

# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Ghurham, County of Dunbartonshire, in Lat.  $62^{\circ} 24'$ , Long.  $6^{\circ} 43' 8''$ , Distance from Sea 120 fms.

Height of Cistern of the Barometer above Mean Sea-level 12 feet, above Ground 5 feet.

During the MONTH of January 1872.

The Hours of Observation are 9 A.M. to 9 P.M.

ELECTROLYTIC Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.				HYGROMETER. No. 881-32				WIND.				RAIN.				CLOUDS.				THERMOMETERS under Ground.				GENERAL REMARKS.
	9 h. A.M.	9 h. P.M.	Protected in Shade, 4 feet above Ground.	Exposed Black Bulbs.	Max. in Sun.	Min. on Grass.	No.	No.	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.	Velocity (0—6) and Direction.	Amount (0—10) and Direction.	Amount (0—10) and Species.	SUNSHINE	Temperature of WEEL at depth of feet, No. —	9 h. A.M.	9 h. P.M.	0—10.	11	Days of Month.		
	* No. 91	Barometer.	Attached Thermometer.	No. 91	Barometer.	Attached Thermometer.	No. 316	No. 3237	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	9 h. A.M.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Hours.	Temperature at Depth and Density,	9 h. A.M.	9 h. P.M.	0—10.	11	
1	28.796	52	28.750	54	30	38	°	°	75	40.5	45	40	SW	5	S	5	0.38	1	°	°	°	°	Johnston	9.5	8.5	3	1
2	28.800	49	29.046	54	45.5	37.5			39.5	38.3	39	37	SW	1	SW	2	0.21	—	8.5	8.5	2	2		8.5	8.5	2	2
3	29.228	49	29.030	54	46	34			38.8	36	44	41	W	1	S	4	0.38	2.5	2.5	2.5	2.5		8.5	8.5	2	3	
4	28.544	49	28.620	53	46	38			44.5	42.8	40	35.6	SE	3	SW	4.5	0.52	—	—	—	—		8.5	8.5	2	4	
5	28.576	46	28.568	45	40	28			35.5	31.6	29.7	29	SE	0.5	SE	0.5	0.20	—	—	—	—		8.5	8.5	2	5	
6	28.400	44	28.1744	44	42	26			38.8	37.5	39	38	SE	2	W	1	0.82	—	—	—	—		8.5	8.5	2	6	
7	28.938	44	29.096	49	40	30			35.8	34	31	30.3	S	0.5	S	0.5	—	2	2	2	2		8.5	8.5	2	7	
8	29.214	44	29.500	54	40	30			35.8	35	36	35.2	E	1	E	0.5	0.42	1	1	1	1		8.5	8.5	2	8	
9	29.780	44	29.914	49	36	30			33	32.5	30	29.5	N	0.5	Calm	0	—	—	—	—	—	8.5	8.5	2	9		
10	29.460	50	29.542	53	44	29.5			43.3	42.7	42	40.6	SE	1.5	SE	4	0.18	—	—	—	—		8.5	8.5	2	10	
11	29.528	50	29.726	53	46	34			42.2	41.4	39	33.6	SW	0.5	SW	0.5	0.14	3	3	3	3		8.5	8.5	2	11	
12	29.754	49	29.458	55	45.5	33			44.1	42.2	45	43.5	SE	1.5	SE	3	0.06	—	—	—	—		8.5	8.5	2	12	
13	29.282	52	29.270	55	47.5	41			46.6	44.5	42	41.4	SW	3	Calm	0	0.11	—	—	—	—		8.5	8.5	2	13	
14	29.382	46	29.678	53	42	33.5			40	38.8	33.5	32.8	NW	1.5	Calm	0	0.15	4	4	4	4		8.5	8.5	2	14	
15	29.430	50	29.530	54	46	33			45.5	43.8	41	40.3	S	2	SW	1	0.21	—	—	—	—		8.5	8.5	2	15	
16	29.450	50	29.558	54	42	37			40.4	39.5	39	38.2	SW	1	S	0.5	0.31	4	4	4	4		8.5	8.5	2	16	
17	28.870	49	28.444	53	40	33			36.8	35.5	38.8	38.2	SW	1	NE	0.5	0.29	3	3	3	3		8.5	8.5	2	17	
18	28.200	48	28.158	50	44	36.5			39	36.8	42.1	41.6	NE	1	NE	0.5	0.74	—	—	—	—		8.5	8.5	2	18	
19	28.450	47	28.830	53	46	34.5			42.1	41.7	40.8	40	Calm	0	Calm	0	0.38	—	—	—	—		8.5	8.5	2	19	
20	29.032	49	29.210	53	43	38			42	41.5	41	39.8	SE	0.5	S	1.5	0.15	—	—	—	—		8.5	8.5	2	20	
21	29.268	46	29.474	51.5	41.5	33			36.4	35.2	35.8	34.2	NW	1	NW	2	0.10	4	4	4	4		8.5	8.5	2	21	
22	29.602	44	29.576	52	37	31			31.4	30.2	36.5	35.5	N	0.5	SE	0.5	0.13	2	2	2	2		8.5	8.5	2	22	
23	29.376	47	29.150	51	42.5	36			41.5	39.5	41.2	40.3	E	1	E	5	0.25	1.5	1.5	1.5	1.5		8.5	8.5	2	23	
24	29.024	44	28.980	51	43	40			40.4	38.8	42.6	41.5	SE	4	E	2	0.31	—	—	—	—		8.5	8.5	2	24	
25	29.090	46	29.420	48	43	36			39.2	37.8	36.5	35.4	N	1.5	N	1	0.05	2	2	2	2		8.5	8.5	2	25	
26	29.688	44	29.888	44	38	32			33	31.4	32.9	32	NW	0.5	N	0.5	0.04	5	5	5	5		8.5	8.5	2	26	
27	29.944	40	30.050	44	34	26			32.8	32	33.2	31.5	NE	0.5	E	0.5	—	3	3	3	3		8.5	8.5	2	27	
28	30.002	45	29.942	51	43	32			34.3	33.5	39	37.5	SE	1	S	2	0.09	—	—	—	—		8.5	8.5	2	28	
29	29.606																										

# 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 shape 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 giving the time only twice a day for some, and once (morning or evening) for other instruments as specified, in the following remarks, listed 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) twice a day for some, and once (morning or evening) for other instruments as specified, in the following remarks, for which the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of *adjustment* or *compensation*, as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a Standard.

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its *scales* are not true, and a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; 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 Meteoro-logical Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather, and thus the 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 a straight line with those on its ivory frame, the surface of the mercury is at the exact height from which the stem 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 tube, a *sharp tap* is produced. If this is prevented by air it may be removed to within a quarter of an inch of the top of the tube, the sun's direct rays not 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, the tube is at 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 by putting a piece of white paper behind the thermometer; 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 *Uph*, which may be improved by putting the ivory peg must be removed 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 eastern 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 by putting a piece of white paper behind the thermometer; 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.

*Projection of Thermometers.*—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed open to the south. These Boxes may be had from the opinions, arranged, so as it once to "protect" the Thermometers, and recommended; printed directions for their use may be obtained with each instrument. The "Minimax" Thermometer of Rutherford is recommended, when graduated on the glass stem and affixed to a frame separate from the "Maximus,"

Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found near the top of the tube and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with 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

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# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Gleneskay, County of \_\_\_\_\_, in Lat.  $62^{\circ} 7' N.$ , Long.  $6^{\circ} 43' E.$ , Distance from Sea 10 miles.

Height of Cistern of the Barometer above Mean Sea-level 12 feet, above Ground 5 feet.

During the MONTH of February 1872.

The Hours of Observation are of Greenwich Time (uncertain)

ELECTRICITY. Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily at 9 P.M.				HYGROMETER. No. 831-32				WIND.				RAIN.		CLOUDS.				THERMOMETERS under Ground.				GENERAL REMARKS.				Days of Month.				
	9 h. A.M.		9 h. P.M.		Protected in Shade, & feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		Readings of the H.Cup Anemometer.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.		9 h. P.M.		Temperature of Well at depth of 1 fathom, and Density.	SEA.	OZONE.	As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.							
		Barometer, No. 91	Attached Thermometer, No. 91	Barometer, No. 91	Attached Thermometer, No. 91	Max. No. 163	Min. No. 325	No. No.	Max. in Sun's ray.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	9 h. A.M.	9 h. P.M.	No. 78	Velocity (0-6), Amount (0-10), and Direction.	Velocity (0-6), Amount (0-10), and Direction.	Velocity (0-6), Amount (0-10), and Direction.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature at 9 A.M. 9 P.M.	0-10.	0-10.	Mention the hour at which storms, including Thunder and Lightning, began and ended.			
1	28.930	51	29.154	57	49	40	0	0	48.4	40	44	41	38	32	S	1	S	2	0.18					1	8.5	7.5									
2	28.888	52	29.130	56	49	41	0	0	45	44	48	44	32	3	SW	5		0.2					2	8.5	8.5										
3	29.366	52	29.492	55	49	40	0	0	44.2	40.8	40	39	3	2	S	1	S	2	0.33					3	8.5	8.5									
4	29.400	50	29.514	54	48.5	41	0	0	43.8	42.8	45	42	38	4	S	5		0.41					4	8.5	9.5										
5	29.688	50	29.588	54	46	40	0	0	44.7	42.8	42	41	38	3	S	3		0.76					5	9.5	9.5										
6	29.438	50	29.550	54	45.5	39	0	0	44.2	42.9	40	39.5	38	1	Calm	0		0.35					6	10.5	9.5										
7	29.708	50	29.870	54	44	36	0	0	42.7	41.8	36	35	Calm	0	SW	0.5		0.18					7	8.5	9.5										
8	29.940	48	30.014	54	42.5	31.5	0	0	38	37	40.2	40	Calm	0	E	0.5		-					8	9.5	9.5										
9	29.410	50.5	29.718	55	44	38	0	0	42.7	40.8	44	43	38	1	S	4		0.21					9	8.5	9.5										
10	29.616	51.5	29.600	54	48	39	0	0	44.4	44	42.8	41.5	38	0.5	S	1.5		0.16					10	10.5	9.5										
11	29.686	50	29.888	54	51	37	0	0	43.7	42	37.1	36.7	38	1	S	0.5		0.05					11	9.5	9.5										
12	29.818	50	29.936	54	46.5	34	0	0	44.8	43.2	45	42	38	1	S	3		0.03					12	8.5	9.5										
13	29.944	50	29.918	55	46	41.5	0	0	44	41.5	44	43.3	38	3	S	3		0.08					13	8.5	9.5										
14	29.944	51	29.922	55	45	41	0	0	43.2	42.8	41	39.5	38	2	S	2		0.14					14	8.5	9.5										
15	29.670	50	29.792	53.5	44	40.5	0	0	42.8	41	43.6	42	38	1	S	3		0.16					15	8.5	9.5										
16	29.632	49	29.688	54	45	39.5	0	0	43	41	41	39	38	4	S	5		0.21					16	8.5	9.5										
17	29.744	48	29.730	50	41	35.5	0	0	38	36	36.2	34.8	31	N	E	3		0.32					17	8.5	9.5										
18	29.458	43	29.368	54	42	34	0	0	40.2	39.2	41	39	N	E	2	E	1	0.36					18	8.5	9.5										
19	29.420	50	29.580	54	44.5	39.5	0	0	42.5	40	41.4	39.8	38	0.5	N	1		0.03					19	7.5	8.5										
20	29.630	49	29.778	55	43	37	0	0	39	37.6	37.6	37	N	E	0.5	E	0.5	0.07					20	8.5	9.5										
21	29.800	49	29.884	52	44	34	0	0	39.1	38.4	39	33	N	E	0.5	Calm	0	0.03					21	8.5	9.5										
22	29.946	46.5	29.930	52	44	32	0	0	41.5	40	39.5	37	38	0.5	S	1.5		0.03					22	8.5	9.5										
23	29.818	47	29.848	52	43	40	0	0	43	40	40.5	38.8	N	E	1	N	1	0.06					23	7.5	8.5										
24	29.864	46.5	29.946	53	43.5	40.5	0	0	42.5	40	42.2	41.5	N	E	1.5	N	2	0.11					24	7.5	8.5										
25	30.008	51	30.044	52	43	36.5	0	0	42	40.2	37.8	35	E	1	N	0.5		0.09					25	7.5	8.5										
26	30.104	49	30.120	53.5	42	32	0	0</td																											

# 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 Returns from different observations; and it is found that differences between Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who attend to the following Directions, secure for their Monthly Returns an accuracy and value commensurate with the labour and pains involved in making them; and for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

*Hours of Observation.*—The Council recommend that Observations be made precisely at 9 o'clock (Greenwich or Railway Time only) twice a-day, nor, as specified in the foregoing remarks, at the top of the schedule. It is hoped that the utmost care will be used in achieving one of the main objects of Meteorological Observation.

*Barometer.*—*Weather-glasses and Barometers*, though thought admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes, 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 the Barometer, the sides of the *cistern* are of leather, and thus, by the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its *scales* are not true, and of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; otherwise coincide being indicated by a little ivory float, whose stem passes freely through the lid and case of 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 screw, *to form one straight line* with those on its ivory frame, the angle of the cistern is then at the exact height from which the mercury 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 *verier*.

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 screw, a *sharp tap* is produced. If this is prevented by air entering the tube, the mercury may be removed 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 *height*, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the sun's direct rays nor the heat of a fire.

*In taking an Observation.*—The attached Thermometer is first noted: the tube must then be gently tapped and the cistern adjusted carefully, hand. 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 may 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.

*Production of Thermometers.*—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed open to the south. These Boxes may be had from the opticians, and be guaranteed against, and may be easily renewed by an observer. When the *column* of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found near the top of the tube, and must be dissolved 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

in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments, as specified in the foregoing remarks, as far as possible. Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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## OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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

  

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

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

Secretary of the Meteorological Society of Scotland, Edinburgh, 4th March, 1852.

Mr. ALFRED DEER BUCHANAN,  
Secretary of the Meteorological Society of Scotland, Edinburgh, 4th March, 1852.

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# INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS,

WITH REMARKS ON THE USE OF INSTRUMENTS.

*Hornshaw*

Page 182

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 results 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 furnish Reports to the Society will by a scrupulous 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, unless it is provided with such means of *adjustment or compensation*, as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

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

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

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed open to form a tight plug to the convex surface of the tube; a *screw tap* is produced. If this is prevented by air from entering the cistern, and got rid of, by inverting the tube, and take down the instrument; it may then be carried with 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 inverted; the space above the mercury in the tube must be ascertained whether the space will greatly facilitate 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 improved by putting a piece of white paper behind the tube, a *slam tap* is produced. Then *screen* up the tube, so as to prevent heat from the person holding the instrument, and exposed to neither the sun's direct rays nor the heat of a fire.

Barometer (cure being taken to prevent the loss of mercury so as to prevent heat from the observer's hands and person from affecting the mercury). The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

*Protection of Thermometers*.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as to once protect the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-taths, in the centre of the Box, and are recommended to instrumentmen. The "Minimum" Thermometer will be found near the top of the tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for registering the greatest heat from the sun's rays, and the least.

*Couds*.—Convenient abbreviations for Clouds.

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# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Glenrothes, County of ..., in Lat.  $62^{\circ} 2' 1''$ , Long.  $6^{\circ} 43' 8''$ , Distance from Sea 120 furl miles.

Height of Cistern of the Barometer above Mean Sea-level 12 feet, above Ground 5 feet.

During the MONTH of April 1872.

The Hours of Observation are of Greenwich Time (unrest)

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.		HYGROMETER, No. 931-32		WIND.		RAIN.		CLOUDS.		THERMOMETERS under Ground.		SEA.	OZONE.	GENERAL REMARKS.		Days of Month.					
		9 h. A.M.	9 h. P.M.	Protected in Shade, 4 feet above Ground.	Exposed Black Bulbs.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	No. of hours in which it fell.	Amount in inches.	9 A.M.	P.M.	9 h. A.M.	9 h. P.M.	Temperature of Water at depth of 10 feet, No.		As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.							
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max. No. 91	Min. No. 92	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Direction.	Force.	Velocity (0-10), and Species.	Velocity (0-10), and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.						
1	29,834	41	29,890	45	43	29,5	0	0	39	39	32	N.E.	0.8	N.E.	1	—	0	70	81	0	70	1			
2	29,890	41	29,960	44	43	29.8			36	35	36	N.E.	4	N.E.	2	0.20	—	—	—	91	81	2			
3	30,036	43	30,170	50	43	33			36.5	32.6	33	31	38	1	N.E.	0.5	—	11	71	61	3				
4	30,188	45	30,112	53	45	30			41.5	37.5	42	38.8	S.W.	0.5	S	3	—	10	71	63	4				
5	30,001	50	30,072	56	44.8	39			41.5	46.3	46.3	44.8	S.W.	3	S.W.	4	0.66	—	81	91	5				
6	30,006	53	29,712	57	52	45			44.5	48.6	47.6	45	S.W.	2	S.W.	5	0.18	—	91	91	6				
7	29,698	52.5	29,654	56	50	44.5			46.5	43.5	46	44	S.W.	3	S.W.	4.5	0.57	8	71	81	7				
8	29,570	51.5	29,956	50	47.5	34.5			43	42.2	34.5	32	S.W.	2	N.W.	1	0.78	2	71	81	8				
9	30,064	48	29,768	56	49	34			44.5	40.5	46.5	44.8	Calm	0	S	2	0.28	3	71	81	9				
10	29,534	52	29,414	55	50	41.5			48.5	46	43	42	S.W.	3	W	5	0.77	0.5	71	10.5	10				
11	29,440	50	29,438	56	49	41			46	42	45	43	S.W.	3	S.W.	3	0.38	5	81	7.5	11				
12	29,543	50	29,660	54	48	39			44	40	40.5	38.8	W	1	W	0.5	0.19	4	71	7.5	12				
13	29,840	48.5	29,744	58	52	39			43.5	39.8	46.5	43.5	S.W.	0.5	S.W.	0.5	0.47	5	71	0.5	13				
14	29,786	53	29,722	57	50	45			48	46	47.5	46.5	W	1.5	S.W.	0.5	0.48	8	8.5	8.5	14				
15	29,746	53	29,586	53	49	39			46.5	44	40	38.8	W	1.5	W	3	1.11	—	7.5	9.5	15				
16	29,622	43	29,892	50	40	33			36.5	34	37.5	36	N	3	N	4	0.23	4	71	8.5	16				
17	30,178	44	30,310	44	42	33			40	37.5	34	32.5	N	3	N.E.	2	0.19	2	71	7.5	17				
18	30,372	41	30,320	47	37	32			34.5	32	32	29.5	N.E.	1	Calm	0	—	71	8.5	18					
19	30,006	44.5	29,862	48	45	32			43.5	40.5	35.5	34.5	W	1	N.E.	0.5	0.12	2.5	7.5	8.5	19				
20	30,112	42	30,198	46	41	32			38.5	37.5	37.5	31.5	N.E.	1.5	N.E.	0.5	0.18	8.5	8.5	20					
21	30,130	41.5	30,092	45	40	28.5			34.5	32.5	29.5	28	N.E.	1	N.E.	0.5	0.40	6	8.5	8.5	21				
22	29,976	42	29,904	45	42	27			37.5	35.5	37.5	36	N	0.5	N.E.	1.5	0.13	3	9.5	8.5	22				
23	29,752	44.5	29,710	48	46	33.5			43.5	40.5	42.5	39.5	E	1	E	0.5	0.08	4	7.5	8.5	23				
24	29,688	45	29,666	49	44	37			40	39	41	40.5	N.E.	1	N.E.	1	0.36	—	7.5	8.5	24				
25	29,604	47	29,574	53	45.5	41			43.5	43	44.5	44.5	N.E.	0.5	N.E.	0.5	0.44	—	10.5	10.5	25				
26	29,628	51	29,616	56	48	40.5			47	45.5	45.5	45.5	S.E.	1	S.E.	1	0.06	—	9.5	10.5	26				
27	29,768	53	29,892	57	48.5	41			47.5	45.5	45.5	42.5	S.E.	0.5	Calm	0	0.12	5	9.5	8.5	27				
28	29,884	52.5	29,766	58.5	51.5	36			44.5	46.5	43	42.5	S.W.	0.5	Calm	0	—	10.5	8.5	10.5	28				
29	29,882	54	30,060	59	52	38			48.5	45.5	48	45.5	S.W.	1	S.W.	1	—	12.5	9.5	11.5	29				
30	29,874	55	29,978	59	52.5	46.5			50	49	49.5	48	S.W.	3	S.W.	1.5	0.46	—	9.5	10.5	30				
31																					31				
Sums.	815,515,12	95	815,386	145,150	156,16	123	144		1242.5	122.5	121.5	119.5	117.5	110	45.5	6	8.5	13	8.52	114.5					
Means.	29,846	47.5	29,851	52.5	46.5	36.5			43.5	40.5	40.5	39.5		1.5	1.5	1.6			44.5	8.5	8.53				
+ 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	2

# 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 shape of instruments, different fixed time only twice a day for some, and once (morning or evening) for other instruments as specified in the following remarks, punctually in the time of reading the instruments will be observed. Observers, in some cases, may find this impossible; and, in such instances, they are specially requested to mark opposite every reading at what time it was taken. It is not 9 o'clock.

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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the greatest convenience of reading, no adjustment of the cistern. Its *scales* are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale, their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *ticker-tape* on this little piston-rod is bought, by the adjusting screw of the mercury *slipper*, it is then in iron frame, the under surface of the mercury *slipper* being 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 in the adjustment will vitiate the readings from the cistern. It must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inverting 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 soon rid of by inverting the sun's direct rays, or the heat of a fire.

In *taking an Observation*, the attached Thermometer is first removed from its fastenings; the ivory peg must be screwed to form a tight plug to the cistern. Then *screen* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument, so that it may be carried with the cistern unbroken. Before suspending the Barometer for use, 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.

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

**Self-Registering Thermometers.**—Professor Phillips, and Negretti and Zambra's Patent "Maximun" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Maximun" Thermometer is Ruthford's recommendation when *graduated*. This thermometer is liable to two derangements both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by stretching the instrument repeatedly against the pain of the hand; when affixed to the depth of water received in gauge. The depth of part of the spirit vessels by light temperature, it will be found near the top of the tube, and must be dislodged from the observer is heated, 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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the greatest convenience of reading, no adjustment of the cistern. Its *scales* are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained

mercury can be adjusted to the *zero-point* of the fixed scale, their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *ticker-tape* on this little piston-rod is bought, by the adjusting screw of the mercury *slipper*, it is then in iron frame, the under surface of the mercury *slipper* being 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 in the adjustment will vitiate the readings from the cistern. It must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inverting 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 soon rid of by inverting the sun's direct rays, or the heat of a fire.

In *taking an Observation*, the attached Thermometer is first

removed from its fastenings; the ivory peg must be screwed to form a tight plug to the cistern. Then *screen* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument, so that it may be carried with the cistern unbroken. Before suspending the Barometer for use, 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.

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

**Self-Registering Thermometers.**—Professor Phillips, and Negretti and Zambra's Patent "Maximun" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Maximun" Thermometer is Ruthford's recommendation when *graduated*. This thermometer is liable to two derangements both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by stretching the instrument repeatedly against the pain of the hand; when affixed to the depth of water received in gauge. The depth of part of the spirit vessels by light temperature, it will be found near the top of the tube, and must be dislodged from the observer is heated, 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

have been compared with a *Standard*.

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# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thurso, Town, County of Sutherland, in Lat.  $62^{\circ} 2' 4''$ , Long.  $6^{\circ} 43' 8''$ , Distance from Sea 120 fms.

Height of Cistern of the Barometer above Mean Sea-level 12 feet, above Ground 5 feet.

During the MONTH of June 1872

The Hours of Observation are of Greenwich Time (unwritten)

ELECTRICITY. Days of Month.	BAROMETER.			SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.			HYGROMETER. No. 891-32			WIND.			RAIN.			CLOUDS.			THERMOMETERS under Ground.			SEA.			ZONE.			GENERAL REMARKS.					
	9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulb.		9 h. A.M.		9 h. P.M.		Readings of the H.C.P. Anemometer		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.		9 h. P.M.		Temperature of Wind at depth of 10 ft. No. 78		Temperature at depth of 10 ft. and density.		As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.				
	Barometer.	Attachment Thermometer.	No. 91	Barometer.	Attachment Thermometer.	No. 91	No. 3165	Max. in Sun.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	9 h. A.M.	No. 78	Velocity (0-8) and Direction.	Amount (0-10) and Species.	Velocity (0-8) and Direction.	Amount (0-10) and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of Wind at depth of 10 ft. No. 78	Temperature at depth of 10 ft. and density.	9 h. A.M.	9 h. P.M.	Mention the hour at which Storms, including Thunder and Lightning, began and ended.	
1	29.932	52.24	862	55	30.8	37.5	47.3	43.4	46	44.5	SW	1	S	1			0.21					6	0	0	0	77	81	77	81	1			
2	29.800	53	29.676	57	51.5	46	50.2	47.4	47.4	46.8	SE	1	SE	1			0.24					—	—	—	—	81	83	81	83	2			
3	29.762	57	29.368	58	50	46.5	49	48.5	47.4	47.4	E	0.5	E	0.5			0.04					—	—	—	—	91	92	91	92	3			
4	29.932	55.5	29.974	61	53	47	50	48	47	45.8	SW	0.5	S	0.5			—					5	—	—	—	1pm	1pm	1pm	1pm	4			
5	29.866	56	29.944	60	54	46	49	48	47	45.7	SE	1	SE	0.5			0.14					3	—	—	—	91	92	91	92	5			
6	30.030	55	30.046	58	49	46	47.7	47.4	46.7	46.2	N.E.	0.5	E	0.5			0.10					—	—	—	—	6pm	6pm	6pm	6pm	6			
7	29.910	57	29.868	60	55	46	53.5	52	46.9	45.7	N.E.	0.5	N.E.	0.5			—					6	—	—	—	6pm	6pm	6pm	6pm	7			
8	29.760	55	29.798	59	52	45	48.5	47.8	46.8	46	N.E.	1	N.E.	0.5			0.07					—	—	—	—	91	92	91	92	8			
9	29.736	56	29.686	57.5	55.5	45.5	51	49.5	48	47.4	N.E.	0.5	E	0.5			0.02					2.5	—	—	—	80	81	80	81	9			
10	29.704	54	29.742	55	49	47	47.9	47.5	47.3	46.9	N.E.	1	N.E.	1			0.30					—	—	—	—	91	92	91	92	10			
11	29.660	53	29.720	57.5	51	46	50	49.5	48.3	47.7	N.E.	0.5	N.E.	0.5			0.07					—	—	—	—	6pm	6pm	6pm	6pm	11			
12	29.738	56	29.818	60	55	47.5	49.7	49.4	48.1	47.1	N.E.	0.5	Calm	0			0.08					—	—	—	—	10	11	10	11	12			
13	29.886	56	29.988	61	56	47.5	53.5	51.5	50.8	49.7	Calm	0	Calm	0			—					7	—	—	—	91	92	91	92	13			
14	30.030	56	30.054	59.5	53	49	50.4	49	50	49.7	E	0.5	E	0.5			—					—	—	—	—	80	81	80	81	14			
15	29.940	56.5	29.986	59	51.5	49	50.3	49.8	49.7	49.3	E	0.5	E	0.5			0.22					—	—	—	—	4pm	4pm	4pm	4pm	15			
16	30.180	57	30.278	61.5	56.5	48	53.5	51.5	52.2	50.5	SW	0.5	S	0.5			0.04					4	—	—	—	91	92	91	92	16			
17	30.234	57	30.322	60	53.5	48.5	51.4	50.8	50.5	50.4	Calm	0	Calm	0			0.06					2	—	—	—	4pm	4pm	4pm	4pm	17			
18	30.020	56	29.922	58	52	49.5	50.8	50.5	50.3	50.2	N.E.	0.5	Calm	0			0.06					—	—	—	—	80	81	80	81	18			
19	29.934	58	29.888	60.5	53	49	52.5	52	50.8	50.4	SE	0.5	SE	0.5			0.04					—	—	—	—	80	81	80	81	19			
20	30.020	58	30.072	62	57	48.5	54.5	51.5	51.3	49.7	SW	0.5	Calm	0			—					12	—	—	—	30	31	30	31	20			
21	30.056	58	29.948	62.5	57	47	53.5	51.5	50	48.7	E	0.5	Calm	0			—					12	—	—	—	30	31	30	31	21			
22	29.844	58	29.870	60	53	47	53.5	54.4	50.8	50.4	N.E.	1	Calm</																				

# 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 by the application of 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 shape 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 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 Railways) Time only twice a day for some, and once (morning or evening) for other instruments, as specified in the following remarks.

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scales are not true, 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 feathered, and thus, by

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

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 inverting 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 tube. It must be perfectly perpendicular, and exposed to neither the sun's direct rays nor the heat of a fire.

In *taking an Observation*, the attached Thermometer is first noted: the tube must then be gently tapped and the cistern adjusted carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be improved by putting a piece of white paper behind the tube. The Barometer (care being taken to prevent the loss of mercury) and gently tapping it, and if this fails, the instrument must be repeated.

The Barometer should be suspended in a good light, which may be removed 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 inverting 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 tube. It must be perfectly perpendicular, and exposed to neither the sun's direct rays nor the heat of a fire.

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**Protection of Thermometers.**—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed open to the south. These Boxes may be had from the Opticians, and are arranged so as to protect the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-bars, in the centre of the Box, and for each instrument: The "Minium" Thermometer of the glass stem read daily, and the readings entered in the returns on the day

on which the rain fell.

**Snowfalls** may, for convenience, be registered in the rain gauge, and may be easily remedied by observing the colour of the snow, or the depth of water received in gauge. The depth of the snow must be measured in some open place where no drifts are 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 do too careful to register observations only, and nothing that partakes of the nature of deduction or inference.

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

*Janv 1892*

## OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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

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

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

columns, under the following conditions:—when a Show shower occurs it must be noted in the "Remarks," and the letter S to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drifts are 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 do too careful to register observations only, and nothing that partakes of the nature of deduction or inference.

The above remarks apply equally to the Thermometers for registering the greatest heat from the sun's rays, and the least

heat from radiation during night. Their bulbs have a black coating, which may easily be made, or mounted, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the sun, and are freely exposed to the sun, and the "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers, or at the top of the schedule; it is secured that those persons who observed, in time of reading the instruments will be informed of the results, and it is found that differences between the and the "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers, or at the top of the schedule; it is secured that those persons who observed, in time of reading the instruments will be informed of the results, and it is found that differences between the and the "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers, or at the top of the schedule; it is secured that those persons who observed, in time of reading the instruments will be informed of the results, and it is found that differences between the and the "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. 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# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thershaw, Duro, County of, in Lat.  $62^{\circ} 27'$ , Long.  $6^{\circ} 13' 8''$ , Distance from Sea  $120$  miles.

Height of Cistern of the Barometer above Mean Sea-level  $12$  feet, above Ground  $5$  feet.

During the MONTH of July 1872.

The Hours of Observation are of Greenwich Time (*uncertain*)

ELECTRICITY. Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.		HYGROMETER. No. 831-37		WIND.		RAIN.		CLOUDS.		THERMOMETERS under Ground.		SEA.	ZONE.	GENERAL REMARKS.		Days of Month.			
	9 h. A.M.	9 h. P.M.	Protected in Shade, 4 feet above Ground; A	Exposed Black Bulbs.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	Readings of the H.Cup Anerometer.	No. of hours in which it fell, No. 78	Amount in inches.	Velocity (0—6) and Direction.	Velocity (0—6) and Species.	9 h. A.M.	P.M.	9 h. A.M.	9 h. P.M.					
	No. 91	Barometer.	Air-thermometer.	Air-thermometer.	Max. in Sun.	Min. on grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	9 h. A.M.	9 h. P.M.	No. 3 inches.	No. 12 inches.	No. 22 inches.			
1	29,666	56	29,720	60	53.5	48.5	51.5	50.0	50.8	49.9	SE	1.5	Calm	0	0.09	—	—	—	—	8.8	8.0	1
2	29,816	57.5	29,950	61	60.5	48	58	53.5	54	51.5	W	0.5	W	0.5	—	—	—	—	4.5	7.0	2	
3	29,954	58	29,909	61	58	50	56	54.7	53.4	54	SW	0.5	SW	1	0.11	—	—	—	8.5	8.1	3	
4	29,942	59	29,958	62	58.5	50	58	56.5	50	49.6	SW	0.5	Calm	0	0.32	—	—	—	8.5	8.0	4	
5	29,846	59	29,740	62	58	50	54.5	53.5	52.4	51.5	SW	1	SW	1.5	0.21	—	—	—	5.5	9.1	5	
6	29,658	58	29,938	61	57.5	50	54	52	51.5	48.5	SW	3	SW	1.5	0.09	—	10	—	8.5	8.0	6	
7	30,040	57.5	30,146	61	58.5	50.5	57	51.5	50.7	49.4	SW	2	SW	0.5	—	—	11	—	7.5	7.0	7	
8	30,084	57	29,899	60	53.5	45	53.4	51.7	49.5	48.7	SE	0.5	NE	0.5	0.36	—	—	—	8.5	9.0	8	
9	29,608	56	29,592	60	55	49	52.8	52.5	51.2	51	NE	0.5	Calm	0	0.90	—	—	—	5.5	10.5	9	
10	29,580	57	29,880	60	53	50	51.5	50.6	50	49	SW	1.5	SW	2	0.20	—	1.5	—	8.5	9.0	10	
11	29,946	58	30,188	62	58	49.5	53.5	51	52.5	51	SE	0.5	Calm	0	—	—	4	—	8.5	9.2	11	
12	30,312	59	30,390	62	55	48.5	51.5	50.4	48.5	47.6	Calm	0	Calm	0	—	—	—	—	6.5	8.0	12	
13	30,326	57	30,334	60	58	44	53.3	51.7	49.8	49.3	Calm	0	Calm	0	—	—	12	—	7.5	8.0	13	
14	30,342	58	30,288	62	66	48	63	56	54	54	NE	0.5	W	0.5	—	—	12	—	8.5	7.5	14	
15	30,046	59.5	29,972	60	64	50	60	54	50.1	47.2	W	0.5	W	0.5	—	—	8	—	7.5	7.5	15	
16	30,010	55	30,032	59	61.5	43	54	49	45.3	42.6	N	1	N	0.5	—	—	14	—	5.5	7.5	16	
17	29,950	54	29,974	57	64	43	58.2	49.1	46	44	N	0.5	N	0.5	—	—	11	—	7.5	7.5	17	
18	30,010	54	30,058	57	59	45	56.7	50.7	46.3	43.3	N	0.5	NW	0.5	0.06	—	10	—	7.5	7.5	18	
19	30,058	54.5	30,090	58.5	59	42.5	56	51	44	42	W	0.5	W	0.5	—	—	17	—	5.5	6.5	19	
20	29,954	55	29,768	60	53	40	52	50.8	52.4	52	SE	1.5	SE	1	0.81	—	—	—	8.5	9.5	20	
21	29,724	58	29,806	63	62	52	55.3	54.4	53.5	52.2	W	1	Calm	0	0.27	—	9	—	8.5	8.5	21	
22	29,770	59	29,658	61	56	52	52.6	52.8	52	51.4	SE	0.5	Calm	0	0.17	—	4	—	6.5	8.0	22	
23	29,750	58.5	29,996	60	59.5	51	56.5	55.5	51.3	50.3	W	1	Calm	0	0.27	—	—	—	5.5	9.5	23	
24	30,126	57	30,260	62	53	50	51.5	50.8	51.3	50.4	E	0.5	E	0.5	0.05	—	—	—	8.5	8.5	24	
25	30,374	58	30,438	60	56.5	50	53.6	51.8	50.3	49.8	E	0.5	E	0.5	—	—	—	—	8.5	8.5	25	
26	30,450	56	30,394	59	56.5	45.5	50.3	47.2	40.5	47.2	E	0.5	NE	1	—	—	—	—	7.5	7.5	26	
27	30,384	57	30,284	59	56.5	45.5	54.8	50	50.7	46.8	N	1	NE	1	—	—	—	—	7.5	7.5	27	
28	30,200	57	30,186	59	59	46.5	56.6	50.5	49.8	45	N	1	NE	0.5	—	—	—	—	7.5	7.5	28	
29	30,170	58	30,190	58	62	48.5	55.5	51	51.8	49	N	1.5	NE	1	—	—	12	—	7.5	7.5	29	
30	30,188	56	30,146	57	61	46.5	53.7	48.8	48.8	45.5	N	0.5	N	0.5	—	—	10	—	7.5	7.5	30	
31	30,064	56	30,000	58	56.5	48	52.6	47.4	52.8	48	N	0.5	Calm	0	—	—	9	—	6.5	7.5	31	

#### NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteors.
cl.	cirrus.	ms.	" nimbus.
cl-cu.	cirro-cumulus.	r.	" rain.
cu.	cumulus.	h. r.	" heavy rain.
cu-a.s.	cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	deev.	s.	" stratus.
f.	ford.	sc.	" squall.
fr.	fr.	sl.	" snow.
h.	haze.	so. hn.	" solar halo.
h. d.	heavy dew.	sq.	" squalls.
h. l.	light dew.	sqs.	" squalls.

# 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 *Observation 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 incomparably, may arise from dissimilarity in the position or shelter of instruments, from the use of differently constructed instruments. It is therefore hoped, that those persons who are specially requested 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 most punctual in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances, they are especially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

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

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

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

When a Barometer having adjustable surfaces has to be removed from its fastening, the ivory peg must be screwed so as to form a tight plug to the cistern. Then screw up 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. 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 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, —usually the lower edge of the vernier, which must be carefully adjusted to form exactly tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

*Protection of Thermometers.*—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed

4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to protect the Thermometers, and 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 not desirable, doors are also made to rain returns. They arise partly from unfavourable situations open to the south. These Boxes may be had from the opticians, and may be easily remedied by an observer.

*Self-Registering Thermometers.*—Professor Phillips' and Negretti and Zambra's Patent "Maximum" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Maximum" Thermometer is recommended when graduated on the glass stem, read daily, and affixed to a frame separate from the "Minimum." This Thermometer is liable to two derangements, by being jarred against, and may be easily remedied by an observer.

When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found near the top of the tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid.

These instruments should be hung horizontally. The above remarks apply equally to the Thermometers for registering the greatest heat from the sun's rays, and the least

radiation during night. Their bulbs have a black coating, and paint involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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The Barometer should be suspended in a good light, which may be improved by putting a piece of white paper behind 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 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, —usually the lower edge of the vernier, which must be carefully adjusted to form exactly tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

*Protection of Thermometers.*—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed

4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to protect the Thermometers, and 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 not desirable, doors are also made to rain returns. They arise partly from unfavourable situations open to the south. These Boxes may be had from the opticians, and may be easily remedied by an observer.

*Self-Registering Thermometers.*—Professor Phillips' and Negretti and Zambra's Patent "Maximum" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Maximum" Thermometer is recommended when graduated on the glass stem, read daily, and affixed to a frame separate from the "Minimum." This Thermometer is liable to two derangements, by being jarred against, and may be easily remedied by an observer.

When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found near the top of the tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid.

These instruments should be hung horizontally. The above remarks apply equally to the Thermometers for registering the greatest heat from the sun's rays, and the least

radiation during night. Their bulbs have a black coating, and paint 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 most punctual in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances, they are especially 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*.

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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 *scales* are not true, induces but so much shorter as to compensate the error that otherwise arise from the fluctuations 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 the surface of the mercury is then at the exact height from which the tube of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the index-float 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*.

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# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thersham Therse, County of ...<sup>from 20th height to feet</sup>, in Lat. 62° 2' N., Long. 6° 43' E., Distance from Sea 120 miles (from 20th height to feet)  
 Height of Cistern of the Barometer above Mean Sea-level 12 feet, above Ground 5 feet. During the MONTH of August 1872.  
 The Hours of Observation are of Greenwich Time (unjust)

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.				HYGROMETER, No. 83482				WIND.		RAIN.		CLOUDS.		THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.		Days of Month.	
		Barometer,	Attached Thermometer, No. 91	Protected in Shade, 4 feet above Ground.	Exposed Black Bulb.	9 h. A.M.	9 h. P.M.	Dry bulb.	Wet bulb.	9 h. A.M.	9 h. P.M.	Readings of the H.Cup Anemometer.	No. of hours in which it fell.	No. 78	9 A.M.	P.M.	SUNSHINE.	9 h. A.M.	Temperature of Wells at depth of 0-10.	Temperature at 1 fathom and Density.	Heidenheim					
		Barometer,	Attached Thermometer, No. 91	Max. Sun's rays	Min. Sun's rays	No. 165	No. 3237	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force	No. 9 h. A.M.	9 h. P.M.	Velocity (0-6), and Direction.	Velocity (0-10), and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	0 A.M. 9 P.M.	0-10.			
		inches.	inches.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.	o.
1	29,928	56	29,906	59	59	51	56	52.6	52.3	49.4	N	0.5	N	0.5	—	—	6	—	—	—	—	—	—	—	—	1
2	29,896	56	29,996	59	59	46	50	46	48.1	46.1	N	1	N	0.5	—	—	10	—	—	—	—	—	—	—	—	2
3	30,018	56	30,050	61	55	73	51	49.7	46.4	44	E	0.5	E	0.5	0.04	—	9	—	—	—	—	—	—	—	—	3
4	30,029	56	30,010	59	55	76	50.6	46.8	50	45.4	N	0.5	N	0.5	—	—	13	—	—	—	—	—	—	—	—	4
5	29,904	55	29,836	57	55	46	52.1	48.9	50	45.5	NE	0.5	NE	0.5	0.04	—	10	—	—	—	—	—	—	—	—	5
6	29,810	54	29,814	57	50	40	55.	51.	47.	45.5	NE	0.5	NE	0.5	0.04	—	—	—	—	—	—	—	—	—	—	6
7	29,790	54	29,860	58	53	41	50.7	47.1	41	39	N	0.5	Calm	0	0.02	3	—	—	—	—	—	—	—	—	—	7
8	29,860	54	29,938	59	54.5	37	47.8	46.3	44.5	42.3	NW	0.5	Calm	0	0.09	9	—	—	—	—	—	—	—	—	—	8
9	29,932	54	29,956	58	55	41.5	51.7	46.7	46.6	30.0	SE	0.5	—	—	—	—	12	—	—	—	—	—	—	—	—	9
10	29,912	54	29,910	57	51.5	41.5	50	47.7	47.7	NE	1	NE	1	—	—	—	—	—	—	—	—	—	—	—	—	10
11	29,910	55	30,008	57	53	48.5	52.7	50.4	50	48.8	NE	0.5	NE	0.5	0.27	—	—	—	—	—	—	—	—	—	—	11
12	30,116	55	30,218	57	59.5	44.5	58	52.5	44.5	43.3	NE	1	Calm	0	—	6	—	—	—	—	—	—	—	—	—	12
13	30,250	56	30,304	58	56	42	54	49.5	46.4	45	Calm	0	3	0.5	—	12	—	—	—	—	—	—	—	—	—	13
14	30,221	56	30,174	60	56	46	51	50.5	49.6	43	1.5	3	0.5	0.21	—	—	—	—	—	—	—	—	—	—	14	
15	30,168	56	30,162	62	58	50	55	52	51	50	S	1	SE	0.5	0.08	5	—	—	—	—	—	—	—	—	15	
16	30,040	59	29,750	61	54.5	50	54	53	52	48	SE	0.5	SE	0.5	0.07	—	6	—	—	—	—	—	—	—	—	16
17	29,704	59	29,878	65	58.5	52	57	54.5	52	43	S	2	0.35	—	—	6	—	—	—	—	—	—	—	—	—	17
18	30,186	60	30,384	63	61	53	60	56	53	51	SSW	1	Calm	0	—	9	—	—	—	—	—	—	—	—	—	18
19	30,404	54	30,382	62	56	51	52	51	51.5	51.5	SE	0.5	0.04	—	—	—	—	—	—	—	—	—	—	—	—	19
20	30,376	58	30,340	61	54	49.5	53.2	52.5	50	49.2	Calm	0	Calm	0	0.03	—	—	—	—	—	—	—	—	—	—	20
21	30,350	59	30,398	64.5	57	47	52.2	51	52	50.1	NE	0.5	E	1	—	4	—	—	—	—	—	—	—	—	—	21
22	30,414	60	30,392	61	58	50	52.8	50	51.2	49	E	1	E	0.5	—	8½	—	—	—	—	—	—	—	—	—	22
23	30,332	58	30,368	57.5	59	48	54	49.8	48	45.2	E	1	E	0.5	—	9	—	—	—	—	—	—	—	—	23	
24	30,190	58	30,168	61	60	44.5	53	51.8	54	53	Calm	0	SW	0.5	0.05	3	—	—	—	—	—	—	—	—	24	
25	30,194	69	30,020	61.5	60	52.5	58	54.5	52	52	W	1	W	0.5	0.08	11	—	—	—	—	—	—	—	—	25	
26	30,020	62	30,170	59.5	59.5	47	53.5	52	49	45	N	0.5	N	0.5	0.01	7	—	—	—	—	—	—	—	—	26	
27	30,220	59	30,130	58.5	56	45.5	53	47.8	49	48	SE	0.5	SE	0.5	0.46	4	—	—	—	—	—	—	—	—	27	
28	30,020	55.5	30,034	59	51	47.5	49.5	47.2	49.5	46.2	NE	2	E	2	0.66	—	—	—	—	—	—	—	—	—	28	
29	29,932	59	29,818	64	55	48	51.8	46.8	50.1	47	SE	3	E	3	—	2	—	—	—	—	—	—	—	—	29</	

# INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance that the Scientific Meteorological Society has proposed to itself, is to secure *perfect uniformity* in the system of observation pursued at all 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 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 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 labor and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among several Returns, without which the Society's Reports will 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 Raiii Time only) twice a-day for some, and once (morning or evening) for other instruments, as specified, in the following remaining schedule. It is hoped that the utopian 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 off 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 Observation 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 should have been compared with a *Standard*.

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

An excellent Barometer is constructed by Mr Adie of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its scale-inches are not 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 the Barometer, the sides of the *cistern* are of leather, and thus aid of a screw acting on the bottom, the surface of the containing mercury can be adjusted to the *zero-point* of the fixed screw, *to form one straight line* with those on its ivory frame; the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed as to form a tight plug to the cistern. Then screw up 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 incising the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air being introduced into 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 the plan fails, the instrument must be repaired.

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

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

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

The above remarks apply equally to the Thermometers for registering the greatest heat from the sun's rays, and the least

from radiation during night. Their bulbs have a black coating which may easily be made, or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "Maximum" should be freely exposed to the sun and the "Minimum" Thermometers ought frequently to be compared with the dry bulb of the Hygrometer. The freezing-point of each Thermometer (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

*The Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and *well-tested form* of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb,—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to 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— $39^{\circ}9$ ,  $40^{\circ}0$ , or  $40^{\circ}1$ ; or again,  $40^{\circ}4$ ,  $40^{\circ}5$ , or  $40^{\circ}6$ , according as it indicates a little under, an exact coincidence with, or a little over  $40^{\circ}$ , or  $40\frac{1}{2}^{\circ}$  respectively. So also  $40\frac{1}{4}^{\circ}$ , and  $40\frac{3}{4}^{\circ}$ , more or less must be registered  $40^{\circ}2$  or  $40^{\circ}3$ , and  $40^{\circ}7$  or  $40^{\circ}8$  respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the *index* which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry *bulbs*, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

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

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

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

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

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

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction,"  $\frac{6}{2}$ , S. W., (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud column, an entry of  $\frac{2}{4}$ , cu-st. 2, cu-st.

"regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent 2-tenths by lower clouds of the *cumulo-stratus* kind.

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

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

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

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

*Ozone.*—Mention whether Schönbein's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus  $\frac{3}{4}$ , as an *ozone* entry; the schedule, will indicate that the ozone paper is tinted as  $\frac{3}{4}$  on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4"; *i.e.*, that it is *blowing fresh*.

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

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

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

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

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

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

The Council 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.

## OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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

EDINBURGH

*General Post Office Building, Second,* (see entry of) the *Metropolitan Society of Second,*

Mr. ALEXANDER BUCHAN,

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

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

*Secretary of the International Society of Secondaria,*

Society of Scotland,

A circular stamp with the text "STATE LIBRARY NEW SOUTH WALES" around the perimeter and "1972" in the center.

Hornbeam  
Aug. 1822





# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Taroe Islands, in Lat.  $62^{\circ} 2' S$ , Long.  $6^{\circ} 43' E$ , Distance from Sea 50 feet miles.

Height of Cistern of the Barometer above Mean Sea-level 40 feet, above Ground 4 feet.

During the MONTH of October 1872.

The Hours of Observation are not Greenwich Time.

ELECTRICITY. Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.				HYGROMETER.				WIND.				RAIN.				CLOUDS.				THERMOMETERS under Ground.				SEA. No. 833 <i>Schonf.</i>	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.		Readings of the H.Cup Anemometer.		No. of hours in which it fell.		Amount in inches.		Velocity (0-5) and Direction.		Velocity (0-10) and Direction.		Amount (0-10) and Species.		Hours.		9 h. A.M.		Temperature of WELL at depth of 1 foot, and Densit.							
	Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max. No. 765	Min. No. 327	Max. in Sun's rays No. 91	Min. in Sun's rays No. 91	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	No. 78	No. 78	Direction.	Force.	Direction.	Force.	9 h. A.M.	Velocity (0-5) and Direction.	Amount (0-10) and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	9 A.M. 9 P.M.	9 A.M. 9 P.M.	As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.								
1	29.516	55.5	29.176	60	46	37	43.2	40.5	44.8	42.2	N	1	N.E.	4			0.35				6				6.1	9.4			1							
2	29.084	57	29.106	61	45	37.5	43	41	38.5	37	N.E.	4	N.E.	4			0.84				—				10.4	9.4			2							
3	29.040	54	29.330	58	39	34	36	35	35.2	34	N	5	N	5			1.22				—				9.5	9.5	More times in the day the wind arose to a gale (6). From other places in these islands that there were no gales.			3						
4	29.878	51.5	30.200	48.5	39.5	33	37.2	33	35.4	32	N	4	S.W.	2			0.20				—				47.8	8.4	Snow.			4						
5	30.070	53	29.794	60	48	34	41.2	39.2	46.4	40	S	4	S.W.	3			0.33				—				9.4	10.3	From 12 o'clock a violent gale (5) to 8.4 p.m. then suddenly decreasing and at 9 p.m. the wind 3. — Barometric 4 p.m. 29.920 at 6.30.			5						
6	29.836	60	29.500	65	53.5	47.5	51.4	48.5	52	50.2	S.W.	2	S.E.	2			0.435				—				8.1	10.2			6							
7	29.534	62	29.516	57	49	47	48.8	45.2	48.2	44	S.W.	4	S	5			0.11				—				8.4	5.6			7							
8	29.396	59	29.264	56.5	49.5	41	47.2	43	42	39.5	S.W.	4	S.W.	2			0.265				—				7.4	9.2	Sometimes in the day gale of wind (5).			8						
9	29.214	63	29.212	61	49	41	47.5	43.8	44	41.2	S	4	S.W.	0.5			0.08				—				9.4	7.4			9							
10	29.330	57	29.474	59	46	37.5	41.2	39	40.2	38.5	N.W.	2	N	1			0.10				—				9.2	7.1			10							
11	29.586	59	29.716	57	47	35	42	38.4	39.2	37	N	0.5	N	1.5			0.02				—				5.4	4.5	Aurora Borealis			11						
12	29.802	58	29.848	57	44	37.5	41.5	38.2	39.8	36.4	N	2	N	1.5			0.02				—				5.1	1.1			12							
13	29.940	57.5	29.930	56.5	48	35.5	48.4	39.8	42.4	39	N	1	S.W.	0.5			—				—				2.1	2.6	from 10 a.m. gale of wind (5).			13						
14	29.752	56	29.600	57	49	42.5	47.2	43.2	49	47.6	S	4	S	5			0.61				—				8.4	4.0			14							
15	29.624	62	29.610	58	49.5	37.5	46.8	43	38.2	37	W	2	Calm	0			0.32				—				4.2	3.0			15							
16	29.620	59	29.932	52	45.5	36.5	44.5	42.5	41.2	38	N	2	N	3			0.31				—				3.2	5.2			16							
17	30.104	57.5	30.062	55	49	32	41	37.5	34	32	N	2	Calm	0			—				—				2.1	2.6			17							
18	29.916	58	29.876	57.5	47	33	44.8	41.8	46.2	43	S.W.	3	W	2			0.045				—				8.1	7.4	Air. bor.			18						
19	29.734	61	29.542	57	49.5	33.5	48.5	47	48.2	47	E	0.5	S.E.	1			0.12				—				8.6	9.1	Snowy rain			19						
20	29.348	58	29.524	60	49.5	44.5	45	42.8	47.2	44	S	4	S.W.	4			0.24				—				10.4	8.4			20							
21	29.628	60.5	29.668	57	48	38	47	43.5	33	36.8	S	3	Calm	0			0.20				—				4.2	3.0			21							
22	29.662	69	29.564	60	44	36.5	43.5	41.5	41.5	39	N	2	N	2			0.455				—				4.2	3.0			22							
23	29.424	58.5	29.300	57	42.5	39	42.6	40.2	40	38.4	Calm	0	Calm	0			0.03				—				5.0	2.0			23							
24	29.288	56	29.440	56.5	48.5	38.5	46.8	45.2	48	46.4	E	4	E	3			0.08				—				2.1	2.6			24							
25	29.614	60	29.658	59	49	46.5	48.5	48	48.2	47	E	2	E	4			0.245				—				10.4	8.4	Fog and rain			25						
26	29.662	60	29.632	55.5	49	46.5	48.2	47	47.6	46.6	E	4	E	4			0.90			</																



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Islands, in Lat. 62° 25', Long. 6° 43' 8", Distance from Sea 50 feet miles.

Height of Cistern of the Barometer above Mean Sea-level 40 feet, above Ground 4 feet.

During the MONTH of November 1872.

The Hours of Observation are not of Greenwich Time.

ELECTRICITY. Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS Read Daily, at 9 P.M.				HYGROMETER. No. 832 & 829.				WIND.				RAIN.				CLOUDS.				THERMOMETERS under Ground.				SEA. No. 833 0-10.	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 Aneroidmeter.		No. of hours in which it fell.		Velocity (0-6) and Direction.		Velocity (0-6) and Species.		No. 78		9 h. A.M.		9 h. P.M.		SUNSHINE.		9 h. A.M.		9 h. P.M.		
	No. 91	Barometer.	Attached Thermometer.	No. 91	Max. in Sun's rays	Min. on Grass.	No. 765	No. 3237	Dry bulb.	Wet bulb.	Wet bulb.	Direc.	Force.	Direction.	Force.	No. 78	Amount (0-10) and Species.	Amount (0-10) and Species.	Amount (0-10) and Species.	Velocity (0-6) and Direction.	Velocity (0-6) and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature and humidity.	9 A.M.	9 P.M.	9 A.M.	9 P.M.	Temperature of Wind at depth of 10 feet, No. 833	Scheibicu	GENERAL REMARKS.				
1	29.322	60	29.386	54.5	42	35	39.2	37	36.5	34.5	N	2	N	1	0.035	—	—	—	—	—	—	—	—	—	—	—	—	—	4/2	3/1	air bor.	1					
2	29.392	53.5	29.508	54.5	39.5	34	38.4	34.6	34.2	32	N.E.	3	N	1	0.06	3	—	—	—	—	—	—	—	—	—	—	—	—	9/3	5/1		2					
3	29.684	61	29.720	52.5	44	31	37.5	36	44	39.5	Calm	0	SW	3	0.065	5	—	—	—	—	—	—	—	—	—	—	—	—	5/6	7/3		3					
4	29.596	59.5	29.244	53	47	37.5	45.2	41	47	45.2	S	4	S	4	0.04	—	—	—	—	—	—	—	—	—	—	—	—	9/4	10/1	a.m. fog and rain. - From 10 a.m. the wind S.	4						
5	29.158	54	28.936	56.5	51	46.5	48	47.6	47.5	47	S	0.5	S	5	0.49	—	—	—	—	—	—	—	—	—	—	—	—	10/5	10/7		5						
6	28.630	60	28.668	56	51.5	42	48.2	45	43.2	38.6	S	4	W	5	0.34	—	—	—	—	—	—	—	—	—	—	—	—	9/4	9/5	air bor. - a.m. fog in the night very violent gale of wind	6						
7	29.100	58	29.460	51.5	43	35	39.5	36	35.2	33.5	W	5	W	4	0.39	—	—	—	—	—	—	—	—	—	—	—	—	9/5	8/4	hail. air bor.	7						
8	29.618	46.5	29.654	54.5	38	33	36	32	33.5	32.8	N.W.	2	Calm	0	0.07	5	—	—	—	—	—	—	—	—	—	—	—	8/2	3/0	Snow.	8						
9	29.612	51	29.818	52	37.5	30.5	37	35	31.8	29.2	N.E.	2	N	2	0.095	—	—	—	—	—	—	—	—	—	—	—	—	9/2	4/2	air bor.	9						
10	30.020	46	30.198	62	36.5	30	34.6	35.5	36	33.8	N	3	N	2	0.23	—	—	—	—	—	—	—	—	—	—	—	—	9/3	5/2	Snow	10						
11	30.336	57.5	30.436	52.5	40	33	39.5	36.2	33.2	31.8	N	2	Calm	0	0.06	2	—	—	—	—	—	—	—	—	—	—	—	4/6	3/2	air bor.	11						
12	30.522	57	30.564	51.5	41	30	37.8	35.5	39.2	36.5	Calm	0	SW	0.5	0.005	5	—	—	—	—	—	—	—	—	—	—	—	2/6	3/6		12						
13	30.566	60	30.410	54	49.5	38	42.2	39.5	40.2	36.8	S	3	Calm	0	—	4/2	—	—	—	—	—	—	—	—	—	—	—	4/5	5/2		13						
14	30.246	56.5	30.210	62	46.5	38	41.2	38.5	46.2	42.5	SW	2	W	2	0.01	—	—	—	—	—	—	—	—	—	—	—	—	8/1	7/2		14						
15	30.276	56	30.262	53.5	47	39	46.6	44	42.4	40.5	SW	2	Calm	0	—	3	—	—	—	—	—	—	—	—	—	—	—	7/1	8/6		15						
16	30.184	58	29.972	55	44	37	41.5	40	42.5	41	Calm	0	E	0.5	0.06	—	—	—	—	—	—	—	—	—	—	—	4/6	6/6		16							
17	29.940	53.5	29.584	54	46.5	41	45.8	43.2	44.2	42.2	S	3	S	4	0.185	—	—	—	—	—	—	—	—	—	—	—	—	10/3	9/14		17						
18	29.420	55	29.524	52	46.5	43	46.1	41.5	44.6	42	S.E.	4	S	4	0.05	4/2	—	—	—	—	—	—	—	—	—	—	—	8/3	8/4		18						
19	29.526	54	29.384	51	46	42.5	45.5	42.2	44	40.8	S.E.	3	E	3	0.04	4	—	—	—	—	—	—	—	—	—	—	—	8/3	6/3		19						
20	29.140	50	29.066	53.5	46.5	41.5	42.2	40.6	44.5	43	E	4	E	4	0.23	—	—	—	—	—	—	—	—	—	—	—	8/1	9/3	Tog a. rain	20							
21	29.248	56	29.328	55	47	42.5	46.2	44.4	45.2	43.6	S	3	S.E.	3	0.39	2	—	—	—	—	—	—	—	—	—	—	—	4/5	10/3	a.m. Tog	21						
22	29.272	57	29.264	54	45.5	42.5	44.8	43	44	42.5	E	3	N.E.	2	0.145	—	—																				



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Islands, in Lat.  $62^{\circ} 21'$ , Long.  $6^{\circ} 43' 8''$ , Distance from Sea 50 feet miles.

Height of Cistern of the Barometer above Mean Sea-level 40 feet, above Ground 4 feet.

During the MONTH of December 1872.

The Hours of Observation are not of Greenwich Time.

ELECTRICITY. Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.		HYGROMETER. No. 822 & 829.		WIND.		RAIN.		CLOUDS.		THERMOMETERS, under Ground.		SEA. No. 833 <i>Sundial</i>	ZONE. No. 0-10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.	Days of Month.
	9 h. A.M.	9 h. P.M.	Protruding 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.	Bearings of the H. Cup Anemometer No. 78	No. of hours in which it fell.	Amount (0-6), (0-10), (0-10), and Species.	Velocity, (0-6), (0-10), (0-10), and Direction.	9 h. A.M.	SUNSHINE.				
	Barometer, No. 91.	Attached Thermometer, No. 91.	Barometer, No. 7165.	Attached Thermometer, No. 2237.	Max. in Min. Sun's rays No. 32.	Max. in Min. Sun's rays No. 32.	Direc- tion.	Force.	Force.	No. 78	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature at Depth of Well, at 0 feet. Temperature and Density 0 A.M. 9 P.M.			
1	29.504	55.	29.856	56.5	44.	39.5	43.4	40.	N.E.	4.	N.E.	3	0.245	-	104 8/3	Fog.	1	
2	30.054	55.	30.042	54.5	41.	29.8	33.4	32.5	29.8	28.5	N.	0.5	0.175	44.8	8/3 7/6	Snow. Aurora Borealis.	2	
3	30.046	54.	30.008	55.5	32.	27.	29.5	27.5	27.8	25.4	N.E.	1.5	N.	-	6/3 3/1	Snow. Aurora Borealis.	3	
4	29.932	51.	29.780	54.	39.5	23	33.5	31.	38.8	37.4	Calm	0	S.W.	0.5	3/1 7/5	am. Snow. from Rain.	4	
5	29.520	60.	29.184	52.	44.	31.5	42.5	40.5	41.	38.8	S.	4	S.E.	4	10/4 10/4	in the night 6 <sup>th</sup> -6 <sup>th</sup> gale of wind. (5)	5	
6	29.032	52.5	29.040	56.	44.5	40.	42.4	40.8	44	42.	S.E.	4	N.E.	4	10/4 10/4	Fog and rain.	6	
7	29.094	59.	29.100	53.	44.	35.	41.4	37.5	37	35.	N.E.	4	N.E.	4	10/4 10/4	Hail. Snow and rain.	7	
8	29.180	56.	29.074	52.	39.	35.	37.2	34.6	38.8	35.6	N.E.	4	N.E.	4	43.8	9/4 8/4 d° d° d° 5 p.m. air. bor.	8	
9	29.188	62.	29.278	52.	39.5	35.5	39.2	34.2	39.	35.8	N.E.	4	N.E.	4	8/3 6/3	Snow. rain. At the observation 9 p.m. the wind had driven some snow in the thermometer box.	9	
10	29.460	57.	29.590	53.5	39.	31.5	33.8	32.8	31.8	28.5	N.E.	3	N.	2	5/3 4/3	Snow. in the thermometer box.	10	
11	29.802	50.	29.882	51.5	31.5	21.5	35.5	24	25.	24.4	N.	3	N.	3	6/3 1/1	d	11	
12	29.850	55.	29.796	53.	36.5	23.	35.	31.8	33.	30.2	N.	2	E.	1	43	7/3 8/4	13	
13	29.526	56.5	29.478	51.5	39.	32.5	35.8	34.5	38.4	36.6	E.	3	S.E.	2	42.5	9/5 9/4	14	
14	29.732	53.	29.972	55.	40.5	37.5	40.	37.8	40.	37.	S.E.	2	S.E.	2	42.5	9/5 3/1 air. bor.	15	
15	30.030	57.	29.888	47.	42.	38.	40.	35.5	40.8	38.	S.E.	2	S.	3	42.5	7/3 7/1	16	
16	29.744	55.5	29.650	52.	45.	40.	42.2	40.2	44.5	42	S.E.	3	S.E.	4	42.5	10/4 8/4	17	
17	29.838	53.5	29.958	52.	44.5	38.5	40.5	37.8	40.2	36	S.E.	4	S.E.	4	10/4 7/1	hail.	18	
18	30.026	54.	30.002	47.5	40.5	36.	39.8	36.6	37.5	34.6	S.E.	4	S.E.	3	42.5	10/4 9/4	19	
19	29.950	52.	29.962	52.5	42	35.5	39.5	38	41.	38.5	E.	4	S.E.	4	42.5	8/3 8/4	20	
20	29.924	53.5	29.992	59.	41	38.	39.6	37.6	38.8	35.	S.E.	3	S.E.	3	42.5	8/3 8/4 am fog and rain.	21	
21	30.062	56.	30.142	51.	39.5	35.5	37.6	34.2	37.	34.2	E.	2	E.	1.5	42.5	8/3 7/1	22	
22	30.140	49.	29.862	50.	38.5	33.5	37.	34.2	37.8	34.	E.	2	E.	4	42.5	9/2 7/1	23	
23	29.148	51.5	28.866	52.5	39.	35.	37.	35.8	37.8	37	E.	4	N.E.	3	42.5	10/4 8/4	24	
24	29.012	52.	29.004	56.	39.	34.	36.5	35.	36.8	34.6	N.E.	2	N.E.	3	42.5	8/3 3/1	25	
25	28.710	56.	28.748	55.5	38.	32.	33.6	33	32.2	30.2	N.E.	2	N.	3	42.5	8/3 7/1	26	
26	29.092	51.5	29.076	54.	42	27	33.	32.4	41.	39.8	S.W.	1	S.E.	2	42.5	10/4 10/4 pm rain	27	
27	28.858	59.5	29.030	55.	50.	41.	45.6	45	47.	42.6	S.E.	3	S.	5	42.5	10/4 10/4 am. fog and rain.	28	
28	29.142	55.	29.400	55.	48.5	34.5	46.8	43	45.2	33.	S.W.	3	N.	1.5	42.5	7/3 7/1	29	
29	29.626	56.5	29.724	56.	39.	34.	36.	33.	37.	35.5	E.	2	E.	1	42.5	7/3 9/1	30	
30	29.560	57.	29.322	50.5	44	39.5	42.4	39.2	44	42.8	S.	4	S.E.	4	42.5	10/4 10/4	31	
31	29.178	53.	29.094	52.	45.	43.5	44.6	43.	44.4	45.	S.	4	SW.	1.5	42.5	10/4 10/4 fog and mist. air. bor.		
Sums.		915.910	1697.5	915.800	1647.5	1271.5	1057.8	1184.3	1113.0	1177.9	1100.5	88	85.5	5.62	388.9	263 227	NOTATION USED IN GENERAL REMARKS.	
Means.		29.545	54.8	29.542	53.1	41	34.1	38.2	35.9	38.	35.5	2.84	2.76	-	43.2	85 7/5	m. denotes meter.	
Total Corrections for Instrumental Errors.								± 0.2	± 0.2					-	± 0.1		in. denotes inches.	
Corrections for Diurnal Range.																	cm. denotes centimetre.	
"Corrected Means."																	mm. denotes millimetre.	
No. of Column.		1	2															

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

## WITH REMARKS ON THE USE OF INSTRUMENTS.

registering the greatest heat from the sun's rays and the least amount

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.

*Banometer.*—*Weather glasses* and *aneroids*, though admirably constructed, exhibit the "Hygrometrical Deviations" Observers

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

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

*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.

*Banometer.*—*Weather glasses* and *aneroids*, though admirably constructed, exhibit the "Hygrometrical Deviations" Observers

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column "Velocity and Direction,"  $\frac{6}{2}$ , S. W. (for example,) will indicate that the  $\frac{2}{2}$ , W.

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

*Wind.*—*Wind* and *Thermometer*. At the commencement of book 1,

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

*Temperature of the Sea.*—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, after a long and laborious investigation, have decided on the following conditions:—The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb,—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the observer that the muslin is always *clean and moist*, and the cotton, which also supplies it with water. It must be seen to by 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.

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

An excellent Barometer is constructed by Mr Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. It consists of a glass tube,

*requiring no adjustment* of the cistern. Its *scales-inches* are not true or observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances, otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the *cistern* are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-rod* on this little piston-rod is brought, by the adjusting screw, to form one *straight line* with those on its ivory frame, the surface of the mercury is then at the exact height from which the again,  $40^{\circ} 4$ ,  $40^{\circ} 5$ , or  $40^{\circ} 6$ , according as it indicates a little

The scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

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

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:—thence  $3\frac{3}{4}^{\text{N.W.}}$ , as an ozone entry in the schedule, will indicate that the ozone paper is tinted as “3” on the scale, that the wind is from the N.W., and that its force on the scale 0-6 is “4”; *i.e.*, that it is *blowing fresh*.

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

*Remarks.*—The “*Remarks*” column is too narrow, but un-

Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

In taking an Observation, the attached Thermometer is first noted: the tube must then be gently tapped and the cistern-adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index,—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly;

since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

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

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a

Some of the most valuable observations that can be avoided so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora boreales, 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

for observation and partly from the vertebral nature of the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the

part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments are observed in some open place is observed, and registered in addition to, and the indications of the rain-gauge. For wind, rain indeed in every column, the observer cannot but register observations only; and nothing that

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*Secretary of the Meteorological Society of Scotland,*

## *EDINBURGH.*

BOOK-POST.



Rev. Shorthorn  
1892

*Mr ALEXANDER BUCHAN*

*Secretary of the Meteorological Society of Scotland,*

*EDINBURGH.*

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS

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

*Verification of Thermometers.*—No instrument ought to be used for Meteorological purposes till it has been carefully tested, and compared with others, and the results of the observations secured.

Returns, an accuracy and value commensurate with the labour tested by comparison with a *Standard Thermometer*. When such Thermometers as are not graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "*Minium*," 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 Observatory.

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 not necessarily, mounted on one frame. As apparently slight Sunshine.—The number of hours in which objects in the sun's

every reading at what time it was taken, if not at 9 o'clock.

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

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

An excellent Barometer is constructed by Mr Adie of London,

deviations from the approved and *well-tested form* of this apparatus seriously vitiate the "Hygrometrical Deductions" Observers, are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb, in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean and moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be

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

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

the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-inches* are not true of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

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

*Reading of the Thermometer.*—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read  $-39^{\circ} 9$ .  $40^{\circ} 0$ ; or  $40^{\circ} 1$ ; or 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. When the system passes freely through the lid and case of the cistern.

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

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

The surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

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

*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. If this is prevented by air it is not a matter of consequence.

*Ozone.*—Mention whether Schönbein's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus  $3\frac{3}{4}^{\text{N.W.}}$ , as an ozone entry in the schedule, will indicate that the ozone paper is tinted as “ $\frac{3}{4}$ ” on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is “ $4$ ”; *i.e.*, that it is *blowing fresh*.

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

temperature in the 2<sup>nd</sup> hour's preceding. It is now 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 3<sup>rd</sup> are those of a series of phenomena commencing at 9 P.M. on the 2<sup>nd</sup>, and extending till 9 P.M. on the 3<sup>rd</sup>.

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

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 liquid, and during the adjustment the eye must be kept steadily fixed on the index, so as to prevent the eye from being strained by looking through the glass.

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

*Snow-falls* may, for convenience, be registered in the rain columns, under the following conditions:—when a Snow shower occurs it must be noted in the “Remarks,” and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift or obstruction exists.

The Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when

part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments are indeed in every column, the observer cannot but register *observations only*; and nothing that is observed, and registered in addition to, and the indications of the rain-gauge. For wind, rain

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

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