

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 sun's heat and the "Maxima" should rest on wooden supports, a few render than quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and entire commonness with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparability among the observations made from their position on the Scale, and ought never afterwards to be used, without being retested. The Thermometer by itself, must be allowed to cover either of these Thermometers; and especially the "Maxima" column, though their apertures and shapes ought to be compared with the dry bulb of the Hygrometer. The Thermometers ought frequently to be exposed to the sun's heat, and especially in the open situation. For comparison of Thermometers, a properly tested Thermometer may be had, on loan, by any observer, from the Meteorological Society.

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

The Thermometers must *hang down* by at least an inch free from the soil, its amount and *creep*,—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 board on which it may be suspended; the water-tap must be 12 and 22 inches, and the stems above ground, protected from the sun's rays, and fitted with sloping collars, to prevent rain-water passing through them; the tube must be made of glass, 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-pipe.

In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be covered, and placed to the side, and a little below the level of the wet bulb,—in no case under the bulb,—the muslin must be of water being conveyed to the bulb by the stems or wooden frames. 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-pipe.

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

is immediately altered by pulling the boxwood frame out of the tube, and hanging them side by side, so that the aforementioned requirements shall be complied with, as far as possible. When a Barometer having adjustable surfaces has to be read, Rutherford's "Mar." and "Mer." Thermometers, their concavities being indicated by a little ivory float, whose stem passes freely through the lid and base of the system. When 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 it is prevented by adjusting the screw, *to form a straight line* with those on its cover frame, the surface of the mercury is then at the exact height from which the thermometer was graduated. In taking an observation, this *provision* underlies, but so much shorter as to *compensate* the error that would otherwise arise from the mercury in the system. This form of instrument has been adopted by the Board of Trade, and has received the approval of the General Committee of the British Association. In another form of the Barometer, the sides of the *cistern* are of leather and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; the index-line on this little piston-rod is brought by the adjusting screw, *to form a straight line* with those on its cover frame, the surface of the mercury is then at the exact height from which the thermometer was graduated.

Barometer.—*Observation.*—The Barometer is to be removed from its fastenings, the ivory peg must be screwed so as to form a right plug to the cistern. Then *seize* up the mercury 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 sun's direct rays nor the heat of a fire.

In taking an Observation.—Observations must be taken quickly; 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 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 merely local influences. The laths forming the sides and doors of the Boxes are arranged so as 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 "Maxima."* Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Maxima" Thermometer of Rutherford is recommended when graduated on the glass stem of which must be grinded against, and may be easily renewed by an observer. When the *column* of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when 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 the tube 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

Rain-gauge.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavorable situations, which the published Sommaries may fairly represent in the whole of Scotland. Observers ought to be confined to individual trees and shrubs; to particular species of birds; and in the case of crops, 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 Society; 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.

Instrument, 9th December 1865.

To

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.



Timbres, etc., whether posted or in transit, whether my letter be safe from robbery, disease, etc. Whether Bills, Postlets, etc., addressed also to state any information you may be able to collect relative to the Posts of Gram, Hay, Peat, etc.

Have the goods addressed to state any information you may be able to collect relative to the Posts of Gram, Hay, Peat, etc.

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SCOTTISH METEOROLOGICAL SOCIETY.

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

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

During the MONTH of March 1874.

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. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.																
	9 h. A.M.	9 h. P.M.	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-Gauge Anerometer.	No. of Hours in which it fell.	Amount in inches.	9 A.M.	P.M.																			
	Barometer, No. 91	Attached Thermometer No. 91	Max. No. 765	Min. No. 3237	Max. No. 9	Min. No. 1	Max. No. 3	Min. No. 1	No. 78	No. 78	Velocity (0-6), and Direction.	Velocity (0-6), and Direction.	Velocity (0-10), and Direction.	Velocity (0-10), and Direction.																		
1	29.980	54.5	30.150	63.	48.	40.	45.2	42.8	44.	42.6	98	3	S E	3	1 pm foggy	1																
2	30.204	59.	30.292	60.	47.	43.	44.8	43.	45	44.	S	4	S	3	43. fog and rain	2																
3	29.988	55.	30.160	53.5	51.	43.	49.4	48.	43.6	42.4	S	5	Calm	0	de aw do	3																
4	29.978	61.5	30.312	62.5	50.	36.5	49.2	47.8	39.2	36.	SW	4	NW	1.	am. de 22	4																
5	30.548	57.5	30.664	58.	46.5	35.5	41.8	38.	42.5	38.8	NW	2	NW	3	1 pm	5																
6	30.450	57.	30.374	60.	49.	42.5	47.2	43.8	45.6	42.	W	5	NW	5	7	6																
7	30.072	57.5	29.580	61.	47.	41.5	45.2	42.2	42.2	39.6	W	4	W	4	1 pm	7																
8	29.446	54.	29.826	53.	44.	21.	33.	29.8	23.	21.6	N	2	N	4	43.	8																
9	29.922	49.5	30.030	53.	26.5	17.5	24.8	22.6	18.4	18.	N	3	N	3	Show (9 pm the thermometer box full of snow)	9																
10	30.020	49.	30.110	52.	27.	16.	20.6	19.	20.	18.8	N	3	S E	2	Show	10																
11	30.106	47.	29.886	53.	34.5	16.5	25.5	22.4	32.6	30.	N	1	NW	1.5	Show	11																
12	29.954	49.5	29.876	57.5	42.	31.	37.	34.5	41.	37.5	S	2	NW	1.	foggy	12																
13	30.216	48.	30.278	55.5	41.	25.	28.	25.8	25.8	24.6	N	2	NW	0.5	1 pm	13																
14	30.120	47	30.112	50.5	35.	21.5	31.4	29.	34.	31.4	E	2	S E	2	43.	14																
15	29.772	55.5	29.812	58.	49.5	33.5	47.	45.6	40.2	38.4	SW	3	NW	1	1 pm	15																
16	29.452	56.	29.340	63.5	49.5	40.	48.3	46.7	44.6	40.6	S	4	W	3	3 pm	17																
17	29.434	55.	29.330	62.	47.	39.5	42.8	39.	41.8	40.	W	3	W	1.	42.8	18																
18	29.718	54.	29.820	62.	42.5	28.	29.5	27.	35.	31.7	N	2	S	3	42.8	19																
19	29.152	57.5	29.304	59.5	42.	32.	40.8	38.	33.	29.7	S	3	NW	4	rain, snow and hail. aur bor	20																
20	29.750	57.5	29.796	60.	46.	27.5	31.	28.8	35.2	34.	W	3.	S	1.	Show	21																
21	29.260	52.	29.196	62.	49.	37.	47.2	46.4	46.	45.2	S	3	SW	2	foggy	22																
22	29.508	62.	29.518	61.	50.	41.	43.9	42.6	50.	48.2	W	2	SW	3	1 pm	23																
23	29.614	61.	29.794	64.	51.	45.5	50.7	48.	47.	42.2	SW	4	NW	3.	44.2	24																
24	29.982	60.	30.284	56.5	47.5	40.	44.2	39.	41.8	39.	NW	4	NW	0.5	1 pm	25																
25	30.260	58.	30.116	57.	49.	40.5	46.2	42.	47.8	44.8	S	3	S	3	43.4	26																
26	29.870	57.5	29.852	61.	49.	43.	47.2	43.8	44.	42.	Y	4	W	2	43.4	27																
27	29.498	56.	29.144	61.	50.	39.	44.	43.	46.2	45.2	S	4	S	3	43.4	28																
28	29.296	56.5	29.084	60.	48.5	41.	45.2	39.4	43.2	40.6	SW	2	SW	4	1 pm	29																
29	29.032	60.	29.000	62.	47.	37.5	43.5	40.8	42.4	40.	S E	2	S E	3	43.4	30																
30	29.058	59.	29.376	60.	48.5	38.	44.8	41.2	39.	36.5	NW	2	Calm	0.	6 pm	31																
31	29.042	52.	28.786	57.5	46.5	35.5	42.7	41.4	43.	41.5	S	3	SW	3.	44.																	
Sums.		922.702	1709.5	923.202	1819.5	401.0	1069.0	1262.1	1181.4	1217.1	1160.9	93	72.5	7.85	89.4																	
Means.		29.765	55.1	29.781	58.7	45.2	34.5	40.7	38.1	39.3	37.	3	2.3	43.1																		
† Total Corrections for Instrumental Errors.								±0.2	±0.2					±0.2																		
‡ Corrections for Diurnal Range.																																
"Corrected Means."								40.5	38.1	39.1	37.																					
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction $\frac{1}{10}$ of Index Errors, for Temp. (Col. 2), = 29.765 - 0.071 = 29.694.
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{1}{10}$ of Index Errors, for Temp. (Col. 4), = 29.781 - 0.081 = 29.700.
Mean at Station, corrected, and at 32°, = 29.697.
 Correction for height, 40 feet, above Mean Sea-level, = 0.43.
Mean, reduced to 32°, and Sea-level, = 29.740.
 Highest reading, corrected for Index error, on the 5th, = 30.664.
 Lowest Do., Do., on the 31st, = 28.786.
 Difference, or Monthly Range, = 1.878.

S.-R. THERMOMETER, (in shade, etc., highest in Month, (corrected for Index Errors), on the 3rd, th. 23) = 51.
Lowest in Month, corrected for Index errors, on the 10th, = 16.
Difference, or Monthly Range, = 35.
 "Corrected Mean" of all the Highest, (Col. 5), = 45.2.
 "Corrected Mean" of all the Lowest, (Col. 6), = 34.5.
 Difference, or Mean Daily Range, = 10.7.
 ** Calculated Mean Temperature of Month, = 39.8.
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 10th, = 51.
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 51.
Lowest at Night, Black Bulb, (corrected for Index errors), on the 10th, = 16.
 "Corrected

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 wind. The "Maximum" should be freely exposed to the sun, 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 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 Thermometers, ought frequently and especially the "Minimum," to be tested. The self-registering Thermometers, ought frequently and especially the "Minimum," to be tested.

The Council recommend that Observations of the Sun's Heat, and of the Wind, shall be made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column "Velocity and Direction," $\frac{2}{2}, \frac{2}{2}, \frac{2}{2}$, (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 velocity of the upper strata.

Temperature of the Sea.—A knowledge of the temperature of water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances. One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

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

The surface of the mercury is then at the exact height from which 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 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 eastern uppermost. Before suspending the Barometer for use, the person who has observed the mercury level in the tube, must ascertain whether the zero mark on the scale is in exact accordance with the zero mark on the scale of the instrument.

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

Ozone.—Mention whether 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".

Electricity.—Too much importance cannot be attached to

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.

Careful observations ought to be made on the changes in the direction of the wind: and during storms, extra observations of wind attaining their maximum, as well as such notes

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, auroræ boreales, remarkable depressions and elevations of the barometer, thunderstorms, and remarkable falls of snow, hail, or rain, the hour of

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

The mercury in the tube. Observations must be taken quickly; 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, the 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-gauge.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation of the Boxes, and partly from the defective nature of the thermometers, and to allow a complete ventilation of the interior, the instruments are suspended on cross-laths, in the centre of one Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, two Boxes may be made to open to the south. These Boxes may be closed at the Society's Office.

Self-Registering Thermometers.—Professor Phillips's, and Legretti and Zambla's Patent "Maxim" Thermometers are recommended: printed directions for their use may be obtained with each instrument. The "Maxim" Thermometers

therfore 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 at part over a lamp; the alcohol will evaporate and again con- tinue in contact with the body of the liquid. These instruments should be hung horizontally.

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—when a Snow shower occurs, it must be noted in the "Remarks," and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as 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.

Mr. ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes,

To

A circular postmark from New York, N.Y., featuring the text "NEW YORK" at the top and "N.Y." at the bottom, with "JAN 1" in the center.

SHRUBS, ETC.	FIR-TIPS.	FIRST IN BLOSSOM.	BLOSSOM.	GENEALogy.	MIGRATION BIRDS.	FIRST	DEPARTMENT.
Barberry,							
Boultree or Elder,							
Broom,							
Hazel,							
Hawthorn,							
Holly,							
Laburnum,							
Lilac,							
Mezereon,							
Mountain Ash or Rowan,							
Rhododendron Ponticum,							
Red Flowering Current,							
Viburnum,							

DESERRVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

Horseshoe
Shoe

Mr ALEXANDER BUCHAN

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

DESERRVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

Horseshoe
Shoe

Mr ALEXANDER BUCHAN

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

DESERRVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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 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 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

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

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such

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.

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 Seale, 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 cast shadows, should be entered in the proper column.

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 re-

The use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-inches* are not true of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances. One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the 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 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

The Comell, a very important anch of Meteorology. The Council therefore recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the end of piers and rocks round the coast, where it is not influenced by the tide. At o near the time of high water, on the 5th, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (oneathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for over and greater depths, noting always the temperature of the air, at 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.

Remarks.—The “*Remarks*” column is too narrow, but unavoidable so. Some of the most valuable observations that can be taken are those for which naurles can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such a are recognised and in use at Greenwich and Southampton, as given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunderstorms, and remarkable falls of snow, hail, or rain, the hour of storms of wind, attaining their maximum as well as such notes as observations during storms. Observations direction of the wind: and

country adjusted to form exactly a tangent to the convex surface direction of the wind; and during storms, extra observations of the mercury in the tube. Observations must be taken quickly; ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results.

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

Rain-gauges.—Many causes conspire to produce anomalies in the measurements of rain-fall. To accom-

storms or wind attaining their maximum, as well as such noted on storms as have been hitherto 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

accommodate a duplicate set of instruments, which is most desirable, in rain returns. They arise, partly, from unfavourable situation doors are also made to open to the south. These Boxes may be 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.

Selv 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.

Summaries may fairly represent 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.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

Have the goodness also to state any information you may be able to collect relative to the Crosses of Grain. Hx. Pattees

SHRUBS, ETC.	Mosses in	FRUITS.	First in	MIGRATORY BIRDS.	First	Attritute.	Departure.
Baberry,							
Bur-tree or Elder,							
Broom,							
Hazel,							
Hawthorn,							
Holly,							
Lamburnum,							
Lilac,							
Mezereon,							
Mountain Ash or Rowan,							
Red Flowering Currant,							
Rhododendron Ponticum,							
VWhim,							

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the 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 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 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 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 Observers of the "Clouds" and "Wind" should make their observations at the same hour every day, and that the "Clouds" and "Wind" should be observed at the same hour every day.

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 upper strata of clouds travel with extreme velocity from S.W., and those in the low regions from W., with one-third the (bottom) speed of the upper. A wind in the second "Cloud"

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 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 Society.

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;—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 immersing 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

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

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory neck must be screwed so as to indicate of that end of the *index* which is next to the surface in the following manner.—Shuns $\frac{3}{4}$ in., as an *ozone* entry in the force and directia of the wind at the time of observation.

indication or that end or the *plate* which is next to the surface in the following manner.—Lids 3 & 4, as far back as the *peg*, and the *ivory peg* and the *cistern*, will be removed, and the *plate* will be turned so as to form a tight plug to the *cistern*. Then *seize* up the *plate* of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry *bulbs*, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd are those of a series of phenomena commencing at 9 A.M. on the 2nd, and ending at 9 A.M. on the 3rd. The observations are to be made at 9 A.M. and 9 P.M. The *plate* is to be removed by twisting counter-clockwise, and the *ivory peg* and the *cistern* are to be replaced in the same order as they were removed.

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, 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

recommend that Self-registering Thermometers and Hygrometers a self-registering instrument which shows the amount of Wind wise unoccupied, or in two ruled off for the purpose, from that be enclosed in a Box, painted white outside, and black within, that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating 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 on a selected piece of ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be recommended; printed directions for their use may be obtained from Negretti and Zambra's Patent "Maximum" Thermometers are

The Council recommend that the rain-gauge ought to be
cross cut grass around its mouth. The rain-gauge should 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,
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.

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 con-
dense in contact with the body of the liquid. These instruments
should be hung horizontally.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faeroe Islands, in Lat. $62^{\circ} 21'$, Long. $64^{\circ} 38''$, 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 May 1874.

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. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.	Day of Month.
	9 h. A.M.		9 h. P.M.		Shade, 4 feet above Ground.				Exposed Black Bulbs.				9 h. A.M.		9 h. P.M.		9 h. A.M.		P.M.		SUNSHINE.		9 h. A.M.		Temperature of WELL at Depth of feet, No.		SEA.	OZONE.		
	Barometer. No. 91	Attached Ther- mometer.	Barometer. No. 91	Attached Ther- mometer.	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Direction.	Force	Dry bulb.	Wet bulb.	Direction.	Force	No. of inches.	Amount (0-6), and Direction.	No. of inches.	Amount (0-6), and Direction.	Hours.	No. 3 inches.	No. 13 inches.	No. 22 inches.	0-10.	Temperature and Density, 0 A.M. 9 P.M.				
1	inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	0.01	°	°	°	°	°	°	°	°	°	1		
	30.282	49.5	30.396	59.5	50.	42.			47.4	44.	44.5	42.	SE	1.	Calm	0.														2
	30.320	53.	30.242	57.	50.	38.			46.2	33.	39.	36.2	W	1.	N	1.5														3
2	30.224	58.5	30.228	56.5	47.	38.			44.	39.	39.	36.2	NE	2	NE	0.5														4
	30.186	54.	30.184	55.	48.	34.			44.8	40.	43.	39.8	N	1	N	0.5														5
	30.124	51.5	30.020	57.5	44	34.5			37.2	34.	36.	34.6	N	2	N	3.		0.06												6
	29.970	55.	29.942	56.	42.5	35.			39.6	37.2	38.	35.6	N	3	N	3.		0.15												7
	29.990	55.	30.022	54.	46.5	33.5			43.	39.	34.5	32.5	N	3	N	2		0.18												8
	29.914	46.5	29.810	53.	42.5	32.			37.2	32.8	36.8	32.4	N	2	N	2													9	
	29.860	57.	29.904	56.	48.	34.			43.	39.	36.3	33.	N	3	NE	1.													10	
	30.064	55.	30.226	56.5	46.	31.5			43.8	38.5	38.6	36.	NE	2	NE	2.		0.005											11	
	30.376	50.5	30.498	54.	44.	33.			40.4	36.2	37.2	33.	E	3	NE	2													12	
	30.546	50.	30.540	55.	45.5	35.			39.5	35.	36.4	33.	NE	3	E	0.5													13	
	30.458	48.5	30.410	57.	46.	36.			43.6	38.5	42.	39.	Calm	0	Calm	0													14	
	30.340	52.5	30.410	55.	46.	34.5			41.4	38.	39.2	36.	NE	2	E	2		0.005											15	
	30.496	61.	30.432	54.5	50.	37.5			47.	41.	44.	40.	SE	2	SW	1													16	
	30.320	50.5	30.264	56.5	50.	42.			48.3	44.7	48.	46.5	SE	3	SW	2													17	
	30.260	54.	30.288	58.5	52.	45.			48.8	45.8	45.	42.5	SW	3	W	0.5		0.02											18	
	30.368	62.5	30.392	60.	57.	37.			55.2	50.	46.8	43.8	NE	1	Calm	0.													19	
	30.408	60.	30.384	59.5	57.	42.			54.	49.	48.	47.	W	2	W	0.5													20	
	30.320	62.	30.252	59.	55.	46.			54.	48.8	48.5	45.5	W	0.5	W	2.													21	
	30.134	55.5	30.070	56.	52.	46.5			50.	48.2	47.2	46.	SW	0.5	SW	1.		0.035											22	
	30.008	53.5	29.944	55.5	52.5	44.			49.	46.2	46.4	44.7	Calm	0.	E	0.5		0.005											23	
	29.864	53.	29.852	57.5	50.5	45.			48.4	45.8	47.3	46.2	E	1.5	SE	0.5													24	
	29.886	55.	29.922	57.5	53.5	46.5			48.8	47.	47.5	46.	SE	1	Calm	0.		0.09											25	
	29.950	54.5	29.900	58.	49.	46.			48.6	47.	48.	47.	SE	1	Calm	0.		0.09											26	
	29.894	50.5	29.754	54.	52.	44.			57.2	46.	48.	47.	SW	2	SW	3		0.31											27	
	29.784	58.	29.668	56.	55.	45.			57.	47.8	46.2	45.2	SW	2	S	2.		0.06											28	
	29.484	53.	29.540	58.																										

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 system of observations pursued at all its Stations. A certain degree of uniformity is absolutely necessary in the instruments used for Meteorological Observations at different Stations; and it is found that differences between the wind, the "Minimum" should be finely exposed to the sun, whose sides protect the bulb from the horizon in an open situation; and the "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation, in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and for the Tables published by the Society, an entire comparability among the monthly 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 schedule. It is hoped, that the utmost may be had, on loan, by any observer, from the Meteorological Secretary. Observers, in some few cases, may find this impossible; in such instances, they are specially requested to make opposition to the following Directions, secure for them 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 comparability among the monthly Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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, 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 panel may be had, on loan, by any observer, from the Meteorological Secretary. Thermometers bought frequently in such instances, they are specially requested to make opposition to the following Directions, secure for them 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 comparability among the monthly Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

The Hygrometer consists of two Thermometers usually, but not necessarily mounted on one frame. As apparently slight deviations from the approved and *well-constructed form* of this apparatus seriously vitiate the "Hygrometric Deductions," Observers, amply 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 such as will bring the tubes forward by an incline, from any board on which it may be suspended; the water-cup must be 5th, 15th, and 25th of each month, the thermometer ought to be accurately measured from the fluctuating surface of the mercury covered, and placed to the side, and a little below the level of the sun's rays, and fitted with sloping tin collars, to prevent rain-water falling on the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the button, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *tight*, 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 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 *scales* are not true, and do not much shorter as to *converge* 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 means 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 removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then screw up the tube, so as to the exact height from which the mercury is then at the cistern. It is taking an observation, as 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 read, the mercury must be read on the index or column of mercury, so as to the extent of one eighth of an inch above the zero-point of the fixed scale; the zero-point of the fixed scale; the reading of the thermometer, and the reading of the hygrometer, will then be the same, to form a complete vacuum, and the mercury will rise to the top of the tube. Thermometers, especially of the self-regulating type, are not to be taken to tenths of degrees, and noted in decimals, as they are liable to give errors of 0.5°, 1°, or 1.5°, according as they are read on the 29th, 30th, or 31st of the month. The reading of the thermometer, and the reading of the hygrometer, will then be the same, to form a complete vacuum, and the mercury will rise to the top of the tube. 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SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Hornshavn, County of Faroé Islands, in Lat. 62° 3' N., Long. 6° 43' E., Distance from Sea 50 feet.

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

During the MONTH of July 1874.

The Hours of Observation are of Greenwich Time.

ELECTRICITY. Day of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.				HYGROMETER. No. 832x829				WIND.				RAIN.				CLOUDS.				THERMOMETERS. under Ground.				GENERAL REMARKS.					
	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.		0 A.M.		P.M.		9 h. A.M.		Temperature of WELL at Depth of feet, No.		SEA.		OZONE.		GENERAL REMARKS.			
	Barometer. No. 91	Attached Thermometer. No. 91	Barometer. No. 7165	Attached Thermometer. No. 227	Max. Min.	Max. Min.	Max. in Sun's rays No. 7165	Min. on Grass. No. 227	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction. No. 78	Force No. 78	Direction. No. 78	Force No. 78	Velocity (0-6), Amount, (0-10), and Direction.	Velocity (0-6), Amount, (0-10), and Direction.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature at Station and Dew-point, No. 831.	0-10.	0 A.M. 9 P.M.	0 A.M. 9 P.M.	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.						
1	29.718	59.	29.792	56.5	55.	43.	51.4	46.5	46.4	44.6	Calm	0	N.E.	1.5	0.02	6	1						
2	29.536	53.	29.354	58.	56.5	45.	49.	48.2	50.8	50.	E	3	Calm	0.	0.51	—	2						
3	29.332	57.	29.306	58.5	57.	49.5	52.2	50.	53.7	51.	S.E.	3	S.W.	3.	0.88	4	3						
4	29.354	57.	29.496	59.	56.5	51.	53.2	52.5	52.	50.3	S.E.	1	N.E.	0.5	0.16	1½	4						
5	29.824	54	30.020	59.	58.	43.	46.7	43.3	44.2	41.	N	3	S.W.	2.	—	—	5						
6	29.892	54.5	29.856	59	56.5	42.	50.5	50.	51.	48.6	S	3	S.W.	3.	0.14	6	6						
7	29.864	55.5	29.828	58.	58.5	49.	53.	50.3	50.8	49.6	S.W.	2	S.E.	1.	0.02	3	7						
8	29.704	57.	29.866	58.	57.5	49.	53.6	50.2	52.3	49.4	S.E.	3	S.W.	3.	0.10	7.	8						
9	29.586	56.5	29.976	59.	56.5	50.	54.8	53.8	51.	47.4	S.W.	5	W	3.	0.34	3	9						
10	29.964	59.	29.978	59.	57.5	50.	52.8	49.8	51.	48.2	S.W.	3	S.W.	3.	0.02	7.	10						
11	30.064	57	30.164	57.5	57.	41.	54.	50.5	41.2	39.	N.W.	3	Calm	0.	0.10	9.	11						
12	30.122	57	30.098	57.5	57.	36.5	52.8	47.8	51.	47.8	S.W.	1	W	0.5	—	12	12						
13	30.088	55.5	30.086	59.5	57.	49.	52.5	47.6	50.4	47.	W	1.5	Calm	0.	—	10.	13						
14	30.060	55.5	30.100	60.	57.5	47.5	57.4	48.2	49.4	47.5	Calm	0	N.E.	0.5	—	10.	14						
15	30.212	58.	30.292	59.5	58.5	47.	53.4	51.	50.4	48.8	E	1	S.E.	1.5	—	12.	15						
16	30.304	60.	30.262	58.5	56.	45.5	54.	50.	50.5	49.	S.E.	1	S.E.	0.5	—	8.	16						
17	30.152	55.	30.152	58.	57.	48.	50.8	50.	55.	53.8	S.E.	1	S.W.	0.5	0.18	—	17						
18	30.206	57.	30.154	59.	58.	51.5	53.	52.2	52.8	52.	Calm	0	Calm	0.	0.05	—	18						
19	30.068	58.5	29.944	60.	56.5	51.	54.	53.2	52.1	51.5	N.E.	1	N.E.	0.	0.10	—	19						
20	29.928	59.	29.866	59.	60.5	51.	56.4	53.5	51.4	50.5	S.W.	2	Calm	0.	0.01	5.	20						
21	29.782	58.5	29.730	59.	57.	47.5	54.8	53.	49.	47.8	Calm	0	Calm	0.	—	7.	21						
22	29.688	57.	29.722	60.5	61.	48.	54.6	50.8	49.	47.	S.W.	1.5	Calm	0.	—	9.	22						
23	29.750	57.5	29.820	59.5	56.5	45.	54.	50.8	50.5	48.4	N.E.	1	N.E.	1.	0.01	—	23						
24	29.924	56.5	30.008	57.5	57.	47.	53.5	50.2	48.2	46.4	N.E.	2	N.E.	3	—	3.</td											

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly 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.

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

lished 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. 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

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 "*Minnimam*" 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 or at the top of the schedule. It is hoped that the utmost care will 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

Direction," 2, W., (for example,) will indicate that the upper strata of clouds travel with extreme velocity from S.W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of 4, 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

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 sea is not only in use, but in its relations to that of our climate, and must be made with great care. The Council, 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 readings ought to be taken to tenths of a degree, and noted in decimals.

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 on this little piston-rod is brought, by the adjusting 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 coincide with the zero-point of the fixed scale, the thermometer is considered to be correctly adjusted.

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 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

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. In reading Rutherford's "*Max.*" and "*Min.*" Thermometers, the indication of that end of the *index* which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry *bells*, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

cube, a sharp top is produced. If this is prevented by air it 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.

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-adjusment 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

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 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 secure

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

"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 will direct

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 registration of such

part of the spirit distils by high temperature, it will be found in is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indeed in every column, the observer cannot be too careful to register *observations* only; and nothing that partakes of the 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,

SHIP LETTER

EDINBURGH.

BOOK-POST.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL PERTINENT TO THE SEASONS

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary 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, Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour tested by comparison with a *Standard Thermometer*. When such observations are made at 9 A.M. and at sunset, the nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky *overhead* (*i.e.*, within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the "clouds" column, though their appearances and changes ought to be noted among the "*Remarks*." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky *overhead* is *half covered* by clouds, 5 is entered as the *observation*, and so on. Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity

be made in the following manner :—In the column *Velocity* of Comparison with a *Savard's 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 "*Menium*," 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 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 to the time of observation, the time of the instrument having been taken.

The *Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight variations, an accuracy and a due consciousness of the care 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.—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 to the time of observation, the time of the instrument having been taken.

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 to the time of observation, the time of the instrument having been taken.

Cloudiness.—The number of hours in which objects in the sun's

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

An excellent Barometer is constructed by Mr Adie of London,

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

moistened by immersing 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 $-39^{\circ}0'40^{\circ}0$, or $40^{\circ}1$; or the index-line on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame. When the system passes freely through the lid and case of the cistern.

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

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

The surface of the mercury is 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* *click* is produced. If this is not the case, the

tube, a sharp tap is produced. If this is prevented by air it 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.

Careful observations ought to be made on the changes in the index,—usually the lower edge of the vernier, which must be

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

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

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

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 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

part of the spirit distils by high temperature, it will be found in is observed, and registered in addition to, and as a check upon, Meteorological Secretary; and they consider it desirable that he the upper lobe, and must be dislodged from thence by heating the indications of the rain-gauge. For wind, rain, and snow, as should have full power to reject any instrument which, on being indeed in every column, the observer cannot be too careful to presented for comparison, does not afford him satisfaction.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroë Islands, in Lat. 62° 2' N., Long. 64° 8' W., 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 1874.

The Hours of Observation are of Greenwich Time.

ELECTRICITY. Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. 8324829.				WIND.				RAIN.				CLOUDS.				THERMOMETERS under Ground.				SEA. Temperature at 1 fathom, and DENSITY, No. 10831	OZONE.	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.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.							
	No. 91	Barometer.	Attached Thermometer.	No. 91	Max. No. 7165	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	Amount in inches in which it fell.	Velocity (0-6) and Direction.	Amount (0-10) and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of WELL, No. 10831	Temperature at 1 fathom, and DENSITY, No. 9 A.M. 9 P.M.	GENERAL REMARKS.							
1	29.330	59.	29.450	58.5	58	48.	53.	48.4	49.4	47.4	NW	3	SW	1		0.15				10.												1		
2	29.052	54.	29.334	57.	56.5	44.	46.5	45.5	45.	43.	NW	3	S	3		0.64																	2	
3	29.570	57.	29.646	56.5	56.	44.5	53.4	47.4	45.4	42.8	NW	3	NW	2		0.13				8												3		
4	29.696	58.5	29.614	58.5	56.	43.	54.	50.	49.4	47.8	NW	3	N	2		0.08				11.												4		
5	29.366	55.	29.428	60.5	51.	43.5	50.5	48.4	44.8	41.8	NW	2	N	1.5		0.10																5		
6	29.640	59.5	29.664	59.5	60.	43.	55.8	47.8	48.8	46.2	NW	3	SW	3					13.												6			
7	29.520	58.	29.420	57.5	59.	47.	56.	51.	50.	48.	S	2	N	3					8												7			
8	29.388	56.	29.580	59.	53.	46.5	50.2	49.8	49.2	48.4	N	3	N	2		0.90																8		
9	29.636	56	29.658	59.	54.	46.5	51.	48.7	47.5	45	E	2	E	1.5																	9			
10	29.660	54.	29.724	58.	53.	44.	48.4	44.	45.6	44.7	N	2	N	1.5					6.											10				
11	29.736	53.	29.750	57.	48.5	44.	48.	44.2	45.8	42.8	E	2	E	2.		0.02				6											11			
12	29.700	53	29.704	57.5	50.	43.5	47.2	44.	47.	44	N	3	N	3																	12			
13	29.718	53.5	29.780	57.	49.	44.5	46.4	44.4	45.6	43.8	N	3	N	2		0.09																13		
14	29.816	52.	29.768	59.	50.	43.	47.8	44.5	46.2	43.	N	2	N	1.5		0.01																14		
15	29.536	53.5	29.406	59.	52.	45.	48.	47.4	49.	48.5	E	1	Calm	0.		0.10																15		
16	29.488	60.5	29.548	61.	57.5	47.5	54.4	50.	48.8	47.2	SW	3	Calm	0.		0.21				10.											16			
17	29.768	57.	29.952	58.	56.	43.5	48.	45.	44.2	43.	N	2	SW	1.		0.09				7.											17			
18	29.984	59.	29.752	58.5	56.5	40.	53.8	51.8	52.	51.6	S	3	SW	3.		0.13				6.											18			
19	29.804	57.5	30.028	57.	56.5	46.	52.6	50.6	48.	46.4	W	4	NW	3		0.51																19		
20	30.328	57.	30.428	59.5	58.5	41.5	53.	51.2	51.5	50.8	SW	3	W	3					10.												20			
21	30.340	56.	30.336	59.	53.	50.5	52.	51.3	52.6	51.8	SW	3	SW	4		0.19				5.											21			
22	30.250	57.5	30.408	60.	60.	45.	51.5	50.8	48.2	44.	W	4	Calm	0.		0.17				5.											22			
23	30.482	62	30.426	60.	56.	40.	53.6	49.5	46.4	44.8	Calm	0.	W	1.					13.												23			
24	30.324	56.	30.236	58.5	55.	45	49.2	46.	49.2	46.4	Calm	0.	S	0.5																		24		
25	30.160	58.5	30.050	61.	57.	45.	52.2	49.	51.8	50.2	W	1	W	0.5					13.												25			
26	29.924	57.	29.652	59.	54.	50.	53.	52.	51.5	51.	S	1.	S	3.																			26	
27	29.492	57	29.586	59.5	56.	48.	54.	51.8	49.4	47.2	SW	1.5	SW	0.5		0.15			</															

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS

THE PREPARATION ON THE USE OF INSTRUMENTS.

WITH REMARKS ON THE USE OF INSTRUMENTS

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

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

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers 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.

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

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

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BOOK-POST.

Secretary

MR ALFEXAN

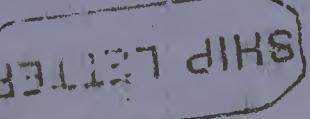
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OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

EDINBURGH

Secretary of the Meteorological Society of Scotland,

MR ALEXANDER BUCHAN,



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

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

THE USE OF INSTRUMENTS

ONE of the objects of immediate importance that the "Scotish Registering the greatest heat from the sun's rays, and the least

"Meteorological Society" has proposed to itself, is to secure a from radiation during night. Their bulbs 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 perfect uniformity in the system of observation pursued at all its mixture of lamp black and printer's ink. They are placed in stations. A certain degree of uniformity is absolutely necessary 20° or 30° of the zenith). The strata of clouds that appear near to justify the publication of Monthly Results from different the horizon are viewed obliquely; and thus, being unable to judge shallow blackened boxes, whose sides protect the bulbs from the amount, we ought not to take them into account in the wind. The "*Maximum*" should be freely exposed to the sun, "clouds" column, though their appearances and changes ought to and the "*Minimum*" should rest on wooden supports a few be noted among the "*Remarks*". The amount of cloud is entered inches from the surface of the grass, in an open situation. from a scale of 0 to 10; thus, when the sky *overhead* is *half* Snow must not be allowed to cover either of these Thermometers; covered by clouds, 5 is entered as the *observation*, and so on. nor the sun's heat to affect the Minimum Thermometer by Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column "*Velocity* 6, S. W. and *Direction*," , (for example,) will indicate that the

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

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

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

Several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological 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.

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 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 *variations of the ground level*.

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 $40\frac{1}{2}^{\circ}$. Setting must be made with scrupulous accuracy; as a slight error respectively. So also $40\frac{1}{2}^{\circ}$, and $40\frac{3}{4}^{\circ}$, more or less must be registered $40^{\circ}2$ or $40^{\circ}3$ and $40^{\circ}7$ or $40^{\circ}8$ respectively. In reading Rutherford's “Max.” and “Min.” Thermometers, the indication of that end of the *index* which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry *bulbs*, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

Ozone.—Mention whether Schinbein'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 $3\frac{1}{4}^{\text{NW}}$, as an *ozone* entry in the schedule, will indicate that the ozone paper is tinted as “ $3\frac{1}{4}$ ” on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is “ 4 ”; 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

ube, a sharp tap is produced. If this is prevented by air it 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.

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

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

of the mercury in the tube. Observations must be taken quickly; 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 and fixed 4 feet above grass in an exposed position, free from at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, the method of *Estimating Wind Force* by such tables as that given in the schedule is, to say the least, unsatisfactory.

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, 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 “*Maximun*” Thermometer of Buxford is recommended when conducted on the class of

on storms as have been hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

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

Sunderford is recommended when graduated on the glass stem 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, the indications of the rain-gauge. For wind, rain, and snow, as indeed in every column, the observer cannot be too careful to register *observations* only; and nothing that partakes of the nature of deduction or inference.

The above remarks apply equally to the Thermometer, Hygrometer, &c., &c.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

DISBURGH 9th December 1865.

MISKURCH, 9th December 1863.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroe Islands, in Lat. $62^{\circ} 2' N$, Long. $6^{\circ} 43' E$, Distance from Sea 37 miles.

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

During the MONTH of October 1874.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 3 P.M.				HYGROMETER. No. 8324829				WIND.				RAIN.		CLOUDS.				THERMOMETERS under Ground.				SEA. 831.	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.		Headings of the H.Cup Anemometer.		No. of hours in which it fell.	No. 78	9 A.M.		P.M.		SUNSHINE.				Temperature of WELL at depth of 1 fathom, and Density.		Temperature at 1 fathom, 9 A.M. 9 P.M.		Mention the hour at which Storms, including Thunder and Lightning, began and ended.				
		Barometer. No. 91	Attached Thermon-	Barometer. No. 91	Attached Thermon-	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	9 h. A.M.	Velocity (0-6), Amount (0-10), and Species.	Velocity (0-6), Amount (0-10), and Species.	Hours.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of WELL at depth of 1 fathom, and Density.	Temperature at 1 fathom, 9 A.M. 9 P.M.	Temperature at 1 fathom, 9 A.M. 9 P.M.	Temperature at 1 fathom, 9 A.M. 9 P.M.	Temperature at 1 fathom, 9 A.M. 9 P.M.	Temperature at 1 fathom, 9 A.M. 9 P.M.	Temperature at 1 fathom, 9 A.M. 9 P.M.	Temperature at 1 fathom, 9 A.M. 9 P.M.	Temperature at 1 fathom, 9 A.M. 9 P.M.	
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	W	3	Calm	0	0.44			5.	°	°	°	°	°	49.	49.	49.	49.	49.	49.	49.	49.
1	29.080	58.	29.152	58.	51.	36.				47.8	45.8	40.6	38.5	N	3	Calm	0	0.44			5.	°	°	°	°	°	49.	49.	49.	49.	49.	49.	49.	49.
2	28.774	53.5	28.660	58.5	48.5	39.				47.5	46.8	48.2	47.4	N	4	N	5	1.68			—						49.	49.	49.	49.	49.	49.	49.	49.
3	28.782	53.5	28.926	58.5	51.	44.5				46.	44.8	47.2	45.	N	2	N	3	0.45			—						49.	49.	49.	49.	49.	49.	49.	49.
4	29.170	56.	29.468	58.	47.5	31.5				42.8	40.8	33.2	30.4	N	4	N	3	0.12			—						49.	49.	49.	49.	49.	49.	49.	49.
5	29.644	53.5	29.674	53.	38.	26.				35.	33.	27.2	25.2	N	2	Calm	0	0.02			7	°	°	°	°	°	48.	48.	48.	48.	48.	48.	48.	48.
6	29.306	47.	28.964	53.5	37.5	25.				34.5	34.	35.8	35.	N	5	N	4	1.49			—						48.	48.	48.	48.	48.	48.	48.	48.
7	29.180	52.	29.576	54.	42.	33.5				39.2	36.4	35.	31.2	N	4	N	3	0.80			—						48.	48.	48.	48.	48.	48.	48.	48.
8	29.684	54.	29.536	53.	47.5	35.				44.	39.5	47.2	42.4	S	3	S	5	0.005			8	°	°	°	°	°	49.	49.	49.	49.	49.	49.	49.	49.
9	29.186	56.5	29.496	54.5	50.5	42.				49.	47.7	46.8	44.	S	5	S	3	9.135			—						49.	49.	49.	49.	49.	49.	49.	49.
10	29.494	56.	29.670	60.	50.5	38.				47.	43.2	40.2	38.6	S	4	S	2	0.17			5	°	°	°	°	°	47.6	47.6	47.6	47.6	47.6	47.6	47.6	47.6
11	29.358	55	29.312	60.5	47.5	42.				46.2	45.	44.8	42.5	S	4	S	5	0.92			—						48.	48.	48.	48.	48.	48.	48.	48.
12	29.450	58.	29.712	58.	49.5	39.5				46.8	43.8	40.8	38.	S	3	N	2	0.26			3	°	°	°	°	°	49.	49.	49.	49.	49.	49.	49.	49.
13	29.794	54.5	29.858	55.5	48.	37.5				44.5	41.	41.8	38.	N	2	N	0.5	0.02			6	°	°	°	°	°	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
14	29.620	57.	29.262	56.	49.5	41.5				47.4	45.	48.5	47.8	S	3	S	4	0.19			—						48.	48.	48.	48.	48.	48.	48.	48.
15	29.216	56.5	29.166	60.5	50.5	45.5				48.6	48.	46.4	45.2	S	3	S	3	0.68			—						49.	49.	49.	49.	49.	49.	49.	49.
16	29.328	58.	29.448	61.5	50.5	44.5				49.5	47.	45.8	44.	S	2	S	1.	—			4	°	°	°	°	°	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8
17	29.110	53.5	28.818	55.	50.5	38.5				48.4	47.2	50.	49.	S	4	S	5	0.35			—						49.	49.	49.	49.	49.	49.	49.	49.
18	29.040	55.	29.226	57.5	51.	46.				49.2	47.	47.2	44.8	S	4	S	3	0.22			—						47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8
19	29.304	56.5	29.474	62.	48.	42.				45.8	44.	44.5	41.	N	3	N	3	0.17			—						49.	49.	49.	49.	49.	49.	49.	49.
20	29.176	53.	29.186	59.	45.	32.				41.	39.	34.7	31.2	N	3	N	3	0.71			3	°	°	°	°	°	49.	49.	49.	49.	49.	49.	49.	49.
21	29.124	53.	29.376	64.	44.	34.				37.	35.5</																							

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Thorshavn, County of Faroe Islands, in Lat. $62^{\circ} 21' 30''$, Long. $6^{\circ} 43' 8''$, Distance from Sea 50 feet miles.

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

During the MONTH of December 1874.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS, Read Daily, at 9 P.M.		HYGROMETER, No. 8324829.		WIND.		RAIN.		CLOUDS.		THERMOMETERS under Ground.		Temperature of WELL at Depth of feet, No. 14831	SEA, Temperature at 10 A.M. and 9 P.M.	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.		Readings of H-Cup Anemometer No. 78		Hours in which it fell.		Amount in inches.		Velocity, Amount, and Direction, (0-0), (0-10), and Species.		Amount, (0-10), and Species.		SUNSHINE.					
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	No. 91.	No. 3237	No. 7165	No. 3237	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No. 9 h. A.M.	No. 9 h. P.M.	No. 9 h. A.M.	No. 9 h. P.M.	No. 9 h. A.M.	No. 9 h. P.M.				
*	No. 91.	inches.	°	inches.	°	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o		
1	29.784	49.	29.966	55.5	32.5	24.5		30.4	29.	26.	23.5	N	3	N	3			0.16											Snow.	1	
2	29.914	47.	29.796	58.	31.	24.		27.	25.2	30.2	29.6	N	2	N	0.5			0.02												Snow.	2
3	29.608	52.	29.616	58.5	39.	28.		36.5	34.	36.6	33.4	N	2	N	3			0.24												Snow & Rain.	3
4	29.184	50.	29.324	60.	38.5	30.		36.8	35.5	31.8	30.	E	3	Calm	0.			0.47											d° d°	4	
5	29.058	47.5	29.156	57.	36.	26.5		35.	31.8	29.2	26.2	N	4	N	1			—												43.5	5
6	29.168	48.5	29.266	60.	36.	24.5		29.8	27.8	35.	32.8	N	0.5	N	3			0.09												Snow	6
7	29.528	48.5	29.540	59.	37.	28.		28.	27.	32.2	24.	N	2	N	3			0.07												43.	7
8	29.466	47.	29.460	58.5	33.	26.5		31.5	29.8	31.8	29.5	N	1	N	1.5			0.02											d°	8	
9	29.572	47.5	29.626	54.5	32.5	24.		26.8	25.5	25.	24.2	N	1.5	N	2			0.16												43.8	9
10	29.578	46.5	29.300	58.	37.	24.		25.	23.5	36.2	33.2	N	1.5	E	3			—												42.8	10
11	29.136	48.5	29.428	58.	40.	35.		39.	35.5	38.	35.2	N	4	N	3			0.01													11
12	29.634	49.5	29.750	59.	39.	31.		32.6	30.2	33.	32.	N	1	N	0.5			—												42.8	12
13	29.996	51.	30.214	55.	36.	31.		34.4	31.2	33.	30.	N	4	N	3			—												Snw & rain	13
14	30.208	54.	30.190	56.	36.	38.		34.	33.	35.	33.	N	3	N	3			0.06		—											14
15	30.024	49.	30.042	54.	39.	31.		38.	35.8	37.	33.	N	3	N	3			0.12		—											15
16	30.184	46.	30.356	61.	39.	27.		30.	30.	34.	33.	N	3	N	3			0.14		—											16
17	30.130	50.	29.624	58.	47.5	28.		39.	36.	47.	45.	S	3	S	5			1.16		—											17
18	29.446	51.	29.880	59.	47.5	26.		38.	33.	28.	27.	N	4	N	3			0.54		—											18
19	29.870	46.5	29.862	57.	33.5	26.5		30.5	29.6	33.2	31.	N	5	N	4			0.37		—											19
20	29.772	52.	29.780	58.	37.	31.5		35.	33.	35.5	32.2	N	2	N	2			0.06		—											20
21	29.792	47.5	29.928	59.5	38.5	33.5		36.8	33.2	35.4	32.	N	3	N	0.5			0.04		—											21
22	29.950	49.	30.036	58.	39.	29.5		38.	36.2	34.	32.	N	1	Calm	0.			0.03		—											22
23	29.880	49.	29.668	55.5	40.5	31.		38.2	36.	39.	37.	S	3	S	3			0.01		—											23
24	29.582	51.5	29.586	62.	41.	33.5		37.8	36.2	38.2	36.5	E	2	E	2			0.33		—											24
25	29.632	54.	29.744	58.	39.	30.5		36.	34.2	33.4	31.8	N	0.5	N	0.5			0.12		—											25
26	29.910	49.	30.008	61.	36.	30.		33.4	30.8	35.4	33.	N	2	N	3			0.09		—											26
27	30.210	50.5	30.212	54.	37.	29.		31.4	30.	34.	30.	N	2	N	1			0.09		—											27
28	30.330	49.5	30.																												

