

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Islands, in Lat. 62° 22', 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 January 1873.

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	OZONE. Schönbe	GENERAL REMARKS.			Days of Month
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulb.		9 h. A.M.			9 h. P.M.		Readings of the H.Cup Anemometer No. 78		No. of hours in which it fell.	Amount (0-6), and Species	P.M.	SUNSHINE.	9 h. A.M.	9 h. P.M.	Temperature of Well at depth of 1 fathoms, and Density, at 9 A.M., 9 P.M.
		Barometer. No. 91	Attached Thermometer. No. 91	Barometer. No. 7163	Attached Thermometer. No. 3257	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.	
1	29.154	63.	29.180	57.	44.	37.	42.8	40.8	37.6	36.2	5	3	Cloudy	0.	0.07	—	2	—	—	—	10 7	air. bor.	1
2	28.916	53.5	28.644	52.5	44	35.	43.	41.5	41.4	39.8	38	2	E	4	0.08	—	—	—	10 10	—	2		
3	28.828	56	29.006	54	45.5	40.5	44.2	40.6	41.2	38.6	5	S	1	0.35	—	—	—	—	—	10 10	1 p.m. the wind decreasing. Air. bor.	3	
4	29.228	60	28.960	55	43.	37.	41.5	38.6	39.5	38.2	S	1	S	3	0.16	—	3	—	—	9 10	p.m. rain	4	
5	28.830	57	29.100	65	40.	34.	38.5	37	36.2	35.	N.E.	0.5	Calm	0	0.70	—	—	—	—	9 6	snow and rain. Air. bor.	5	
6	29.390	64	29.176	52.5	41.5	32.5	40.	37.8	38.5	37.5	E	2	S.E.	4	0.32	—	—	—	12 p.m. 42.8	8 10	—	6	
7	29.150	53.5	29.014	53	47.	39.5	43.4	41.2	45.8	43.	S	3	SW	4	0.31	—	—	—	10 9	fog and rain. p.m. 3-7 the wind 5.	7		
8	28.882	58	29.080	56.5	46.	38.5	44.2	43.5	41.	37.2	SW	1.5	N.W.	3	0.17	—	—	—	12 p.m. 43.	10 10	am fog and rain. Air. bor.	8	
9	29.336	64.5	29.414	56	41.5	34.5	35.8	34.5	36.6	35.	Calm	0	N.E.	1.5	0.08	—	2	—	—	7 1	—	9	
10	29.320	53.5	29.412	54	38.	35.	37.8	35.6	36.2	34.6	N.E.	3	N.E.	1	0.03	—	—	—	1 p.m. 42.8	10 9	a.m. fog	10	
11	29.434	53	29.384	54.5	37.5	34.	37.	35.5	34.5	33.	N.E.	1.5	N.E.	0.5	—	—	—	—	7 2	air. bor.	11		
12	29.338	55	29.228	52	36.5	31.5	35.8	33.8	31.5	30.8	N.W.	2	Calm	0	0.08	—	4	—	—	9 2	soon. hail	12	
13	29.296	52	28.888	50	42.	30.	30.2	28	40.	39.	Calm	0	W	4	0.24	—	—	—	5 10	hail, snow and rain. 7 p.m. lightning	13		
14	29.064	57	29.120	52	46.	37.	45.2	42.	39.8	36.	S.W.	4	W	5	0.45	—	—	—	10 10	hail, snow and rain.	14		
15	29.348	60.5	29.560	50.5	45	32.	38.5	36.8	32.	31.	W	4	N.W.	1.	0.38	—	—	—	10 10	10 10	15		
16	29.772	47	29.690	49	43.	34.5	39.	37.	42.	39.	W	2	S	3	0.09	—	—	—	9 10	air. bor.	16		
17	29.254	60	29.164	52.5	42.5	38.	41.8	38.5	40.	34.8	S.E.	4	W	3	0.37	—	2	—	9 10	fog and rain. 8 p.m. lightning	17		
18	28.516	51.5	28.340	49.5	41.5	27.5	40.4	40.	38	33.8	S	5	S.W.	4	0.34	—	—	1 p.m. 41.8	10 9	foggy rain. hail. 9 p.m. lightning	18		
19	28.018	50	27.970	52.5	38.5	32.5	33.2	32.6	37.2	33.	Calm	0	W	3	1.02	—	—	—	1 p.m. 42.8	10 10	5 a.m. Barom. 27.982 at 60°. 1 p.m. high water. 5 p.m. Barom. 27.982 at 59°. 5 a.m. high water.	19	
20	28.376	57.5	28.612	54	35.	32.	37.8	34	37.5	32.	E	2	N.	0.5	0.02	—	—	—	1 p.m. 42.8	8 2	snow. air. bor.	20	
21	28.830	54	28.934	53.5	36.5	28.	32.8	30.5	35.2	33.8	N	0.5	N	0.5	—	—	—	7 2	air. bor.	21			
22	28.978	53	29.056	52	37.	33.	35.2	33.5	33.8	32.2	N	1.5	Calm	0	0.01	—	—	1 p.m. 42.2	8 1	air. bor.	22		
23	29.152	51.5	29.350	53.5	36.5	30.5	34.8	33	34.	32.	N.W.	2	N.W.	1.	0.03	—	—	1 p.m. 42.5	9 8	—	23		
24	29.632	51.5	29.784	53.5	36	26.5	29.8	27.2	31.2	29	N	0.5	S.E.	0.5	0.01	—	—	6 3	—	24			
25	29.578	54	29.330	54	42.5	31	40.8	37.6	42.	41.2	S	3	S	4	0.30	—	—	1 p.m. 42.5	10 10	at the observation 9 p.m. the open paper was blown away	25		
26	29.140	55	29.338	54	48.	42.	45.6	43	47.2	44.	S	4	S	5	0.29	—	2	—	10 8	—	26		
27	29.726	58	29.744	57.5	47.5	41	45.5	44.	44.	42.2	SW	3	S	3	0.13	—	3 1	1 p.m. 42.6	9 10	air. bor.	27		
28	29.680	56	29.670	55	46.	42.5	44.8	43.2	43.6	41.	S	4	S	4	0.05	—	—	1 p.m. 43.	9 10	fog and rain	28		
29	30.092	52	30.210	56	46	33.	39.	36.6	41.	39.2	SW	2	SE	1.5	0.09	—	6	1 p.m. 42.6	8 2	—	29		
30	30.166	50	30.230	53.5	43.5	40.	40.8	39.	41.	38.4	S	3	S	3	0.10	—	4	1 p.m. 43.	10 10	—	30		
31	30.304	53	30.294																				

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS

WITH DIRECTIONS ON THE USE OF INSTRUMENTS.

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

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

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

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

An excellent Barometer is constructed by Mr Adie of London, the use of which is attended with the great convenience of requiring no *adjustment* of the cistern. Its *scale-inches* are not true inches but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the *cistern* are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame, the surface of the mercury is then at the exact height from which the tube, a sharp top is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; 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 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 top is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

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

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which 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 "Maximum" Thermometers are recommended: printed directions for their use may be obtained with each instrument. The "Minium" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found near the top of the tube, and must be dislodged from 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

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 3^d are those of a series of phenomena commencing at 9 P.M. on the 2^d, and extending till 9 P.M. on the 3^d.

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, Lind's Anemometer is also recommended; the method of *Estimating* Wind Force by such tables as that given in the schedule is, to say the least, unsatisfactory.

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly from unfavourable 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.

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

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

The nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from

J. Thorndike
January 1871

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

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

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

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Islands, in Lat. 62°21', 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 February 1873.

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.				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.		Projected 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 WELL at Depth of feet, No.	SEA. 1833	OZONE.	
	Barometer, No. 91	Attached Ther- mometer	Barometer, No. 91	Attached Ther- mometer	Max. No. 765	Min. No. 3237	Max. in Sun's rays	Min. on Grass	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction:	Force	Direction:	Force	No. 78	(0-6), Amount, (0-40), and Species.	(0-6), Amount, (0-40), and Species.	(0-6), Amount, (0-40), and Species.	Hours.	No. 3 inches.	No. 13 inches.	No. 22 inches.	Schærdal 0-10.	Schærdal				
1	30.226	50.	30.174	49.	42.5	37.5	40.	37.5	39.2	35.6	SE	5	SE	5	—	—	—	—	—	0.02	—	—	—	—	—	—	10/10	hail and rain. Sur. box.	1	
2	30.150	50	30.126	50	40.	31.	37.5	33.2	32.	31.	SE	2	NE	3	—	—	—	—	—	0.17	—	—	—	—	—	—	9/9	Snow and hail. Sur. box.	2	
3	30.164	46.5	30.312	55.5	33.	22.	24.5	23.	24.8	23.2	Calm	0	Calm	0	—	—	—	—	—	0.21	6	6	6	6	6	6	2/7	In the night snow. Sur. box.	3	
4	30.396	50.5	30.300	51.	38	20.	25.2	23.5	37.	32.5	Calm	0	SE	1.5	—	—	—	—	—	0.10	—	—	—	—	—	—	4/5	9/9	hail. rain	4
5	30.036	54	29.920	52	41.5	35.5	40.2	36.2	37	35.6	SE	3	SE	2	—	—	—	—	—	0.10	—	—	—	—	—	—	8/10	Snow. rain.	5	
6	30.116	54.5	30.256	55	43.	32.	35.8	33.2	34.	31.	Calm	0	Calm	0	—	—	—	—	—	0.01	—	—	—	—	—	—	10/10	Snow. rain.	6	
7	30.152	52	30.096	58.5	47.5	33.	40.2	43.5	46.5	45.4	SW	4	SW	4	—	—	—	—	—	0.51	—	—	—	—	—	—	7/1	Sur. box.	7	
8	30.262	53.5	30.164	55.5	46.6	35	37.5	35.5	44.8	43.	Calm	0	W	4	—	—	—	—	—	0.06	4/2	8/10	8/10	8/10	8/10	8/10	8/10	Sur. box.	8	
9	30.200	56	30.354	54	46	36.5	42.2	39.	37.2	31.6	W	3	NW	3	—	—	—	—	—	0.08	3	3	3	3	3	3	3	Sur. box.	9	
10	30.716	48	30.588	53	38	27	28.6	27.8	33.6	30.	N	2	W	1	—	—	—	—	—	0.09	4	4	4	4	4	4	4	Sur. box.	10	
11	30.166	57	30.332	54	46	33	44.8	40.8	37.2	32.6	NW	3	N	1.5	—	—	—	—	—	0.09	6	6	6	6	6	6	6	Sur. box.	11	
12	30.418	60	30.256	55	44	36	40	36.2	39.5	36.2	NW	0.5	W	0.5	—	—	—	—	—	0.30	6	6	6	6	6	6	6	Sur. box.	12	
13	30.144	60	30.096	55	47.5	35.5	43.2	39.8	40.2	37.5	W	1	NW	1	—	—	—	—	—	0.18	6	6	6	6	6	6	6	Sur. box.	13	
14	30.070	61	30.100	55.5	48.5	38	44.5	40	43.6	41.5	NW	1.5	NW	1.5	—	—	—	—	—	0.12	3	3	3	3	3	3	3	Sur. box.	14	
15	29.952	59.5	29.908	55	48.5	42.5	47.2	45	48	46.5	SW	4	SW	4	—	—	—	—	—	0.39	—	—	—	—	—	—	10/10	Fog. rain.	15	
16	29.886	61	29.848	68.5	49.5	47	48	45.8	48.2	46.2	SW	5	SW	5	—	—	—	—	—	0.41	—	—	—	—	—	—	10/10	Fog. rain.	16	
17	29.902	58	30.080	57	50	36	40.5	39	37	SW	1	NW	0.5	—	—	—	—	—	0.69	—	—	—	—	—	—	9/10	de. de. more boats with men were lost.	17		
18	30.214	60	30.166	57.5	48.5	36.5	42	40.6	48.2	44.2	SW	1	SW	5	—	—	—	—	—	0.18	—	—	—	—	—	—	7/10	From 11 a.m. the wind suddenly rising (5) and then increasing	18	
19	29.942	68	30.024	54	49.5	38.5	47.1	43.2	39.2	33.5	SW	5	W	5	—	—	—	—	—	0.32	3	3	3	3	3	3	3	Sur. box.	19	
20	30.460	50.5	30.112	48.5	40	30.5	32.6	31	37	36.2	NW	0.5	SE	4	—	—	—	—	—	0.26	—	—	—	—	—	—	5/9	in snow. rain.	20	
21	29.500	53.5	29.608	52	39	28.5	37.2	34.2	39.5	38.2	W	5	N	5	—	—	—	—	—	1.48	—	—	—	—	—	—	10/9	Rain. hail and snow.	21	
22	29.966	50	29.900	53	30	17.5	17.5	17	19	18	N	4	N	4	—	—	—	—	—	0.30	—	—	—	—	—	—	9/8	Sur. box.	22	
23	29.850	51.5	29.844	53	27	18	23	22	25	24.2	N	3	N	3	—	—	—	—	—	0.20	4	4	4	4	4	4	4	Sur. box.	23	
24	29.860	49	29.952	62	30	20.5																								

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 instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by scrupulous attention to the following Directions, secure for them Monthly Returns in 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 inevitably fail in achieving one of the main objects of Meteorological Observation.

Honor 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, 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 deviations from the approved and well-ested form of this apparatus seriously vitiate the Hydrographic Deductions. Observers, especially requested to attend to the following conditions:—

The Barometer, the thermometer, and the hygrometer, though atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used. Meteorological Observations 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 concavity being indicated by a little ivory float, whose stem passes freely through the lid and base of the cistern. When the index-tube 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 tube, a sharp *key* is protuded. If it is prevented by air, if the setting is graduated. In taking an observation, by inverting the Barometer (ear being taken to prevent the loss of mercury by tightening the ivory key), and gently tapping it; and, if this is done, the instrument must be repainted.

The Barometer should be suspended by a piece of white paper behind the tube, a complete vacuum is to be obtained, by pulling the tube, so that the mercury strikes the top of the tube, and the mercury to within a quarter of an inch of the top of the tube, and take down the instrument. 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 *key* is protuded. If it is prevented by air, it is noted: the tube must then be gently tapped, and the cistern adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index,—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

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

Self-Regulating Thermometers.—Professor Phillips, and Negretti and Zambra's Patent "Maxima" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Maxima" Thermometer of Batherford is recommended when graduated on the glass stem, and affixed to a frame separate from the "Maxima." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks, it may be re-united by striking the instrument, repeatedly, against the palm of the hand; when the part of the spirit distils by high temperatures, it will be found in the upper lobe, and must be distilled from thence by heating the part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments register *observations* only; and nothing that partakes of the nature of deduction or inference.

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

Observations in connection with the Periodical Return of the Seasons. The observations are to be made with great care. The sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of crops, and plants greatly depend on the temperature of the soil—it is amount and constancy—the Council recommend that observations in this interesting department be made at 9 A.M., by observations placed in the earth, their bulb being sunk to 3, 5, 12, and 22 inches, and the stems above ground protected from rays east slants, 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—in no case under the bulbs—the mush in must be of water being conveyed to the bulbs by stems or wooden frames, which also supplies it with water. It must be seen by cotton, which also supplies it with water. It must be seen by the observer that the mush is always *clean* and *moist*, and the placed.

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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Islands, in Lat. 62° 21', 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 March 1873.

The Hours of Observation are 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.		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.	Readings of the H-Cap Anerometer No. 78.	9 A.M.	P.M.	9 h. A.M.	Temperature at Depth of feet, No. 833	SEA.	OZONE.						
	Barometer. No. 91	Attached Ther- mometer. No. 91	Barometer. No. 91	Attached Ther- mometer. No. 327	Max. Min. Sun's rays	Max. Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction. No.	Wind. No.	No. of hours in which it fell.	Velocity, (0-6), and Direction.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Amount, (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature at 1 fathom, 9 A.M. and 9 P.M.	Schonbeac
1	29.424 45.	29.134 49.	40. 32.	37.8 38.	37.2 32.5	38.2 36.4	SW. 4	SW. 4	0.01		4.											1
2	28.992 57.5	29.274 53.5	40.5 34.		38. 35.8	37.2 34.5	SE 4	W 3	0.35		—											2
3	29.510 53.	29.584 55.	45. 34.		38.8 37	42. 40.5	W 2	S 2	0.18		6											3
4	29.468 52	29.650 57.	47. 38.		41. 39.6	38.4 36.2	S 3	N.W. 0.5	0.09		6											4
5	29.992 62	29.892 53.5	46. 33.5		42.8 38.2	41.2 37.2	W. 0.5	S 3	0.03		7											5
6	29.386 54	29.150 51.5	44.5 32.5		43.2 40.8	43.4 43.	S 4	SW. 3	0.19		—											6
7	29.368 55	29.334 54	46. 36.		41.2 38.4	38. 36.4	SW. 3.	SE 1.	0.06		9											7
8	29.426 52	29.182 54	43. 35.		40.6 39.	42.8 40.5	SE 3.	SE 3.	0.10		1/2											8
9	29.194 56.5	29.250 56.5	44. 34.		38.2 37.2	35.2 33.	Calm. 0.	Calm. 0.	0.23		—											9
10	29.318 53	29.412 54.	45. 35.0		41.8 39.2	40.2 38.2	E. 4.	E. 3.	0.09		4											10
11	29.682 54	29.750 53.	42. 32.		38.4 36.2	34.5 30.5	NE 4	N.E. 4	0.48		—											11
12	29.696 53.	29.780 54.5	37. 31.5		35. 31.5	33.2 31.2	NE 4	N.E. 4	0.22		—											12
13	29.866 52.5	29.954 55.5	41. 30.		34.4 31.8	32. 29.4	NE 2	N 2	0.16		6											13
14	30.086 51.	30.198 53.5	44. 29.5		35.6 33.5	30.8 28.5	NE 2.	Calm. 0.	0.01		5											14
15	30.146 53.5	30.100 52.	44. 29.5		40. 37.6	43.6 38.5	S 3	SW. 4	0.04		—											15
16	30.108 53.	30.168 62.	45.5 32.5		42.8 37.8	38. 34.2	SW 3	S 1.	—		8.5											16
17	30.116 53.	30.088 52.	45.5 36.		42.2 37.1	40.2 37.	SW 2	S 2.	—		8.											17
18	29.680 51.5	29.972 56.	48. 35.5		44.6 43.	36.8 33.8	SW 4	N.W. 3	0.32		4											18
19	30.292 55.	30.384 57.	38. 28.		33.4 30.5	29. 27.	N 3	Calm. 0.	—		7											19
20	30.292 49	30.294 58.	48. 27.5		38.4 36.6	43.8 41.8	SW 2	W 1.5	0.04		6											20
21	30.292 57	30.320 58.	49. 42.5		46.2 42.8	44.2 42.2	W 0.5	Calm. 0.	0.01		—											21
22	30.314 61	30.212 56	46. 40.		43.2 42.	42. 39.	SE 0.5	S 1.5	0.01		—											22
23	30.100 54.5	30.032 56.	46. 40.		42.8 39.5	43. 40.8	S 1.5	SW 1.	0.05		—											23
24	30.026 56.	30.074 58.	49. 42.5		45.8 43.4	45.2 41.8	SW 3	S 3	0.01		—											24
25	30.044 59	30.020 60	47.5 44.		47.2 43.8	45.2 41.4	SW 4	S 3	—		—											25
26	30.026 55.5	30.064 59.	50.5 45.		49. 46.	47. 44.8	S 3	S 0.5	0.01		—											26
27	30.058 57.5	30.044 60	48. 44.		45.8 43.6	45.2 44.2	Calm. 0	Calm. 0.	—		—											27
28	29.992 58.5	29.990 56	51. 43.5		47.5 45.8	44.4 43.	Calm. 0	SW 3.	—		7											28
29	30.002 59.	29.964 56	46.5 43.		46.2 43.8	46.4 45.2	S 2	S 3	0.07		—											29
30	29.992 57.	29.896 58	50.5 40.5		44.5 43.5	43.2 42.2	Calm. 0	SE 0.5	0.03		—											30
31	29.676 58	29.650 56	47. 43.		45.6 44.	46.8 44.8	SE 3	S 4	—		2											31
Sums.	12.013 16.804	16.985 924.816	1725.6 1405.1	1124.	1290.3 1211.6	116.1 1177.2	780	62.5	2.85		91					509.8	269 266					
Means.	29.816 54.8	29.833 55.7	45.3 36.3		41.6 39.1	40.4 38.2	2.4	2.0			488					42.5	8.7 8.6					
† Total Corrections for Instrumental Errors.					± 0.2	± 0.2										8.2						
‡ Corrections for Diurnal Range.																						

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 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 snowing for other instruments, as specified in the following remarks, or at the top of the schedule. It is hoped that the utmost care will be exercised by those persons who 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 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 suited for scientific purposes. Nor can any Barometer be used for Meteorological Observations which is not supplied with such means of adjustment or compensation as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a Standard. Two moderate-priced Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

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

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *seize up* the tube, the sun's direct rays nor the heat of a fire, and *got rid* of it by inverting the instrument, it may then be carried with the rapidly taken, being so readily affected by heat from the person of the observer.

In taking an Observation, the attached Thermometer is first noted: the tube must then be gently tapped, and the cistem-adjusment carefully made. By raising and lowering the eye, the instrument should be suspended in a good *light*, which 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 improved by putting a piece of white paper behind the sun's direct rays or the heat of a fire. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a box painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The boxes 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-slats, in the centre of the Box, and face the door, opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

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

When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when the part of the spirit distils by high temperature, it will be found in the upper lobe, and must be distilled 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 register observations only; and nothing that partakes of the nature of deduction or inference.

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

registering the greatest heat from the sun's rays, and the least amount of clouds will be found on the other side. The hills have a black coating, amount of cloud in the atmosphere ought to be estimated from which may easily be made, or mended by the application of a greater or less obscuration of the sky overhead (i.e., within 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 two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, as specified in the following remarks, or at the top of the schedule. It is hoped that the utmost care will be exercised by those persons who 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 9 o'clock.

For comparison of Thermometers, a properly tested Thermometer ought frequently and those in the lower regions from W. with one-third the (extreme) speed of the former. Again, in the second "Cloud" regions are covered to the "amount" of 4-tenths with stratus clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

Sunshine.—The number of hours in which objects in the sun's rays cast shadows should be entered in the project column, an entry of $\frac{1}{2}$, (e.g.) will indicate that the higher column, an entry of $\frac{1}{2}$, (e.g.) will indicate that the higher *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 12, 18, and 22 inches, and the stems above ground, protected from the sun's rays, and fitted with sloping collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames, which also supplies the water to the bulb. The Burton must be made of the geological formation and agricultural condition of the soil in which these Thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council therefore recommend that the temperature of the sea carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by the tide, at least an inch free from the surface of the water, on the 15th, 18th, and 25th of each month, the thermometer ought to be immediately altered by pulling the wooden frame out of the water, and fastened to the neck of the bulb, the stem being bent to a right angle, and the bulb suspended by a string, so as to bring the entire instrument into the water. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will read -39.9, 40.0, or 40.1, or water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. 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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshaven, County of Faroë Islands, in Lat. $62^{\circ} 2' 1'$, 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 April 1873

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.	OZONE.	GENERAL REMARKS.				Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.			9 A.M.		P.M.		SUNSHINE.		9 h. A.M.			Temperature of WELL at Depth of feet, No.						
		Barometer. * No. 91	Attached Ther- mometer	Barometer. No. 91	Attached Ther- mometer	Max. No. 7165	Min. No. 3237	Max. in Sun's rays No. 91	Min. on Grass. No. 91	Readings of the H-Cup Anemometer No. 91	No. 91	Dry bulb. No. 91	Wet bulb. No. 91	Dry bulb. No. 91	Wet bulb. No. 91	Direction. No. 91	Force No. 91	Direction. No. 91	Force No. 91	No. of hours in which it fell. No. 91	Amount in inches. No. 91	Velocity, (0—6), and Direction. No. 91	Amount, (0—6), and Species. No. 91	Velocity, (0—10), and Direction. No. 91	Amount, (0—10), and Species. No. 91	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.				
		Dry bulb. No. 91	Wet bulb. No. 91	Dry bulb. No. 91	Wet bulb. No. 91	Direc- tion.	Force No. 91	Direc- tion.	Force No. 91	No. 91	Velocity, (0—6), and Direction. No. 91	Amount, (0—6), and Species. No. 91	Velocity, (0—10), and Direction. No. 91	Amount, (0—10), and Species. No. 91	9 A.M.	9 P.M.	SUNSHINE.	9 h. A.M.	9 A.M.	9 P.M.	Temperature at 1 fathom, and Density. No. 833	9 A.M.	9 P.M.	Temperature of WELL at Depth of feet, No.	Sea.	Ozone.	Mention the hour at which Storms began and ended.							
1	29.804	55.	30.080	56.	49.	38.5	44.	39	41.	38.6	W	2	SW	i	0.17			8.	o	o	o	14°	44.2	8	8	air. bor.				1				
2	29.912	58	29.548	52.5	46.5	41.	46	41	44.4	42.5	S	3	SW	3	0.22			5				14°	44.2	7	10					2				
3	29.554	54	29.658	53.5	46.	37.5	45.	41.6	39.4	37.	SW	3	S	3	0.38			4				14°	43.6	7	10	Rain and hail				3				
4	29.572	57.5	29.476	52.	45.	35.	42	38.8	37.1	35.5	W	3	W	2	0.38			—				14°	43.6	8	10	Rain, snow, and hail.				4				
5	29.560	52.5	29.630	59.	44.	33.5	38.6	36.2	39.6	37.5	NW	3	N	3	0.17			—				14°	43.8	9	9	Hail and snow.				5				
6	30.000	62	30.022	54.5	44	35.	42.	38.6	37.	34.2	NE	2	N	3	0.24			6				14°	43.8	6	6					6				
7	30.100	55.	30.170	54.5	48.	35.	40.8	36.6	43.	38.8	N	1.5	W	3	—			10.				14°	44.2	4	8					7				
8	30.226	55.5	30.382	58.	55.	40.5	49.2	46.	44.	42.2	NW	1.5	W	2	0.01			7				14°	44.2	8	6					8				
9	30.418	55.	30.444	56	52	42.5	48.6	45.	45.6	43.5	W	3	W	0.5	—			7				14°	44.2	9	10					9				
10	30.446	59.	30.308	57	50.5	44.	47.4	44.8	45.8	42.5	W	2	NW	2	—			10				14°	44.2	7	9					10				
11	30.176	57	30.208	52.5	51.5	32.	50.6	46.5	32.6	31.	NW	3	NE	3	0.13			3				14°	44.2	7	10	pm. snow and rain.				11				
12	30.242	51.5	30.088	47.	37.	30.5	34.2	31.	30.8	30.2	NE	3	E	3	0.16			—				14°	44.2	9	10	Snow.				12				
13	30.030	52.	30.092	54.5	40	30.5	34.4	33.8	40.	37.4	E	4	E	4	0.45			—				14°	43.2	10	10	Snow and rain.				13				
14	30.126	47.	30.174	52.	42.	38.5	40.8	39.5	41.6	38.8	S	4	S	4	0.28			—				14°	43.2	10	10					14				
15	30.080	55	30.018	54.	45.	41.	43.4	42.	43.	41.	E	3	E	3	0.01			—				14°	43.2	9	9					15				
16	29.932	57	29.904	57	46.5	42.5	45.2	43.5	44.	42.2	S	2	S	2	0.01			—				14°	43.2	8	6	Soggy				16				
17	29.906	60	29.964	60	46.5	43.	44.8	43.2	44.	43.	SE	2	SE	1.5	—			—				14°	44.2	8	8	fog				17				
18	30.046	60	30.112	54.5	47.	43.5	45.8	43.8	45.2	43.4	Calm	0.	Calm	0.	—			—				14°	44.2	7	6					18				
19	30.236	62	30.384	57	49.5	41.5	47.	43.	42.2	40.4	N	1.5	N	0.5	—			9				14°	44.2	2	8	air. bor.				19				
20	30.456	67	30.376	60	52.5	36.	49.6	45.4	45.	42.6	S	2	NW	1.5	—			12				14°	44.2	8	6					20				
21	30.438	59.5	30.394	56	46.5	35.	40.2	35.8	36.5	33.5	N	3	NE	2	—			1				14°	44.2	5	3					21				
22	30.386	54.5	30.356	55.	44.	35	39.8	34.6	36.	33.	N	3	NE	2	—			8				14°	44.2	3	1.					22				
23	30.292	55.	30.280	55	43.	33.5	39.6	34.8	36.2	33.5	N	1	NE	1	—			7				14°	44.2	2	5	in the night air. bor. in all parts of the sky				23				
24	30.342	60.	30.350	56	46.	31.	41.4	38.2	35.2	33.8	NE	3	Calm	0.	0.01			6.				14°	44.4	7	4.	Snow and rain.				24				
25	30.278	58	30.216	53	47.																													

Sums.	902.582	1708.	902.510.	1670.	1417.51119.			1320.	1219.8	1233.
Means.	30.086	56.9	30.084	55.7	47.3	37.3		44.	40.7	41.
† Total Corrections for Instrumental Errors.								±0.2		±0.2
‡ Corrections for Diurnal Range.										
"Corrected Means."								43.8	40.7	40.
No. of Column.	1	2	3	4	5	6	7	8	9	10

S.-R. THERMOMETER , (in shade, etc.), Highest in Month , (corrected for Index Errors), on the 8th,.....	=	<u>55.</u>
Lowest in Month , corrected for Index errors, on the 12th, and 13th.....	=	<u>30.5</u>
Difference, or Monthly Range ,	=	<u>24.5</u>
" Corrected Mean " of all the Highest , (Col. 5),	=	<u>47.3</u>
" Corrected Mean " of all the Lowest , (Col. 6),	=	<u>37.3</u>
Difference, or Mean Daily Range ,.....	=	<u>10.0</u>
** Calculated Mean Temperature of Month,	=	<u>42.3</u>

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

Set on	12 Days, Amount in inches,	=	3.22								
WIND.		SUMMARY.									
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	5	3	2	4	1	2	6	6	1.	2.52	
P.M.	5	4	3	3	1	3	3	6	2.	2.47	
N.	5	3	2	4	1	2	6	6	1.	2.52	

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

*Observations made and
Return verified by*

H. E. Holt

(Signed)

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself is to secure a from radiation during night. Their bulls have a black coating, amount of cloud in the atmosphere ought to be estimated from which may easily be made, or needed by the application of a mixture of lamp black and painter's ink. They are placed in 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely, and thus, being unable to judge the distance, we ought not to take them into account in the observations; and it is found that instruments from different stations, without the publication of Monthly Results from the same, are found to differ in their apparent height.

Retorts 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 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.

It is hoped that the utmost punctuality in the time of reading the tube will be observed. Observers, in some few cases, may find this impossible; in such instances, they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

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

Two moderately-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 intended with the great convenience of requiring no adjustment of the cistern. Its scale-zincs are not true, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be secured so as to form a tight plug to the cistern. Then, when the tube is a complete vacuum; this is the case when, on inclining the tube, a sharp top is produced.

In *taking an Observation*, the attached Thermometer is first noted: the tube must then be gently tapped, and the cistem adjustment carefully made.

By raising and lowering the eye, the tube must be brought into the plane of the back and front of the eye; and if this is done, the instrument must be repaired.

The Barometer should be suspended by a piece of white paper behind the tube. Then, when the top of the mercury strikes the sun's direct rays, it is presented by air, and exposed to neither heat 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 cistem adjustment carefully made.

An accurate adjustment and reading of the Barometer, recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from the merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior.

The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, and affixed to a frame separate from the "Aneroid," This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer.

When the *bottom* of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when the part of the spirit distils off, the thermometer will be found in the upper hole, and must be dislodged from thence by heating the part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

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

To

M. ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

Trunks, Posts, bedding, &c., and Age-toned condition of the instrument you may be able to collect details from the Correspondence, etc. Whether Postage, Postage also to state any information you may have respecting the delivery of the Correspondence, etc.

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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshaven, County of Faro Islands, in Lat. $62^{\circ} 2' 1''$, 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 Mai 1873.

The Hours of Observation are ^{not} Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS. Read Daily at 9 A.M.		HYGROMETER. No. 8224829		WIND.		RAIN.		CLOUDS.		THERMOMETERS. under Ground.		SEA.		OZONE.		GENERAL REMARKS.									
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Temperature of WELL at Depth of feet, No.							
		Barometer, No. 91	Attached Ther- mometer No. 91	Barometer, No. 7165	Attached Ther- mometer No. 237	Max.	Min.	Max. in Sun's rays	Min. in Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force	No. of rain- ers in which it fell.	Amount (0-5) in inches.	Velocity, (0-10) and Direction.	Amount (0-10) and Species.	Hours	No. 8 inches.	No. 12 inches.	No. 22 inches.	Temperature 9 A.M.	Temperature 9 P.M.	Elasticity and Density	Temperature 9 A.M.
1	29. 824 58.	29. 758 59.5	49.5 39.5	45.4 43.2	42. 41.	N.E. 2	S.E. 1	0.09	—	3	—	5 8	9 p.m. fog	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	29. 504 55.5	29. 732 57.5	48. 34.	42. 42.	35.2 32.5	N.E. 3	N. 3	0.90	—	—	—	44.5 10	axis. fog and rain. p.m. rain	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	29. 826 56.	29. 664 59.	44.5 29.5	38.6 34.8	31.4 29.4	N. 3	Calm 0	0.08	—	—	—	5 7	Snow and hail	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	29. 790 65.	29. 806 58.	47.5 29.	42.4 37.8	40.2 37.4	E. 3	N.E. 3	0.25	6	6	—	9 10	1 p.m.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	29. 828 55.5	29. 894 57.5	46. 34.5	42.8 38.2	42.3 38.8	N.E. 3	N.E. 3	0.14	9	9	—	44.5 8	8 8	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	29. 936 58.	29. 928 57	48. 39.5	45. 40.5	42. 38.	N.E. 3	N.E. 2	—	8	8	—	44.6 8	8 8	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	29. 832 56.	29. 840 56.5	47. 37.	46. 40.6	42.8 39.8	N.E. 4	N.E. 3	0.01	—	—	—	44.6 8	8 8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	29. 880 57.	29. 866 60.	49.5 41.	45.6 41.	43.5 41.6	N.E. 3	N.E. 1	0.05	6	6	—	1 p.m.	10 6	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
9	29. 952 55.5	30. 050 61.	51. 42.	47.2 45.8	45. 42.2	N. 5	N. 1.5	0.27	5	5	—	45.4 9	9 6	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
10	30. 128 63.5	30. 092 57.	47. 40.	45.2 41.	40.8 37.	N.E. 2	Calm 0	0.12	6	6	—	45.4 9	9 7	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
11	30. 070 58.	30. 134 58.	47.5 35.5	45.6 40.8	37. 34.8	E. 3	E. 0.5	0.12	8	8	—	45.4 9	9 7	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
12	30. 212 58.	30. 358 58.	46. 36.	41. 37.	39.6 35.4	N. 2	N. 1.	—	11	11	—	45.4 9	9 5	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
13	30. 418 60.	30. 414 57.	47. 34.5	47. 41.8	37.2 34.2	N. 2	N. 1.5	—	—	—	—	45.4 9	9 6	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
14	30. 378 53.	30. 376 58.	43.5 32.	40. 35.8	32.2 27.8	N. 3	N. 3	—	9	9	—	45.4 9	9 5	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
15	30. 272 55.	30. 224 54.	37. 30.	35. 31.	31. 20.8	N. 3	N. 2	0.01	4	4	—	45.4 9	9 4	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
16	30. 172 57.	30. 070 52.	46. 30.	36. 34.2	35.2 32.2	N. 3	N. 2	0.07	5	5	—	45.4 9	9 10	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
17	30. 036 54.	30. 072 57.	41. 31.5	39.4 34.	33.5 30.8	N. 3	N. 1	0.09	—	—	—	45.4 9	9 3	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
18	30. 068 60.	30. 104 57.	43. 28.5	40. 43.6	32. 29.2	N. 3	N. 0.5	0.11	10	10	—	45.4 9	9 3	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
19	30. 000 51.5	30. 018 57.	45. 28.	42. 41.	40. 36.8	S. 4	S. 4	0.10	2½	2½	—	45.4 9	9 10	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
20	29. 780 54.	29. 368 51.	49. 35.	42. 41.	40. 47.8	S. 4	S. 4	0.59	—	—	—	45.4 9	9 10	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
21	29. 180 53.5	29. 470 57.	49. 41.	45. 44.	44. 42.	S. 5	W. 4	0.42	—	—	—	45.4 9	9 8	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
22	29. 600 63.	29. 440 56.5	49. 38.5	45. 42.	41. 38	W. 3	N.W. 0.5	0.36	7	7	—	45.4 8	8 8	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
23	29. 452 58.	29. 592 6																											

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 in the publication of Monthly Results from different instruments; 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 observations, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by scrupulous attention to the following Directions, secure for their monthly results, 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 results, without which the sun's heat to affect the Minimum Thermometer by distillation.

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 care will be taken in observing the instruments till it has been carefully 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 save and frame to which they are attached.—The frame must be so applied 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 moderately-priced Barometers have been approved by the Council; if properly tested and attested 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—squares are not true, but so much shorter as to compensate the error 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 surface of the mercury is of leather, and thus by aid of a screw acting on the bottom, the surface of the contained mercury, can be adjusted to the zero-point of the fixed scale; its concidence being indicated by a little ivory float, whose stem passes freely through the lid and cuse of the cistern. When the index-tube on this little piston-rod is brought by the adjusting screw, to form one straight line with those on its ivory frame, the scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the 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 screen up the top of the tube, a sharp top is produced. If this is pivoted by air it may be removed to the cistern, and got rid of, by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), gently tapping it; and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, it may be improved by putting a piece of white paper behind the glass, to form a sharp top. This is pivoted by air if 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 part of the cistern which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly, so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Protection of Thermometers.—The Council of the Society recommend that Self-Registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from mere local influences. The legs 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 of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self Registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "Minimum" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Minimum" Thermometer of Rutherford is recommended, when graduated on the glass stem, and affixed to a frame separate from the "Thermometer." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when the part of the spirit distils by high temperature, it will be found in the upper tube, and must be distilled from beneath by heating the part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

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

registering the greatest heat from the sun's rays, and the least amount of cloud in the atmosphere ought to be estimated from the application of a greater or less observation of the sky *overhead*, i.e., within 20° or 30° of the zenith. The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge 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 observations, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will, by scrupulous attention to the following Directions, secure for their monthly results, 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 results, without which 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 a comparison is made, the thermometer on the stem, not merely on the tube, ought to be tested once a year, in snow or melting ice. For comparison of Thermometers a properly tested Thermometer is required. Thermometers ought frequently and those of the "Minimum" Thermometer by distillation, to be compared with the dry bulb of the Hygrometer. The (extreme) speed of the former. Again, in the second "Cloud" (extreme) speed of the latter.

Hygrometer.—A hygrometer, (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 is required. Thermometers ought frequently and those of the "Minimum" Thermometer by distillation, to be compared with the dry bulb of the Hygrometer. The (extreme) speed of the former. Again, in the second "Cloud" (extreme) speed of the latter.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only of itself, but in its relations to that of our rays cast shadows, should be entered in the proper column.

Underground Thermometers.—As the goniometric 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 tilted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames, medium fineness, and fastened at the neck of the bulb by cotton, which also supplies the bulb with water. The Mention must be made of the geological formation and agent—

the observer that the muslin is always clean and moist, and the place.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only of itself, but in its relations to that of our rays cast shadows, should be entered in the proper column.

Ozone.—Mention whether Schöniger'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°, as an ozone entry in

which and Southampton, are given at the foot of the column. Greenwich and Southwark, are given at the head of the column. Besides special and extraordinary observations, great prominence is given in this column to prevalent diseases, as such notes ought to be given in this column to the name of the N.W. and that its force on the scale 0, is 44°, 46°, that it is blowing fresh.

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

Hygrometer.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read on the 3rd of each month, the index of the tide being taken at 9 A.M. only, as indicating the greatest and least degrees of the mercury or alcohol, is alone noted. Readings of the scale, of the mercury or alcohol, will be read at 9 A.M. on the 3rd, 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, 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 snakes, etc.

Careful observations ought to be made on the changes in the direction of the wind, and during storms, extra observations of winds attaining their maximum, as well as such notes ought to be made at every hour of Greenwich time. Such a storm as have been hinted at above. When 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 observations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns, otherwise in one, or in two rows off for the purpose, from that was unoccupied, or in the head—Remarks. It is intended that observations by the self-registering instrument which shows the amount of Wind

that passes it per day, from which also the Velocity of the Wind can be determined, and the time of observation may be ascertained. For indicating the direction of the wind, it is difficult to obtain an unexceptionable position for the vanes; but in all cases the Gang-Lind's Anemometer is also recommended; the method of indicating Wind Force in cases of storms, poses no great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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

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

(By Order) A. B.

Instruction, 9th December 1865.

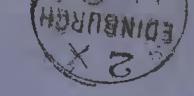
To

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

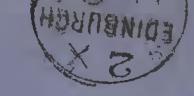


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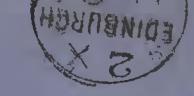


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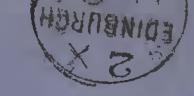


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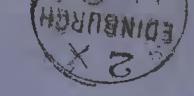


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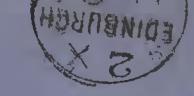


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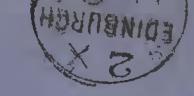


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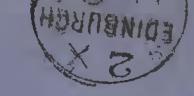


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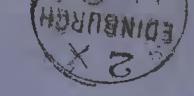


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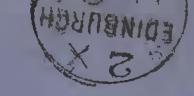


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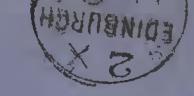


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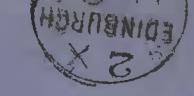


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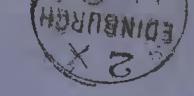


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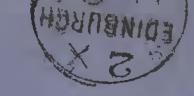


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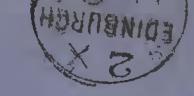


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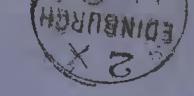


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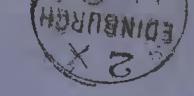


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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshaven, County of Faroë Islands, in Lat. 62° 25' 8", 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 June 1873.

The Hours of Observation are 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.				GENERAL REMARKS.				Days of Month.
		9 h. A.M.		9 h. P.M.		Exposed in Shade, 4 feet above Ground.				Exposed Black Bulbs.				9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		SEA.		OZONE.						
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max.	Min.	Max.	Min.	Max. in Sun's rays	Min. on Grass.	No.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Kone.	Direction.	Kone.	No. 78	Hours.	No. 9-10	No. 11-12	No. 13-22	Temperature of W.M. at Depth of feet, at Latitude, at Observatory.	Temperature of W.M. at Depth of feet, at Latitude, at Observatory.	Sea.	Ozone.				
1	1	inches.	°	inches.	°	o	o	o	o	o	o	o	o	o	o	o	o	SW	2	Calm	0	—	—	—	—	—	—	—	76	1				
2	2	30.358	66	30.340	63.5	60	44	58.	49.8	51	49	W	2	W	1	—	—	—	—	—	—	—	—	—	—	—	—	68	2					
3	3	30.280	62	30.226	62	57.5	48.5	53.2	49.3	50.2	47	W	2	Calm	0	—	—	—	—	—	—	—	—	—	—	—	—	85	3					
4	4	30.104	59.5	30.050	60	54.5	45.	48.2	46.8	48.3	47	Calm	0	Calm	0	—	—	—	—	—	—	—	—	—	—	—	—	56	4					
5	5	30.070	61	30.144	59	59	41	56.	48.6	46.8	44	W	2	Calm	0	—	—	—	—	—	—	—	—	—	—	—	—	75	5					
6	6	30.178	60	30.318	56	59	40	50	47	42	37	W	1.5	N	2	—	—	—	—	—	—	—	—	—	—	—	—	77	6					
7	7	30.148	55	30.058	57	59	35	44	40	50	48	SW	2	W	1	—	—	—	—	—	—	—	—	—	—	—	56	7						
8	8	29.816	56	29.710	57	54	47	53	51	51	50	W	3	W	3	0.85	—	—	—	—	—	—	—	—	—	—	—	47.5	8					
9	9	29.652	64	29.480	58	56	47	53.8	52.4	48	46.5	SW	3	SE	1	—	—	—	—	—	—	—	—	—	—	—	—	86	9					
10	10	29.000	57	28.794	53	52	42	50	49	48	45	SE	4	S	5	0.90	—	—	—	—	—	—	—	—	—	—	—	1010	10					
11	11	29.140	56	29.370	55	54	39	50.	46	49.8	45.8	S	5	S	4	0.24	—	—	—	—	—	—	—	—	—	—	—	95	11					
12	12	29.590	61	29.676	57	56	46	53.	52	49	46.8	SE	3	SE	1	0.07	—	—	—	—	—	—	—	—	—	—	—	87	12					
13	13	29.730	57	29.788	57	55	48	49.5	49	49	48.5	Calm	0	NE	1	—	—	—	—	—	—	—	—	—	—	—	76	13						
14	14	29.874	61	29.900	60	61	47	52.	51	50	48	E	1	NE	1	0.13	—	—	—	—	—	—	—	—	—	—	—	66	14					
15	15	29.876	63.5	29.878	58	59	48	57.4	51.2	49	47.5	NE	2	Calm	0	—	—	—	—	—	—	—	—	—	—	—	76	15						
16	16	30.124	61	30.130	61	55.5	47	48.	46.7	48.2	46.6	Calm	0	W	0.5	—	—	—	—	—	—	—	—	—	—	—	57	16						
17	17	30.076	58	30.024	58.5	54	46	49.2	47.8	49.2	48.2	NE	1.5	Calm	0	—	—	—	—	—	—	—	—	—	—	—	88	17						
18	18	29.622	56	29.502	58	55	48	52.	49.3	52.2	51	SW	4	SW	4	0.35	—	—	—	—	—	—	—	—	—	—	—	1010	18					
19	19	29.648	58.5	29.794	59	56	50	53.4	50.2	51	49.6	W	4	SW	0.5	0.09	—	—	—	—	—	—	—	—	—	—	5	19						
20	20	29.640	59	29.504	60.5	57	48	53.2	52.2	50.2	49	SW	2	SW	0.5	0.39	—	—	—	—	—	—	—	—	—	—	7	20						
21	21	29.578	59	29.764	60	58	47	52.	49.5	48.5	46.5	N	3	W	0.5	0.26	—	—	—	—	—	—	—	—	—	—	75	21						
22	22	29.530	57	29.374	58	53	47	50.4	49.4	49	47	S	2	SE	2	0.17	—	—	—	—	—	—	—	—	—	—	86	22						
23	23	29.756	58	29.918	59	54	41	45.8	44.7	47.5	45.5	N	3	N	2	—	—	—	—	—	—	—	—	—	—	—	83	23						
24	24	29.882	58	29.764	57	53.5	40.5	50.2	47	49	46.1	SW	1	SW	1.5	0.01	—	—	—	—	—	—	—	—	—	—	55	24						
25	25	29.626	59	29.650	59.5	55	46.5	49.4	46.4	44.8	SW	3	W	1.5	0.07	—	—	—	—	—	—	—	—	—	—	—	85	25						
26	26	29.780	63	29.900	60	57	46.5	57.3	49.5	50.6	47.2	W	3	SW	2	—	—	—	—	—	—	—	—	—	—	—	11	26						
27	27	29.802	58	29.726	59	56	48	52.7	49	48.2	46.5</																							

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 from radiation during night. Their bulls have a black covering, which may easily be made, or intended, by the application of a mixture of lamp black and printer's ink. They are placed in 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge in the position or shade of the clouds, we ought not to take them into account in the observations; and it is found that differences between the two stations, so very considerable, as to the "Maximum" should be freely exposed to the sun, and the "Minimum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. The "Maximum" is used for Meteorological purposes, while the "Minimum" is used for comparison with the laboratory thermometer.

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. For comparison of Thermometers a properly tested Thermometer or at the top of the schedule. It is hoped that the utmost care will be taken in achieving one of the main objects of Meteorological Observation.

The "Barometer" is constructed by Mr. A. de London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scale-edges 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 Medical Committee of the British Association. In another form of the "Aneroid," the sides of the cistern are 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 base of the cistern. When the "Aneroid" on this little piston-rod is brought, by the adjusting screw, to form an air-tight tube with its ivory frame, the surface of the mercury is then at the exact height from which the cistern is graduated. In taking an observation, this "provisionary" setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the "barometer."

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 top of the tube, a "sharp tip" is produced. If this is prevented by air it may be removed to the cistern, and set in, by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg, and gently tapping it); and if this plan fails, the instrument must be repaired.

The Barometer should be suspended in a good light, which is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of a piece of white paper behind the glass, the "barometer" will be 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 reading Ruthenford's "Max." and "Min." Thermometers, are those of a series of phenomena commencing 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.

Hour of Observing Temperature.—The Thermometer 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 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 both and front of the tube; usually the lower edge of the vessel, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

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

Self Registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "Minimum" Thermometers are recommended, printed directions for their use may be obtained with each instrument. The "Minimum" Thermometer of Rutherford is recommended, when graduated on the glass stem and affixed to a frame separate from the "Maximum." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

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

Short-term
June 1873

To

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

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

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who 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

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.

Horn 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 deviations from the approved and well-tested form of this amara-

Thermometers as are *not* graduated on the stem, but merely on an attached scale, undergo repairs, they are *very* liable to be moved from their position on the Scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "*Minimum*" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing-point of each Thermometer (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly tested Thermometer may be had, on loan, by any observer, from the Meteorological 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 amara-

6, S. W.
Direction, " 2, W.
upper strata of clouds travel with *extreme* velocity from S. W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" 4, st.
2, cu-st.

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

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

every reading at what time it was taken, in not at 3 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, and is recommended to the Council by the Committee of the Royal Meteorological Society.

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 atmosphere, of great interest. The bulb must be delicate, and must be made with great care. The bulb must be

the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-inches* are not true inches but so much shorter as to *compensate* the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought, by the adjusting screw, to form one *straight line* with those on its ivory frame, the

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 $\frac{3}{4}^{\text{N.W.}}$, 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.

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

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 tan* is produced.

Remarks.—The “*Remarks*” column is too narrow, but unavoidable so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunderstorms, and remarkable falls of snow, hail, or rain, the hour of lightning, etc. Observations ought to be made on the changes in 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 another tangent to the curve of the index.

The Council would strongly recommend that every observatory be furnished with a Hemispherical-Cup Anemometer,—a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind may be ascertained. For indicating at the time of observation may be made on the 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

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accom-

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

The use of a lens will greatly facilitate affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accom-

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

Rain-gages.—Many causes conspire to produce anomalies

immoderate 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 snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon part of the spirit distils by high temperature, it will be found in

Negretti and Zambra's Patent “Maximum” Thermometers are recommended: printed directions for their use may be obtained with each instrument. The “Minimum” Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the “Maximum.” This Thermometer is liable to two 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

Self Registering Thermometers.—Professor Phillips's, and Meroeological Secretary; and they consider it desirable that before purchasing new instruments, should communicate with the makers.

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meroeological Secretary; and they consider it desirable that before purchasing new instruments, should communicate with the makers.

Tc

Mr ALEXANDER BUCHAN

Secretary of the Meteorological Society of Scotland.

EDINBURGH.

BOOK-POST.

Secretary of the Meteorological Society of Scotland,

OBSEERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS

in which anemometer should be nicely exposed to the sun; and the "Minimum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who will 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 tested by comparison with a *Standard Thermometer*. When such 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 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 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, For comparison of Thermometers, a properly tested Thermometer is honed that the utmost care be had or been by our observer from the Meteorological stations are covered to the "amount" of $\frac{4}{10}$ th parts with strata

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

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

Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and constancy,—the Council recommend that observations in this interesting department be made at 9 A.M., by scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any thermometers placed in the earth, their bulbs being sunk to the bottom of the hole.

tion as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*. Two moderate-priced Barometers have been approved by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

An excellent Barometer is constructed by Mr Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its *scale-inches* are not true inches but so much shorter as to compensate the error that would proceed as from the moist cloth in ordinary circumstances.

One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometer is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging 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 when the screw, to form one straight line with those on its ivory frame, 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 one straight line with those on its ivory frame, the

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 $3\frac{1}{4}$, 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 Electricity.—Too much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial

the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

In taking an *Observation*, the attached Thermometer is first mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

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

The Council would strongly recommend that every observatory be furnished with a Hemispherical-Cup Anemometer, — *Protection of Thermometers.*—The Council of the Society

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

Self Registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent “Maximum” Thermometers are recommended: printed directions for their use may be obtained with each instrument. The “Minimum” Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the “Maximum.” This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Islands, in Lat. 62° 62' 1", 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 August 1873.

The Hours of Observation are ^{not} of Greenwich Time.

Days of Month.	BAROMETER.			SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.			HYGROMETER. No. 822 & 829.			WIND.			RAIN.			CLOUDS.			THERMOMETERS under Ground.			GENERAL REMARKS.			Days of Month.					
	9 h. A.M.		9 h. P.M.		Projected in Shade, 4 feet above Ground.			Exposed Black Bulbs.			9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H Cup Anemometer No. 78.	No. of hours in which it fell.	Amount in inches.	P.M.	9 h. A.M.	9 h. P.M.	Temperature of WELL at Depth of feet, No. 10833.	SEA. 10833.	OZONE.			
	Barometer, * No. 91	Attached Thermometer	Barometer, No. 91	Attached Thermometer	Max. No. 7165	Min. No. 3237	Max. in Sun's rays	Min. on Grass.	No. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force	No. 78.	Velocity, (0-6), and Direction, 9 h. A.M.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction, 9 h. A.M.	Amount, (0-10), and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	SUNSHINE.	Temperature at Ullathorn and Dusby 9 A.M. 9 P.M.	Schelkine 0-10.	
1	inches	°	inches	°	°	°	°	°	°	55.2	53.	55.	53.	W	1.	N.E.	1.	—	—	8	—	—	—	—	—	—	—	—	—	1
2	29.662	59.	29.828	61.	64.	51.	55.	53.	W	1.	N.E.	1.	—	—	—	—	—	—	—	—	6	3	3 p.m.	49.5	49.5	6	6	—	2	
3	29.838	64.	29.660	60.	56.	51.	56.	51.	SW	3	N.W.	2	0.41	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	3	
4	29.684	63.	29.634	60.	56.5	49.	54.	51.	52.	49.8	SW	4	SW	2	0.03	—	—	—	—	—	5	—	—	—	—	—	—	—	—	4
5	29.550	60.	29.522	60.	55.	49.5	54.8	51.	50.2	49.	W	3	W	0.5	0.25	—	—	—	—	—	5	—	—	—	—	—	—	—	—	5
6	29.626	62.	29.421	61.	58.5	47.5	56.2	51.6	50.	48.8	W	2	S	3	0.03	—	—	—	—	—	8	—	—	—	—	—	—	—	—	6
7	29.172	58.	29.430	58.	59.	49.	51.6	48.2	52.	49.	W	5	N.W.	1.	0.76	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
8	29.680	58.	29.584	58.	56.	43.	52.	48.	50.	48.	W	1	Calm	0	—	—	—	—	—	6	—	—	—	—	—	—	—	—	8	
9	29.614	66.	29.704	62.	57.5	47.	53.	52.	50.	48.2	SW	3	Calm	0	0.14	—	—	—	—	—	8	—	—	—	—	—	—	—	—	9
10	29.784	62.	29.860	59.	57.5	45.	54.4	48.6	45.2	44.6	N	3	N	0.5	0.03	—	—	—	—	—	5	—	—	—	—	—	—	—	—	10
11	29.874	61.5	29.992	61.	62.5	41.5	54.	47.3	46.2	44.	N	3	W	0.5	0.01	—	—	—	—	—	14	—	—	—	—	—	—	—	—	11
12	29.802	60.	29.710	58.	58.	43.5	54.	48.	51.2	49.5	SW	3	S	3	—	—	—	—	—	6	—	—	—	—	—	—	—	—	12	
13	29.532	57.5	29.436	61.	56.5	48.5	54.	53.	51.2	48.8	S	3	SW	0.5	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	13	
14	26.368	61.	29.486	60.5	58.5	48.	54.	50.8	52.2	50.	W	3	W	3	0.04	—	—	—	—	—	6	—	—	—	—	—	—	—	—	14
15	26.504	57.	29.568	59.5	57.	50.	52.8	51.2	53.	51.	SW	3	W	3	0.14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15
16	29.660	57.	29.702	60.	57.5	50.	53.4	49.8	52.	50.6	SW	3	S	3	0.04	—	—	—	—	—	4	—	—	—	—	—	—	—	—	16
17	29.618	57.	29.504	60.	55.	48.5	52.	51.2	49.	47.	S	2	N	2	0.30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	17
18	29.688	60.	29.826	61.	58.5	43.	52.4	47.	47.4	46.	NW	2	N.E.	0.5	0.06	—	—	—	—	—	9	—	—	—	—	—	—	—	—	18
19	29.818	67.	29.760	68.	53.	44.	52.	50.	49.8	48.	N.E.	2	N.E.	2	0.04	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19
20	29.700	57.	29.660	55.	56.	46.	52.	48.5	48.	47.	N	3	N.E.	2	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20
21	29.694	56.	29.768	56.	57.	48.	56.	54.	51.	49.8	N.E.	2	E	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	
22	29.860	57.	29.852	58.	57.	46.	49.	47.	52.8	49.5	Calm	0	Calm	0	—	—	—	—	—	12	—	—	—	—	—	—	—	—	22	
23	29.884	59.	29.948	59.	60.	41.	56.	53.	49.	47.2	Calm	0	Calm	0	—	—	—	—	—	12	—	—	—	—	—	—	—	—	23	
24	30.036	62.	30.116	58.	60.	42.5	58.2	51.8	46.3	45.	Calm	0	Calm	0	—	—	—	—	—	11 1/2	—	—	—	—	—	—	—	—	24	
25	30.182	59.5	30.196	60.	57.5	44.5	56.	50.7	50.	48.6	W	2	W	0.5	—	—	—	—	—	12	—	—	—	—	—	—	—	—	25	
26	30.188	64.	30.184	62.	60.	47.	56.	52.4	47.4	46.2	SW	2	SW																	

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshaven, County of Faroë Islands, in Lat. 62° 2' 1", 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 September 1873.

The Hours of Observation are 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.		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.		P.M.		9 h. A.M.		SEA. No. 832	OZONE. Exhalation												
	Barometer, No. 91	Attached Thermometer, No. 91	Barometer, No. 7165	Attached Thermometer, No. 3237	Max. No. 91	Min. No. 91	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	No. of hours in which it fell.	Amount in inches.	Velocity (0-6) and Direction.	Amount, (0-10), and Species.	Velocity (0-10), and Direction.	Amount, (0-10), and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of W.E. at height of feet, No.	Temperature at London, and Density,	0-10.					
1	29.630	58.	29.712	60.	56.	48.	51.	48.2	51.	49.7	N	3	N	3	0.08	6.	1pm	50.	8	6								1				
2	29.906	56.	30.058	56.5	52.	44.	49.	46.4	45.5	42.4	N	3	N	3	0.02	3	1pm	49.	7	3									2			
3	30.206	54.	30.284	57.5	52.	42.	50.2	45.6	45.6	43.2	N	2	N	0.5	—	10	1pm	49.	4	3									3			
4	30.350	58.	30.432	59.	55.	43.	49.	45.	46.5	44.2	N	2	N	1.5	—	6	1pm	49.	5	3									4			
5	30.410	56.	30.328	56.	53.	40.	49.2	45.8	41.	38	N	2	N	1	—	10	1pm	49.2	1	0									5			
6	30.112	55.	29.944	57.5	55.	35.5	48.	46.	44.	40.7	N	E	1	N	0.5	—	10	4	2										6			
7	29.802	55.	29.780	58.	56.	41.	48.6	44.5	48.	46.	N	3	N	1	—	6	1pm	49.4	4	0									7			
8	29.800	56.5	29.778	58.	56.5	46.	52.	49.8	47.	45.6	Calm	0	Calm	0	—	2	1pm	49.4	1	2									8			
9	29.646	57.	29.570	61.5	56.5	45.5	53.2	50.	48.	46.	S	E	2	S	0.5	0.01	5	6pm	50.	5	8	aur bor.									9	
10	29.526	61.5	29.474	61.	57.5	42.5	54.2	49.	47.4	44.8	N	E	3	N	1.5	—	10	6pm	49.4	7	5									10		
11	29.500	59.	29.604	58.	54.	42.	50.	47.	44.	41.	N	E	2	N	1	0.02	6	6pm	49.	4	1								11			
12	29.746	59.	29.856	56.	51.5	36.5	46.8	45.	44.	42.	N	E	0.5	N	W	0.5	2	6pm	49.	3	3								12			
13	29.930	57.	29.920	57.5	55.	35.5	47.8	43.	45.	42.6	N	W	1.	N	W	1.	6	5pm	49.	5	2	aur bor.									13	
14	29.854	60.	29.794	58.	54.5	37.	51.2	46.8	46.	42.5	S	E	2	S	E	3	3	6pm	49.	5	7	aur bor.									14	
15	29.704	60.	29.656	57.	52.	45.	50.6	45.4	47.	44.2	N	E	3	N	W	3	4	6pm	48.9	7	6								15			
16	29.646	60.5	29.576	58.	54.5	39.	48.4	44.8	39.2	38.2	N	E	2	Calm	0	0.17	3	6pm	48.5	4	2	aur bor.									16	
17	29.352	60.	29.046	56.5	50.5	37.5	48.6	45.7	45.2	43.2	N	E	3	N	3	0.17	—	6pm	48.7	6	9	fog and rain									17	
18	29.120	60.	29.532	56.	50.	42.	48.3	45.5	43.	39.8	N	3	N	3	0.31	—	—	40	6pm	48.8	10	aur bor.									18	
19	29.824	61.5	29.762	58.	52.5	36.	47.4	42.	46.	43.	N	W	2	S	E	3	8	6pm	48.5	6	5								19			
20	29.452	58.	29.848	54.5	48.	37.	44.2	42.5	39.2	36.	N	E	4	N	3	0.77	—	6pm	48.5	8	9	aur bor.									20	
21	30.170	65.	30.168	56.	50.5	38.	47.2	40.	50.	46.5	N	W	3	N	4	—	10	6pm	48.5	7	7								21			
22	29.908	60.	29.914	58.	53.5	50.	51.	50.	52.	48.8	N	W	4	N	5	1.67	—	6pm	48.8	10	10	Heavy winds from 10 a.m.-5.									22	
23	30.094	63.	30.134	59.	53.5	51.	51.4	49.5	52.4	50.	N	W	4	S	W	3	0.75	—	6pm	48.8	8	10								23		
24	30.174	57.	30.136	59.	54.	50.	52.4	51.	52.	50.	S	W	3	S	W	3	0.05	—	6pm	48.8	9	9	fog and rain									24
25	30.008	58.5	30.000	63.	53.5	50.8	52.	49.7	51.5	50.4	S	W	3	S	W	2	0.09	—	6pm	48.8	8	9	de de									25
26	29.994	59.	29.914	60.	54.	46.5	49.8	48.7	47.6	45.8	Calm	0	N	8	1	0.03	—	6pm	49.	6	5								26			
27	29.308	59.	29.544	60.	58.5	40.5	57.4	55.	41.2	38.8	S	W	5	N	4	1.15	—	6pm	49.	10	9											

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENT

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 wind 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 distillation.

Verification of Thermometers.—No instrument ought to be as illustrating the condition and currents of the upper and lower atmosphere, as the thermometer; and it is therefore important that the Society will by a scrupulous

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 "*Maximam*" should be freely exposed to the sun, and the "*Minimam*" 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 covering it.

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

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, at the top of the schedule. It is hoped that the utmost uncertainty 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 very 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.

The entries in the schedule are to be made in the following manner;—In the column “Velocity and Direction,” $\frac{2}{2}, \text{W.}$ (for example,) will indicate that the regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column “Velocity and Direction,” $\frac{2}{2}, \text{W.}$ (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 $\frac{4}{2}, \text{st.}$, (e.g.) will indicate that the higher regions are covered to the “amount” of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

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

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

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

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

Ozone.—Mention whether Schönbein's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus $\frac{3\text{ SW}}{4}$, 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 the measurement of the electric current, and the resistance of the circuit, and the potential difference between the terminals of the battery.

Barometer.—Before suspending the Barometer for use, it must be accounted whether the tube above the reservoir

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

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

In taking an Observation, the attached Thermometer is first inverted : the tube must then be gently tapped and the cistern-junction carefully made. By raising and lowering the eye, must be brought into the plane of the back and front of the dial, — usually the lower edge of the vernier, which must be

Remarks.—The “Renier's” 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 boreales, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of

Solar Observations, and so on, as far as possible, to be made on the days of the Equinoxes and Solstices, and during the change in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results.

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

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation for observation and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day *viz.*, on the 21st days of March, June, September, and December.

Self Registering Thermometers.—Professor Phillips's, and Segretti and Zambra's Patent "Maximun" Thermometers are recommended: printed directions for their use may be obtained from the Society's Office.

The "Minutem" Thermometer of each instrument. The

therford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum." This thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. Then the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when the spirit distils by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating at part over a lamp; the alcohol will evaporate and again commence in contact with the body of the liquid. These instruments could be hung horizontally.

To

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

A. B
(By Order)

DINDBURG, 9th December 1865.

UBCII, 9th December 186

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS

observed. Observers, in some few cases, may find this impossible; in such instances, they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

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

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

An excellent Barometer is constructed by Mr Adie of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-inches* are not true inches but so much shorter as to *compensate* the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Bayonet, 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 base of the cistern. When the *index* "K" on this little victim is brought beneath the

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 "Hegrometrical 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 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

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

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

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

Temperature of Wells.—The temperature of the water at the

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

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

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 $3\frac{3}{4}^W$, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as “ $3\frac{3}{4}$ ” 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.

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 boreales, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of Careful observations ought to be made on the changes in the

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

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

Snow-falls may, for convenience, be registered in the 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, part of the spirit distils by, *i.e.*, the temperature of the air.

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

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

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

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

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary; and they consider it desirable that he

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.

(By Order) A. B.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

Observations only; and nothing that partakes of the deduction or inference.

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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Isles, in Lat. $63^{\circ}21'$, 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 November 1873.

The Hours of Observation are 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	OZONE.	GENERAL REMARKS.	As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevailing Diseases, etc.	Mention the hour at which Storms began and ended.	Days of Month.						
		9 h. A.M.		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.													
		Barometer, * No. 91.	Attached Thermometer No. 91.	Barometer, Attached Thermometer No. 765 No. 237.	Max. Min. No. No.	Max. Min. on Sun's rays No. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No. of hours in which it fell.	No. 78.	Readings of II-Cup Anemometer No. 9 h. A.M.	Velocity, (0—0), Amount, (0—10), and Species.	Velocity, (0—0), Amount, (0—10), and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of WELL at Depth of feet, No. 0—10.	Temperature and Humidity, 9 A.M. 9 P.M.		
1	28.756	53.	28.664	57.	45.	35.	37.6	36.2	43.2	41.	Calm	0	NE	3	0.29					5	○	○	○	11 a.m.	45.6	5.6	1
2	28.800	55.	29.202	53.	45.5	41.	43.8	42.	44.	42.	NE	3	SE	4	0.88					—	8	10		1 p.m.	45.5	9.5	2
3	29.468	53.	29.472	55.5	46.5	37.	45.2	43.5	38.	36.	NE	4	NE	2	0.05					3				2 p.m.	3.2		3
4	29.522	53.	29.714	55.5	41.	32.5	39.2	37.8	33.5	30.7	NE	3	NE	3	0.03					2				2 p.m.	45.	6.3	4
5	29.772	53.5	29.854	53.5	87.5	29.	32.2	29.6	36.2	34.	N	2	N	2	0.02					3				2 p.m.	5.2		5
6	29.972	48.5	30.050	55.	38.	31.5	35.3	32.2	33.2	29.8	NW	2	N	2	—					—				2 p.m.	44.5	7.1	6
7	30.296	51.5	30.430	54.	34.	30.5	32.	29.5	32.2	31.4	N	3	N	2	—					—				2 p.m.	5.3		7
8	30.452	44.5	30.500	56.	40.	26.5	33.	30.	38.2	36.6	Calm	0	Calm	0	—					5				2 p.m.	4.2		8
9	30.572	51.5	30.652	60.	43.	37.	40.2	37.8	39.	37.	Calm	0	Calm	0	—					—				2 p.m.	45.	5.3	9
10	30.604	55.	30.616	54.5	43.	34.	38.	37.	37.8	36.2	Calm	0	Calm	0	0.01					—				2 p.m.	45.	7.6	10
11	30.542	54.5	30.456	58.	42.5	37.	40.5	38.5	42.	40.8	SE	4	SE	1	0.03					—				2 p.m.	7.6		11
12	30.340	53.	30.304	58.	43.5	39.5	41.	24.0	24.2	41.	NE	0.5	NE	2	0.33					—				2 p.m.	45.	7.6	12
13	30.312	55.	30.340	55.5	42.	33.5	37.8	36.2	37.	35.2	NE	2	SE	2	—					2				2 p.m.	9.2		13
14	30.396	58.5	30.358	56.	42.	34.5	36.8	34.6	42.	38.	Calm	0	W	3	—					—				2 p.m.	7.8		14
15	30.344	56.	30.356	56.	47.	41.	46.	42.4	45.	41.4	W	3	NW	4	—					—				2 p.m.	8.9		15
16	30.410	55.5	30.430	58.	47.5	43.	44.8	41.5	47.	42.	NW	3	NW	3	—					—				2 p.m.	7.8		16
17	30.382	56.	30.388	59.	48.5	45.	47.	44.2	47.2	44.5	NW	3	NW	3	0.02					—				2 p.m.	4.7		17
18	30.376	58.	30.302	59.	47.	42.	45.6	43.2	43.4	41.	NW	3	SW	2	0.01					—				2 p.m.	8.6		18
19	30.116	53.	29.922	57.	46.5	41.5	46.2	44.6	45.2	41.	SW	3	SW	4	0.10					—				2 p.m.	44.5	7.10	19
20	29.778	54.5	29.708	56.	46.5	40.	40.8	38.8	43.2	39.6	W	2	W	3	0.32					—				2 p.m.	8.8		20
21	29.014	54.5	28.816	58.	47.	44.5	44.	42.	43.4	40.8	W	4	NW	4	0.80					—				2 p.m.	44.6	10.6	21
22	29.152	55.5	29.046	54.5	44.	32.	36.8	32.8	34.	33.	NW	3	NE	2	0.16					1				2 p.m.	7.2	a.m. rain. from 7 p.m. snow.	22
23	28.956	48.	29.136	52.	37.	31.	34.	32.8	33.6	33.	N	2	NE	0.5	0.64					—				2 p.m.	10.4	Snow	23
24	29.128	54.5	29.300	51.	39.	31.	34.	32.8	35.	30.2	NW	3	NW	4	0.37					—				2 p.m.	44.	8.7	24
25	29.590	49.5	29.684	52.	38.	29.5	31.2	29.8	35.	37.	NW	3	NW	3	0.68					—				2 p.m.	7.7	Snow and hail. Air bor.	25
26	29.338	50.	28.860	55.	46.	29.	32.	32.	45.	44.	NE	4	Calm	0	1.58					—				2 p.m.	8.9	9 a.m. the thermometer box was full of snow. a.m. snow. p.m. rain.	26
27	28.848	53.	29.350	55.	46.5	37.	43.	42.5	38.5	35.	Calm	0	NW	4	0.31					—				2 p.m.	43.7	7.10	27
28	29.496	54.	29.072	57.	46.5	32.5	34.	32.4	34.	33.6	N	1	NE	2	0.66					—				2 p.m.	6.7	pm. Snow and rain	28
29	29.154	50.	29.464	52.5	39.5	31.5	36.	34.8	32.8	30.4	NE	3															

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

WITH REMARKS ON THE USE OF INSTRUMENTS

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who 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 "Maximum" should be freely exposed to the sun, and the "Minimum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by distillation.

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 "*Miniam*," 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 "Hypsometrical 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 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 trouble.

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

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

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

Temperature of the Sea.—A knowledge of the temperature of the upper strata of clouds travel with extreme velocity from S.W. and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" 4, st. 2, cu-st. column, an entry of $\frac{6}{2}$, S. W.

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

Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and constancy,—the Council recommend that observations in this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to 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.

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-inches* are not true inches but so much shorter as to *compensate* the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their coincidence being indicated by a little ivory float, whose item passes freely through the lid and case of the cistern. When the index-line on this little piston-rod is brought, by the adjusting crew, to form one *straight line* with those on its ivory frame, the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore recommend that the temperature of the sea be carefully taken by a properly constricted apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At or near the time of high water, on the 5th, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

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

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

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.

Remarks.—The “*Remarks*” column is too narrow, but un-
avoidably 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 advan-
tage of, and a list of such as are recognised and in use at Green-
wich 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, auroræ boreales,
remarkable depressions and elevations of the barometer, thunder
storms, and remarkable falls of snow, hail, or rain, the hour of
the day, &c. &c.

In *taking an Observation*, the attached Thermometer is first
adjusted: the tube must then be gently tapped and the easter-
nward adjustment carefully made. By raising and lowering the eye,
must be brought into the plane of the back and front of the
index,—usually the lower edge of the vernier, which must be
refined to form exactly a tangent to the convex surface

The Council would strongly recommend that every observatory be furnished with a Hemispherical-Cup Anemometer,²—a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind would be likely to give highly interesting and important results.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate the thermometer, the door is made double, and the outer door is hinged to the inner door.

Rain-gages.—Many causes conspire to produce anomalies in the registration of Observers to the registration of such

occur 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.

Self Registering Thermometers.—Professor Phillips's and Negretti and Zamira's Patent "Maximum" Thermometers are recommended : printed directions for their use may be obtained at each instrument. The "Minimum" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum." This thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer.

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

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS