, and must be removed from the Station, and ought never afterwards to be used, without being *re-tested*. The self-registering and especially the *W. Murchison* Thermometers, which frequently require 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.

One form of "Mason's" Hygrometer is highly objectionable. The frame of the thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the thermometer equipments shall be completed with, as far as possible, the same care which also supplies it with water. It must be seen to by the observer that the tinslin is always *clean* and *waist*, 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 Hunserson 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.

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

Wind.—A wind-vane ought to be elevated 12 feet at least above surrounding objects. When it oscillates incessantly, the 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 strain of clouds overhead, and to the direction of smoke, etc.

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 grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—when a Snow shower occurs it must be noted in the "Remarks," and the depth of snow must be measured in gauge. The depth of snow affixed to the depth of water received in gauge. When the snow must be measured in some open place where no drift is likely to have accumulated, the snow must be measured, as 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.

at abbreviations for Luke Howard's

Observations of the clouds are made at 9 A. M. and at sunset, 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

Deaths by tower 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, the Council recommend that the following thermometers in this interesting department be made at 9 A.M. on the 1st of each month, and the results entered in the proper column:—
1. Its amount and constancy;—the Council recommend that thermometers in this interesting department be made at 9 A.M. on the 1st of each month, and the results entered in the proper column:—
2. 12 inches, and the stems above ground, protected from the sun's rays, and fired with sloping tin collars; to prevent animals being conveyed to the bulbs by the stems or wooden frames.
3. The water meter must be made of the geological formation and agricultural condition of the soil in which these Thermometers are used.

Onion.—Mention whether Solomon's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the 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 onion entry in the schedule, will indicate that the onion paper is tilted as 4.3° in the scale, that the wind is from the N.W., and that its force is 3.3°; 4.4°; 4.5°; *i.e.*, that it is blowing from the scale 0—0.5°; 0.5—1°; 1—1.5°; 1.5—2°; 2—2.5°; 2.5—3°.

Remarks.—The "Remarks" column is too narrow, but can be probably so. Some of the most valuable observations, however, are those for which no room can be given nor hours assigned. It is to be used for contractions only, therefore, to be taken every afternoon, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. These special and extraordinary observations, great phenomena, &c. ought to be given in this column to prevent diseases, differences of 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, thunderstorms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes as may be of use in the vicinity of an Observatory. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the low-line in winter ought to be recorded.

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 tested for comparison, does not afford him satisfaction.

(By Order) A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

Have the goodness also to state any information you may be able to collect relative to the crops of grain, hay, potatoes, turnips, linens, etc., whether affected with disease prevalent among cattle; and the Agricultural condition of the district generally.

Secretary of the Meteorological Society of Scotland.

EDINBURGH.

BOOK-POST

To

Bathurst
Sept. 1868.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Ballater, County of Aberdeen, in Lat. 57° 22' N, Long. 2° 12' W, Distance from Sea 43 miles.
Height of Cistern of the Barometer above Mean Sea-level 660 feet, above Ground 4 feet. During the MONTH of September 1868.
The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. —				WIND.				RAIN.		CLOUDS.				SUNSHINE. HOURS.	THERMOMETERS. under Ground.			SEA.	OZONE. 0—10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, &c. Mention the hour at which Storms began and ended.	Days of Month.		
		9 h. A.M.		9 h. P.M.		Protected in Shade, 3 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.											
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H. Cup Anemometer No.	No. of hours in which it fell.	Amount in inches.	Velocity, (0—10), and Direction.	Amount, (0—10), and Direction.	Velocity, (0—10), and Direction.		Amount, (0—10), and Direction.	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.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°					
	1	29.258	59	29.482	61	63	46.5			58.5	50	53	49.5	N.	1	N.	2				2m. 50m.	10m. 50m.							Light & fine	1			
	2	29.580	62	29.508	64	68	45			63	55	59	53	"	1	N.	1				2m. 20m.	10m. 8m.							Br. mon. haze	2			
	3	29.350	64	29.442	62	65	49			59	54.8	48	47	S.W.	1	"	0.5			0.3	35m. 10m.	0								occ heavy shs.	3		
	4	29.480	60	29.350	64	62	39			57.5	48.5	60	58	0		S.W.	2				2m. 10m.	0								Cloudy & dull but cold occ. shs.	4		
	5	29.446	66	29.550	67	71.8	54			65.8	59.5	59	58	0	"	"	0.5				3m. 8m.	10m. 20m.									Very fine but	5	
	6	29.500	68.5	29.420	71	79	54			73	63	68	60	S.W.	2	"	1.5				1m. 10m.	15m. 5m.									L.	6	
	7	29.478	71	29.496	66	72	49			72	64	50.5	48.5	N.	1	S.W.	0.5			3.5	15m. 10m.	10m. 10m.									Heavy rain from noon	7	
	8	29.680	63	29.580	61	60	41			49.5	43.5	44	43	Var.	0.5	S.W.	0.5				2m. 10m.	10m. 20m.									Clear & fine shs.	8	
	9	29.850	61	29.728	62.5	60	36			52.5	49	49	46.5	S.W.	0.5	N.	0.5				1m. 10m.	15m. 8m.									At. beautifully dappled sky	9	
	10	29.572	60	29.480	62	64.8	36.5			58	57.8	53	50	"	2	0					3.5m. 10m.	15m. 8m.									L.	10	
	11	29.538	61	29.584	61.8	53.5	47.5			57.8	50.5	48.5	46.8	0		S.	0.5			1.0	3m. 10m.	3m. 10m.									Clear fog & drizzle, occ. clear & drizzle	11	
	12	29.696	55.5	29.634	54	50	39			45	41	40.5	39	N.E.	2	N.E.	0.5				2m. 5m.	10m. 10m.									Clear & sharp but Br. beautiful shs.	12	
	13	29.562	55	29.516	55	53	35			47.5	41.5	35	34	"	1.5	0					2m. 5m.	0									By drizzle & clear fine shs.	13	
	14	29.460	55	29.506	54	49.8	31.5			46	42.5	47	43	"	2	N.E.	1			0.1	2m. 10m.	2m. 10m.									Very dull & drizzle but	14	
	15	29.500	56	29.500	56	50	43			46.5	44	46.5	43	"	2	"	2				3m. 10m.	2m. 10m.									occ. li shs.	15	
	16	29.398	55.5	29.350	58	50	41.5			49	45.5	45	44	"	1	"	1				2m. 10m.	2m. 10m.									dull & drizzle but	16	
	17	29.270	58	29.250	57	50	43			47	44	46.8	44	"	1.5	"	0.5			0.3	2m. 10m.	1m. 10m.									weat & dr.	17	
	18	29.246	57	29.268	60	65	43			47.3	46.7	57	50	0		0			0.9	10m. 10m.	1m. 10m.											occ. shs. Br. rain & haze	18
	19	29.230	58	29.240	60	53.5	49			57.8	50	57	50	N.E.	2	N.E.	3			2.20	5m. 10m.	6m. 10m.									L.	19	
	20	29.058	58.8	29.290	61	59.5	48			54.1	54	53.5	53	S.	3	S.	3			3.3	10m. 10m.	10m. 10m.									Very wet, but shs.	20	
	21	29.300	60	29.346	61	54.5	49			54.5	54	50	49	"	2	"	0.5			1.1	10m. 10m.	10m. 10m.									Br. drizzle & rain & haze	21	
	22	29.320	60	29.280	62.5	55	47			57.7	50	50	48.5	"	0.5	"	0.5			0.8	2m. 10m.	2m. 10m.									fine shs. Br. fog & drizzle	22	
	23	29.050	60	28.980	61	53	48			58.5	49	50	49	Var.	0.5	"	2			2.5	3m. 10m.	3m. 10m.									Heavy shs.	23	
	24	28.992	59	29.050	61.5	53.5	43			49	47	45	44	N.E.	1	0			0.2	3m. 10m.	2m. 10m.											Light & fine from noon	24
	25	29.058	57	29.016	58.5	57	42.5			49	45	43.5	42	Var.	1	N.E.	0.5				1m. 10m.	10m. 8m.									into dull	25	
	26	29.050	58.5	29.088	57	52.5	42			44	44	46.5	45	0		0			3.6	2m. 10m.	10m. 10m.											Cloudy, occ. li shs. Br. haze	26
	27	28.820	58.5	28.850	59	55	44			54	52	50.2	50	N.E.	3	N.E.	2			1.27	5m. 10m.	4m. 10m.										very wet shs.	27
	28	28.588	58.5	28.660	61	60.5	42.5			57.7	57	43	42.5	S.	0.5	S.W.	0.5			3.2	2m. 10m.	10m. 10m.										Light & fine Br. mon. haze	28
	29	28.450	58	28.478	60.8	58.8	38			48	47.5	45.7	45	S.	1	S.W.	0.5			5m.	4m. 10m.	15m. 10m.										Very heavy & occ. shs.	29
	30	28.700	57	29.070	58	48.8	40.5			45	43	42	39	N.E.	2	N.E.	2			1.8	1m. 10m.	3m. 10m.										Cold stormy shs.	30
	31																																31

Sum.	878.400	144	879.012	116	1728.2307	154	126	125	143	3	7	85.281	274	2103	35.5	190	6.30																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	</
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm for Temp. (Col. 2) = 29.280 - 0.08 = 29.199
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4) = 29.300 - 0.08 = 29.217
Mean at Station, corrected, and at 32°, = 29.208
Correction for height, feet, above Mean Sea-level, = 703
Mean, reduced to 32°, and Sea-level, = 29.218
Highest Reading, corrected for Index error, on the 9th, = 29.850
Lowest Do., Do., on the 29th, = 28.450
Difference, or Monthly Range, = 1.400

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 6th, = 79.0
Lowest in Month, corrected for Index errors, on the 14th, = 31.5
Difference, or Monthly Range, = 47.5
"Corrected Mean" of all the Highest, (Col. 5), = 57.6
"Corrected Mean" of all the Lowest, (Col. 6), = 43.6
Difference, or Mean Daily Range, = 14.0
** Calculated Mean Temperature of Month, = 50.6

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 11th, = 79.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 79.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 11th, = 31.5
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 31.5
Difference of above Means or Range ("exposed"), = 47.5

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 51.1
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 48.2
† Computed Temperature of Dew-Point, = 48.3
† Do. Elastic Force of Vapour, = 303
† Do. Weight of Vapour in a Cubic Foot of Air, = 81
† Relative Humidity, (Saturation = 100), = 81
RAIN fell on 17 Days; Amount in Inches, = 6.30

WIND.	SUMMARY.											
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.		9	5	1	1	4	3	7	118			
P.M.		8	5	1	6	3	2	5	098			
Month.		0	8	5	1	1	5	3	1	6	108	116

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 James J. Paterson
Ballater

(Signed) James J. Paterson

WITH REMARKS ON THE USE OF INSTRUMENTS.

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-valves* are not true, but formed by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation is prevented, and must be made with great care. The bulb must be of delicacy, and must be made with great care.

their coincidence being indicated by a little ivory chain, when stem passes freely through the lid and case of the distem. When the *index-line* on this little piston-rod is brought, by the adjusting screw, to *form one straight line* with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error will vitiate the readings from the *zero*.

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

In *taking an Observation*, the attached Thermometer is first noted: the tube must then be gently tapped and the cistern-adjustment carefully made. By raising and lowering the eye, it may be brought into the above of the back and front of the

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

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

Underground Thermometers.—As the germination and growth of crops and plants greatly depend on the temperature of the soil, its amount and constancy,—the Council has decided that observations in this interesting department be made by means of thermometers placed in the earth. The bulbs being sunk to 3, 6, 9, 12, and 22 inches, the bulbs have been ground, prevented from the soil's rays, and fitted with sloping tin collars, to prevent rain-water from being admitted to the bulbs by the stems or wooden frames.

Monitors must be made of the geological formation and physical condition of the soil in which these Thermometers are placed.

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

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

time or, and at its or such as are recognised at the time of the occurrence of the storm, and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been limited at the 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.

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

presented for comparison, does not afford any satisfaction.

(By Order) A. B.

(By Order) A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

SHRUBS, ETC.	FRUIT.	FRUIT IN BLOSSOM.	FRUIT IN GENERAL.	MIGRATORY BIRDS.	First Arrival.	Departure.
Gooseberry,	Apple,			Cuckoo,	1833	
Mountain or Elder,	Black Currant,			Cut-throat,	1833	
Hazel,	Cherry,			House-Swallow,	1833	
Broom,	Gean,			Lapwing,	1833	
Hawthorn,	Gooseberry,			Plover,	1833	
Holly,	Teach,			Sand-Martin,	1833	
Laburnum,	Pear,			Starling,	1833	
Lilac,	Plum,			Swan,	1833	
Mezerion,	Shawberry,			Rail or Corn Crane,	1833	
Mountain Ash or Rowan,						
Red-flowering Currant,						
Rhododendron Ponticum,						
Whip,						

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, diseases, etc. Whether Epizootic diseases prevail among cattle; and the Agricultural condition of the district generally.

BOOK-POST

EDINBURGH

Mr ALEXANDER BUCHAN

Secretary of the Meteorological Society of Scotland.

To

Ballantine
Sept-1868-

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Pallat, County of Merioneth, in Lat. 54° 22' N, Long. 2° 22' W, Distance from Sea 43 miles.Height of Cistern of the Barometer above Mean Sea-level 600 feet, above Ground 4 feet.During the MONTH of October 18 68.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.				CLOUDS.				THERMOMETERS.				SEA.		OZONE.		GENERAL REMARKS.		Days of Month.
		9 h. A.M.		9 h. P.M.		Protected in Shade & not above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H. Cup Anemometer No.		No. of hours in which it fell.		Amount in inches.		9 A.M.		P.M.		9 h. A.M.		9 A.M. 9 P.M.						
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	No.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No.	No.	No.	No.	Temperature of surface of water, feet.	Temperature of air, and duality.	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	29.350	54.5	29.440	55	48.5	35			42.8	40.8	35	34	N.E. 1	N.W. 0.5					3.0	2.0	2.0	1.0								fine but damp thro.	1				
	2	29.440	54	29.470	57	53.5	32			46	42	44	43	N. 0.5	0					1.0	2.0	2.0	1.0								fine thro	2				
	3	29.360	58	29.158	57	52	39			49	44	44	43	S.W. 0.5	8	1				1.6	2.0	1.0	2.0								dull do.	3				
	4	28.950	55	29.150	57	50.5	40.5			46	44	43	41	0	S.W. 0.5					2.0	1.0	0									cloudy do	4				
	5	29.346	54.5	29.236	58	56	33.5			43	41.5	49	46	S.W. 0.5	8	0.5				0		2.5	1.0								fine from sun thro	5				
	6	28.960	57	29.088	60	57	46			52	50	47	44.5	N. 3	S.W. 2					5.0	1.0	3.5	1.0								fine from sun	6				
	7	29.088	58.8	29.146	58	52	41			47	42.7	44	41	N. 2	"	1				3.0	1	0									light & sharp wind	7				
	8	29.218	55	29.120	60	53.5	35			47.5	43	50.5	48	"	2	"	3			0.7	3	1	4.5	1.0							cloudy & dark	8				
	9	29.044	58	29.220	60	55.5	43			53.5	50.5	43	42	S.W. 1.5	"	1				3.0	1.0	0									dull. (Mr. Shaver)	9				
	10	29.446	54	29.500	57	58	31			37.5	37	36	36	"	1	"	0.5			0.7	0	0									fine	10				
	11	29.458	55	29.568	56	57.7	31			42	41	57	48	0	"	1				2.0	1.0	0									fine	11				
	12	29.270	57.7	29.270	60.5	54	48			52	49	52	49	S.W. 2	"	2				1.0	3	8	2.0	1.0							cloudy & light wind	12				
	13	29.366	58	29.580	55	62.5	32.5			46	44	33	33	N. 0.5	"	0.5				2.0	1.0	0									fine thro.	13				
	14	29.600	53	29.250	53	53.5	29			35	34	47	43	S.W. 0.5	"	2				0.7	0	2.0	1.0								light & fresh	14				
	15	28.672	54	28.638	54.5	52.5	42.5			54	52	44	40	"	3	"	4			3.0	1	0									fine	15				
	16	28.618	52.5	28.74	52	47	36.5	Sally Bar Lowd.		44	38	39	36.5	"	2	"	2			0		0										fine	16			
	17	28.74	50	28.800	50	45.0	32			42.4	38	32	31	N. 2	"	0.5				4.0	1.0	0									fine	17				
	18	28.896	48	28.928	47	43	25.5			33	32	28	27	S.W. 0.5	"	0.5				0.5	1	0									fine	18				
	19	28.960	46	29.292	45.8	43	27			40.5	39	38	35.5	N.E. 0.5	N.E. 0.5					4.0	1.0	2.0	1.0								fine	19				
	20	29.266	45	29.050	44	44	24			28	27	39	36.4	S.W. 0.5	0					2.0	1.0	1.0	1.0								fine	20				
	21	28.880	44.5	29.070	46	43	37			38.5	37.5	42	39	0	S.W. 1					0.1	1.0	1.0	1.0	8							fine	21				
	22	29.230	46	29.038	46.5	50	35			43	41	44	41	S.W. 0.5	"	2				0.2	2.0	1.0	2	7							fine	22				
	23	28.846	47	28.834	47.5	47.5	32.5			42	39	36	34	N. 2	"	1.5				2.0	1.0	0									fine	23				
	24	28.550	46	28.74	45	39	29			37	35	39	38	0	N.E. 2					0.6	2	1.0	2.0	1.0							fine	24				
	25	28.830	45	28.848	45.5	46	30			40	38.5	30	30	S.W. 1	0					0		0									fine	25				
	26	28.834	45	28.918	45	44	29			41.5	37	38.5	34.8	N. 2	N. 2					2.0	0	2.0	2	0							fine	26				
	27	29.448	44.5	29.440	44.5	42.7	33.5	Sally Bar.		37	35	37.5	36	S.W. 1						3.0	1.0	3	5								fine	27				
	28	29.440	45	28.96	45	45	33			36	35	43	41	"	0.5	2				1.0	1.0	3.0	1.0								fine	28				
	29	28.660	46.8	28.70	46	45.5	35			39	37	36	34	"	1.5	"	1.5			0		3.0	1.0								fine	29				
	30	29.140	46	29.166	48	50.5	33.5			43	39.7	48	44	"	2	3				2.0	1.0	4.0	1.0								fine	30				
	31	29.150	49	29.028	52	53.5	47			53	49	57	53	"	2	"	2			3.0	1.0	3	10								fine	31				
Sums.		901.686	164	901.448	163	45.5	107.85			360	42									180																
Means.		29.087509	29.095519	49.9348		42.9404	41.5395			115	135																									
† Total Corrections for Instrumental Errors.																																				
† Corrections for Diurnal Range.																																				
"Corrected Means."										42.1	41.7																									
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), = 29.029
“Corrected Mean” of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = 29.034
Mean at Station, corrected, and at 32°, = 29.032
Correction for height, feet, above Mean Sea-level, = 721
Mean, reduced to 32°, and Sea-level, = 29.753
Highest Reading, corrected for Index error, on the 13th, = 29.550
Lowest Do., Do., on the 16th, = 28.514
Difference, or Monthly Range, = 1.036

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 31st, = 58.3
Lowest in Month, corrected for Index errors, on the 26th, = 24.0
Difference, or Monthly Range, = 34.3
“Corrected Mean” of all the Highest, (Col. 5), = 49.9
“Corrected Mean” of all the Lowest, (Col. 6), = 34.8
Difference, or Mean Daily Range, = 15.1
** Calculated Mean Temperature of Month, = 42.4

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 31st, = 58.3
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun, = 58.3
Lowest at Night, Black Bulb, (corrected for Index errors), on the 16th, = 24.0
“Corrected Mean” (Col. 8), of Black Bulb Min. on grass, = 34.8
Difference of above Means or Range (“exposed”), = 34.3

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 42.4
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 40.4
†† Computed Temperature of Dew-Point, = 37.1
†† Do. Elastic Force of Vapour, = 22.1
†† Do. Weight of Vapour in a Cubic Foot of Air, = 82
†† Relative Humidity, (Saturation = 100), = 82
RAIN fell on 13 Days; Amount in Inches, = 1.80

WIND.		SUMMARY.									
Direction	N	NE	E	SE	S	SW	W	NW	Calms or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.		2	1			1	18	6		4	1.15
P.M.		2	1			1	10	2	1		1.35
Mean.	0	2	1	0		1	18	4	1	4	1.25
											1.46

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

Jas. Pateron
Pallat

(Signed)

Jas. Pateron

WITH REMARKS ON THE USE OF INSTRUMENTS.

Barometer—Weather glass and thermids, though admirably adapted, as the latter certainly are, to indicate various 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*.

An excellent Barometer is constructed by Mr. Adie of London the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-inches* are not true inches but so much shorter as to *compensate* the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. The instrument has been adopted by the

their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the column. When the *under-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*.

cistern uppenmost. 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 top* is produced. If this is prevented by air it may be removed to the cistern, and got rid of by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it and if this

In *taking an Observation*, the attached thermometer is usually noted: the tube must then be gently tapped and the instrument adjusted carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index;—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly, so as to prevent heat from the observer's hands and person from communicating to the thermometer.

The laths forming the sides and doors of the Boxes are arranged so as to "protect" the instruments, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, the doors are also made to open to the south. These Boxes may be

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-untied by striking the instrument repeatedly against the palm of the hand; when the part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating that part over a lamp: the alcohol will evaporate a again com-

The above remarks apply equally to the Thermometers for dense in contact with the body of the liquid. These instruments should be hung horizontally.

10

under, an exact coincidence within, or a little over 40°, or less than 40°, respectively. So also 40°, and 40°, and 40°, and 40° respectively. The registered 40°-2 or 40°-3 and 40°-7 or 40°-8 respectively. The reading Rutherford's "*Mon.*" and "*Mon.*" 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 promptly taken, being so readily affected by heat from the person

Clouds.—Convenient abbreviations for Luke Howard's register *observations* only; and nothing that partakes of the nature of deduction or inference.

100

WITH REMARKS ON THE USE OF INSTRUMENTS.

Ozone.—Mention whether components of ozone are observed. The paper is affixed by a pin to a board in the threatened area. The paper is placed in the center of the compass 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, 9 p.w., as an ozone entry in the schedule, will indicate that the ozone was timed as 4.3 p.m. on the scale, that the wind is from the N.W., and that its force

(By Order) A. B.
 FORTSMITH, 9th December 1955.

10

FOREST TREES.	In flower.	In least buds.	In least.	Dressed of leaves.	CROPS.	Sowing or planting.	Appearing or above ground.	In Ear.	First Cut
Alder,					Barley,				
Asb,					Bere or Bigg,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Tenag,				
Lime,					Potatoes,				
Oak,					Tunip,				
Sycamore or Plane,					Rye Grass,				

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit Ripe.	First in Blossom.	First in Fruit Ripe.	Department.
Barberry,	Apple,					
Bountree or Elder,	Black Currant,					
Broom,	Cherry,					
Hazel,	Gean,					
Rowan,	Gooseberry,					
Holly,	Peach,					
Laburnum,	Pear,					
Lilac,	Plum,					
Alexander,	Strawberry,					
Mountain Ash or Rowan,						
Red Flowering Currant,						
White-flowered Currant,						
Whin,						

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, Peas, etc., whether plentiful, or in perfection; whether any have suffered from blight, or other diseases, etc.

1851

1030
871
220
58523

Mr. ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

To

1851

7 N
EDINBURCH
NO 8
68

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Pallata, County of Aberdeen, in Lat. 57°42'N, Long. 2°42'W, Distance from Sea 43 miles.Height of Cistern of the Barometer above Mean Sea-level 660 feet, above Ground 4 feet.During the MONTH of November 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. _____				WIND.				RAIN.		CLOUDS.				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.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.			9 h. A.M.					Temperature of air, surface of water, and in shade.	9 A.M. 9 P.M.		As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	
		Barometer. * No. _____	Attached Ther- mometer No. _____	Barometer. No. _____	Attach- ed Ther- mometer No. _____	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. _____	Direc- tion.	Force No. _____	Direc- tion.	Force No. _____			9 h. A.M.	Velocity, (0-10), and Direc- tion.	Amount, (0-10), and Species.	Velocity, (0-10), and Direc- tion.		Amount, (0-10), and Species.	No. 1. inches.	No. 2. inches.							No. 3. inches.
1	28.890	55	29.006	53.5	59	41			58.7	64	41.6	39.5	N. 3	N. 4			0.2	311.	10 a.m.	317.	8 a.m.									4th. Mild & rainy, clouds, & colder in evening.	1			
2	29.096	52	28.780	50	47	39			44.5	39.5	46.5	42.3	" 3	" 2			0.8	3.0	5 a.m.	317.	8 a.m.									" Sharp & cold. Wind. Rain. Cloudy & foggy.	2			
3	28.478	50.5	28.544	50	47	38			44	42.5	38.5	38	" 2	" 1.5			2.5	3.0	10 a.m.	2.0	10.									dull & showery.	3			
4	28.600	49	28.586	48	42.8	33			37	34	35	33	" 2	N.W. 2			0.7	0		2.0	10.									Some showers during the day.	4			
5	28.572	46	29.024	45.3	36.7	31.5			34.7	34.5	34	33	N.W. 2	" 0.5			1.1	3.0	10 a.m.	2.0	10.										fell. Ground white, & even. 11 P.M. (Storm) & drift.	5		
6	29.180	44	29.300	42.5	35	27.5			29.5	28	30	29	Var. 0.5	N. 0.5			1.3	3.0	3.	0											Ground well cut with rain, & had a drift.	6		
7	29.296	46	29.250	41	38	17.5			24	24	33	31.5	S.W. 0.5	S.W. 0.5			0.2	2.	5.	0											light rain, & with rain, & a drift.	7		
8	29.326	41.5	29.520	41	39	23	High Bar.		33	32	29	29	0	" 0.5				2.6	10.	0												fine rain.	8	
9	29.638	41.8	29.654	41	39	24	High Bar.		36	34.5	34	33	0	0				2.	8.	2.6	10 a.m.											cloudy & dull.	9	
10	29.646	42	29.630	41	38.5	25			34.3	34	26	26	0	0				2.	10.	0												cloudy & fine rain.	10	
11	29.594	41	29.708	40.5	40	23			29	28	34.5	33	0	0			0.2	2.	8.	2.5	8 a.m.											cloudy & fine rain.	11	
12	29.810	41	29.970	41	39.3	27	High Bar.		34.5	33.8	28	28	0	S.W. 0.5			0.2	1.5	8.	0												cloudy & fine rain.	12	
13	29.450	42	29.900	41	44	24.5			34	33	40	38.5	S.W. 0.5	0			0.7	1.0	8.		8 a.m.											cloudy & fine rain.	13	
14	29.800	42	29.844	42.5	42.5	38.3			41	39	42	38	N. 2	N. 0.5			0.6	2.0	8.	2.0	8.											cloudy & fine rain.	14	
15	29.850	44	29.804	43	42	34.5			37	36	37	35.5	0	0			1.8	10.	1.0	5.												cloudy & fine rain.	15	
16	29.644	44	29.660	44	43	33			40	39	42	40.8	0	S.W. 0.5			2.0	8.		10.												cloudy & fine rain.	16	
17	29.732	45	29.770	45	42.8	39			41	40	40	38.	0	0			2.0	8.		1.8	10.											cloudy & fine rain.	17	
18	29.726	45.5	29.850	44	42.8	33			38.5	37	36	33	S.W. 0.5	N.W. 0.5			0.3	3.0	5.	2.0	10.											cloudy & fine rain.	18	
19	29.830	45	29.768	45.5	36.5	30.5			33.7	32.5	31.8	30.5	" 0.5	Var. 0.5			1.8	10.		10.												cloudy & fine rain.	19	
20	29.530	45	29.300	43	35.5	30	High Bar.		32.8	31	35	32	0	S.W. 1			1.5	10.		1.0	5.											cloudy & fine rain.	20	
21	28.940	43	28.464	43	43	32.8			34.5	32.5	43	41	S.W. 2	" 1.			1.9	2.	8.	2.	8.											cloudy & fine rain.	21	
22	28.186	46	28.206	46	49.5	41.5	High Bar.		48	44	43	42	" 3	" 0.5			0.3	4.	5.	2.0	8.											cloudy & fine rain.	22	
23	28.572	47	28.972	46	44.5	34.5			38.5	37	35	33	" 1	" 1			0.3	3.0	10.	2.0	8.											cloudy & fine rain.	23	
24	29.150	45	29.108	44	37	23			28	27	35	34.5	S.W. 0.5	0			1.6	2.0	10.	2.0	10.											cloudy & fine rain.	24	
25	29.000	44	29.024	44	41.5	34			39	37.5	41.5	39.8	" 1.8	" 1			2.3	3.0	10.	3.0	10.											cloudy & fine rain.	25	
26	29.154	44.5	29.314	44	41.8	33			34.2	34	40	39	S.W. 0.5	0			1.5	8.0		1.0	10.											cloudy & fine rain.	26	
27	29.382	45	29.460	44	41	35			37	36.5	37	36.3	" 0.5	0			0.2	2.0	10.	2.	10.											cloudy & fine rain.	27	
28	29.246	45	29.236	46.5	40	35.5			39.2	37.8	39	36	S.E. 1.5	S 0.5			1.8	8.		1.5	8.											cloudy & fine rain.	28	
29	29.200	45	29.130	44	37.5	37			39	36	39	37	0	S.E. 2			3.8	2.0	10.	2.5	10.											cloudy & fine rain.	29	
30	29.050	45	29.030	45	42.7	38			39.8	38	43	41	S. 2	S. 2			3.0	2.	6.0	4.5	10.											cloudy & fine rain.	30	
31																																	cloudy & fine rain.	31
Sums.	8783.58	15	8787.92	14.5	2503.56	3			2471.85	15	2471.85	15			29.5	6		2.19																
Means.	29.279	55.2	29.293	54.2	41.7	32.2			37.1	35.5	37.0	35.4			0.97																			
† Total Corrections for Instrumental Errors.																																		
† Corrections for Diurnal Range.																																		
† Corrected Means.									37.3	37.2																								
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++ for Temp. (Col. 2), = 29.209
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = 29.226
Mean at Station, corrected, and at 32°, = 29.218
Correction for height, feet, above Mean Sea-level, = 72.5
Mean, reduced to 32°, and Sea-level, = 29.943
Highest Reading, corrected for Index error, on the 13th, = 29.950
Lowest Do., Do., on the 22th, = 28.186
Difference, or Monthly Range, = 1.764

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 1th, = 59.0
Lowest in Month, corrected for Index errors, on the 7th, = 17.5
Difference, or Monthly Range, = 41.5
"Corrected Mean" of all the Highest, (Col. 5), = 41.7
"Corrected Mean" of all the Lowest, (Col. 6), = 32.2
Difference, or Mean Daily Range, = 9.5
** Cal. Temperature of Month, = 37.0
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index Errors), on the 1th, = 59.0
"Corrected Mean" of all the Highest, (Col. 5), = 41.7
Lowest in Month, Black Bulb, (corrected for Index errors), on the 7th, = 17.5
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 32.2
Difference of above Means or Range ("exposed"), = 9.5

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 37.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 35.4
†† Computed Temperature of Dew-Point, = 32.9
†† Do. Elastic Force of Vapour, = 1.87
†† Do. Weight of Vapour in a Cubic Foot of Air, = 8.5
†† Relative Humidity, (Saturation = 100), = 85
RAIN fell on 26 Days; Amount in Inches, = 2.19

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	2	1	1	3	4	1		11	0.97	
P.M.	2	2	1	2	4	3	3		10	0.77	
Mean.	2	0	2	1	1	8	4	2	10	0.87	

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

Observations made and
Return verified by

James Walter Paterson
Pallata

(Signed)

Dr. Paterson

287
81
106

435

WITH REMARKS ON THE USE OF INSTRUMENTS.

Hour of Observation.—The Council recommend that Observations be made precisely at 0 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 0 o'clock.

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

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

The Barometer should be suspended in a good *Utzlet*, 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.

Self-Registering Thermometers.—Professor Phillips's, and N. C. and Zamboni's Patent *"Mercurium"* Thermometers are recommended; pointed divisions for their use may be obtained with each instrument. The *"Mercurium"* Thermometer of Rathenow is recommended when graduated on the glass stem, and affixed to a tube separate from the *"Mercurium"*. This Thermometer is liable to two drawbacks, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks, it may be reunited by sucking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper globe, and must be discoloured 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

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 the 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 a

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The readings ought to be taken to tenths of a degree, and noted in the decimal.

This the Thermometer will read $-39^{\circ}.9$, $40^{\circ}.0$, or $40^{\circ}.1$; a little under, $40^{\circ}.4$, $40^{\circ}.5$, or $40^{\circ}.6$, according as it indicates a little under, an exact coincidence with, or a little over 40° , or $40^{\circ}.2$, respectively. So also $40^{\circ}.3$ and $40^{\circ}.4$, more or less must be registered $40^{\circ}.2$ or $40^{\circ}.3$ and $40^{\circ}.7$ or $40^{\circ}.8$, respectively. In reading Kutherford's *Therm.*, and its *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 observing.

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

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

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation for observation and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexpected 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 readers entered in the returns on the day on which the rain fell.

on *Snow-falls* may, for convenience, be registered in the 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.

WITH REMARKS ON THE USE OF INSTRUMENTS.

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.

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

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our

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

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

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

"Observations in connection with the periodic return of the seasons," possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; 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.

(By Order) A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

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

(By Order) A. B.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Ballaater, County of Highland, in Lat. 57° 12' N, Long. 9° 12' W, Distance from Sea 43 miles.Height of Cistern of the Barometer above Mean Sea-level 660 feet, above Ground 4 feet.During the MONTH of December 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. —				WIND.				RAIN.		CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA. Temperature at 1 fathom, and Depth.	OZONE. 0—10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.			
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.												
		Barometer. No. —	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. —	Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	No. — 3 inches.	No. — 12 inches.		No. — 22 inches.									
		Inches.	°	Inches.	°	°	°	°	°	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	9 h. A.M.	Amount in inches.	Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	Velocity, (0—10), and Direction.	Amount, (0—10), and Species.		°	°	°							
1	29000	46	28982	46	44.5	40.5			43.8	42	41.5	41	SE	2	SW	0.5		0.6	38	100	0								dark & wet. Partly clear. Partly cloudy.	1				
2	29076	46	28978	44	42	30			31.8	31	37	36.5	SW	0.5	0			7.6	65	100	48	5							Clear & fine. Partly cloudy.	2				
3	28710	45	28566	45.5	47	36			39.3	38	47	44.6	"	2	SW	3		0.4	40	10	28	8							dull & showery. Partly cloudy.	3				
4	28418	47	28188	49	53	42			4.9	4.7	4.7	4.5	"	2	"	1														cloudy & drizzle. Partly cloudy.	4			
5	28230	49	28348	49	50	44.5			4.7	4.7	4.6	4.2	"	4	"	2			0		2	8								Clear & fine. Partly cloudy.	5			
6	28550	49	28550	49	49	39.5			4.8	4.1	4.0	3.9	N.	1	0			3	2	0										fine. Partly cloudy.	6			
7	28750	48	28950	48	48	35			4.4	4.2	3.8	3.7	SW	0.5	0			4.0	2	10	0									SW.	7			
8	28840	49	2904	47	42	30			3.9	3.8	3.8	3.0	E.	3	0			7.8	10	0										dull & wet. Partly clear. Partly cloudy.	8			
9	29496	46.8	29440	45	39	29			3.2	3.1	3.9	3.7	0	0	0			5.9	5	10	5	10								dull & chilly. Partly cloudy.	9			
10	28714	45	2864	49	54	37.5			4.0	3.8	3.2	3.0	SW	0.5	SW	5		6.9	5	10	5	10								very cold. Partly cloudy.	10			
11	28722	49.5	29014	47	58.5	32			3.7	3.7	3.2	3.2	SW	2	SW	1		3.6	10	3.6	10									Cold & wet. Partly cloudy.	11			
12	29270	45	29224	43	34	23			2.4	2.4	3.5	3.4	0	SW	0.5																Clear & fine. Partly cloudy.	12		
13	29072	43	28878	42	40.5	32			3.7	3.3	4.0	3.9	SW	2	SW	1		3.9	3.5	10	3.5	10									very stormy. Partly cloudy.	13		
14	28620	44	28668	44	48	39.5			4.4	4.4	4.4	4.2	SW	2	SW	2		4.0	4	10	4	10									Clear & fine. Partly cloudy.	14		
15	28320	47	28600	48	48	41			4.0	3.9	3.9	3.8	0	SW	0.5			0.8	2	10	1	10									dull & fine. Partly cloudy.	15		
16	28400	47.5	28488	47	45	36			3.9	3.6	3.6	3.5	N.	0.5	0			7.3	0	0	0										Clear & fine. Partly cloudy.	16		
17	28534	47	28846	46	43.5	31			5.0	4.8	3.4	3.4	SW	2	SW	0.5		3.8	10	0											fine. Partly cloudy.	17		
18	28610	47	28920	47	50.5	33			3.1	3.1	3.6	3.5	0	0	0			4.5	2	10	10										very wet. Partly cloudy.	18		
19	29000	46	28920	44	87	29			3.7	3.6	3.6	3.5	0	0	0			0.5	15	10	15	10									light rain. Partly cloudy.	19		
20	28850	45	28860	43.5	38.5	33			4.1	3.9	4.1	3.9	SW	2	0			1.6	4.5	10	1.5	10									very heavy rain. Partly cloudy.	20		
21	28374	44	28208	42	42	34			3.5	3.4	3.4	3.6	0	SW	0.5			1.5	10	2	3										fine. Partly cloudy.	21		
22	28244	45	28244	44	44	34			3.8	3.6	4.1	3.9	SW	0.5	SW	2		0.1	0	2	10										Cold & wet. Partly cloudy.	22		
23	28270	45	28236	44	42	33			3.8	3.6	4.1	3.9	SW	0.5	SW	2		3.8	10	0											light rain. Partly cloudy.	23		
24	28220	45	28208	44	41.5	29			2.6	2.6	3.4	3.3	0	0	0			0.2	2	10	10										dull & rainy. Partly cloudy.	24		
25	28370	43	28638	43	33.2	23			2.9	2.9	3.8	3.6	SW	0.5	SW	2		7.2	2	10	10											showery. Partly cloudy.	25	
26	28570	42	28108	41	37.2	27			3.0	2.9	3.8	3.6	SW	0.5	SW	3		0.8	3.5	10	1	10										showery. Partly cloudy.	26	
27	27700	43	27940	41.8	39.5	34			3.0	3.2	2.4	2.4	SW	1	SW	0.5			3.8	10	2.5	10										showery. Partly cloudy.	27	
28	28250	42	28468	41	39	23.8			3.3	3.2	3.0	2.9	"	2	"	0.5			1.4	3	2	10										showery. Partly cloudy.	28	
29	28422	41	28490	40	35.5	22			2.8	2.8	3.0	3.0	0	0	0																	showery. Partly cloudy.	29	
30	28674	40	28730	39	34	26			3.5	3.3	2.5	2.5	0	0	0																	showery. Partly cloudy.	30	
31	29008	39.8	29290	39	37	22																											showery. Partly cloudy.	31
Sums.	887410		888064		13319.1001				23	19	135	107	35	27					6.10															
Means.	28.626	45.3	28.647	44.7	42.9	32.3			37.7	36.1	37.7	36.4	1.13	0.89																				
† Total Corrections for Instrumental Errors.																																		
† Corrections for Diurnal Range.																																		
† Corrected Means.																																		
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction $\frac{1}{1000}$ for Temp. (Col. 2), = 28.626 - 0.043 = 28.583

"Corrected Mean" of Barometer at 9 A.M., minus the Correction $\frac{1}{1000}$ for Temp. (Col. 4), = 28.647 - 0.042 = 28.605

Mean at Station, corrected, and at 32°, = 28.594

Correction for height, feet, above Mean Sea-level, = 725

Mean, reduced to 32°, and Sea-level, = 28.320

Highest Reading, corrected for Index error, on the 7th, = 29.486

Lowest Do., Do., on the 17th, = 27.700

Difference, or Monthly Range, = 1.786

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 11th, = 53.5

Lowest in Month, corrected for Index errors, on the 31st, = 22.0

Difference, or Monthly Range, = 31.5

"Corrected Mean" of all the Highest, (Col. 5), = 42.9

"Corrected Mean" of all the Lowest, (Col. 6), = 32.3

Difference, or Mean Daily Range, = 10.6

** Calculated Mean Temperature of Month, = 37.6

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 11th, =

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

Lowest at Night, Black Bulb, (corrected for Index errors), on the 11th, =

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

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 37.9

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 36.3

† Computed Temperature of Dew-Point, = 33.4

† Do. Elastic Force of Vapour, = 1.89

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

† Relative Humidity, (Saturation = 100), = 86

RAIN fell on 18 Days; Amount in Inches, = 6.10

SUMMARY.											
WIND.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.		1	2	2	2	2			11	1.13	
P.M.	1	1			2	2	2	0	12	0.89	
Mean.	1	1	1	1	2	2	2	0	11	1.01	1.11

This Schedule not to be Gunned or Fastened, and Forwarded by Book Post, prepaid.

(Signed) J. R. Paterson

Observations made and Return verified by

J. R. Paterson
Ballaater

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS. WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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

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

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

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before 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 should be repaired.

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

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

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

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "Maximum" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Minimum" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum." This Thermometer is liable to two 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 reunited by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper tube, and must be discoloured 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 imitated, by the application of a mixture of lamp black and water'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. Show must not be allowed to cover either of the Thermometers; nor the sun's heat to affect the Minimum Thermometer by distillation.

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

The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and collected form of this apparatus specially require the "Hygrometrical Deductions," Observers, and especially 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 bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always clean and moist, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed, evaporation will proceed as from the moist cloth in ordinary circumstances.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39.9, 40.0, or 40.1; in decimal, 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 40.3, respectively. So also 40.1 and 40.2 or 40.8 respectively. In reading Rutherford's "Max" and "Min" Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

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

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

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—When a Snow-fall 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 obscuration of the sky *on-shed* (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, one 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 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" of S.W., W., N.W., (for example,) will indicate that the wind is blowing from the S.W., &c. The upper strata of clouds travel with extreme velocity from S.W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of $\frac{1}{4}$, (*or*), 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 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. Attention must be made of the geological formation and agricultural condition of the soil in which these Thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself but in its relations to that of our 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 Schönbem's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation in the following manner;—thus $\frac{3}{4}$ W., as an ozone entry in the schedule will indicate that the ozone paper is tinted as "3" on the scale 0=6 is "4," i. e., that it is *blowing fresh*.

Electricity.—The much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial magnetism, and as a meteorological phenomenon. A proper Electrometer is necessary to every complete meteorological observatory. **Remarks.**—The "Remarks" column is too narrow, but unavoidable. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been 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 completed, 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 margin of the margin. Additional remarks may be made on the periodic return of the "Observations" in connection with the periodic return of the seasons, possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fully represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

The Council recommend that *tem diu* observations be taken—viz., on the 21st days of March, June, September, and December. Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the makers. The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary; and they consider it desirable that he should have full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

EDINBURGH, 9th December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.		In Flower.		In Leaf.		Divided or Shaved of Leaves.		CROPS.		Sowing or Above Ground.		In Flower.		First Planted.	
Alder.	...							Barley.	...						
Aspen.	...							Bear or Bigg.	...						
Beech.	...							Oats.	...						
Birch.	...							Wheat.	...						
Elm.	...							Beans.	...						
Larch.	...							Peas.	...						
Lime.	...							Potatoes.	...						
Oak.	...							Turnips.	...						
Sycamore or Plane.	...							Rye Grass.	...						

MIGRATORY BIRDS.		First in Generality.		First in Particularity.		Arrival.		Departure.	
Apple.	...							Cuckoo.	...
Bourne or Bled.	...							Cartilage.	...
Black Currant.	...							House Martin.	...
Cherry.	...							Lapwing.	...
Gooseberry.	...							Plover.	...
Holly.	...							Sand Martin.	...
Laburnum.	...							Starling.	...
Lilac.	...							Swan.	...
Mountain Ash or Rowan.	...							Rail or Corn Crane.	...
Red Flowering Currant.	...								
Rhododendron Ponticum.	...								
Wain.	...								

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

BOOK-POST.

Mr. ALEXANDER BUCHAN.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Bulletin
Dec 1868

To