

# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Forest of Glen Tanar, Abernethy County of Aberdeenshire, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea 35 miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of *January* 1897

The Hours of Observation are of Greenwich Time.

[illegible]

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction $\frac{+}{-}$ =		29.931
for Temp. (Col. 2), = 29.931 - 0.53		
"Corrected Mean" of Barometer at 9 P.M., minus the Correction $\frac{+}{-}$ =		29.891
for Temp. (Col. 4), = 29.891 - 0.53		
Mean at Station, corrected, and at 32°,..... =		29.911
Correction for height, feet above Mean Sea-level,..... =		
Mean, reduced to 32°, and Sea-level, ..... =		
Highest Reading, corrected for Index error, on the 10 th,..... =		30.180
Lowest Do. Do., on the th,..... =		29.390
Difference, or Monthly Range, ..... =		1.090

<b>S.-R. THERMOMETER,</b> (in shade, etc.), <b>Highest in Month,</b> (corrected for Index Errors), on the <u>11</u> th, .....	=	<u>55.0</u>
<b>Lowest in Month,</b> corrected for Index errors, on the <u>11</u> th, .....	=	<u>0.7</u>
Difference, or <b>Monthly Range,</b> .....	=	<u>54.3</u>
"Corrected <b>Mean</b> " of all the <b>Highest,</b> (Col. 5), .....	=	<u>38.3</u>
"Corrected <b>Mean</b> " of all the <b>Lowest,</b> (Col. 6), .....	=	<u>24.6</u>
Difference, or <b>Mean Daily Range,</b> .....	=	<u>13.7</u>
<b>** Calculated Mean Temperature</b> of Month, .....	=	<u>31.4</u>
<hr/>		
<b>S.-R. THERMOMETER, Black Bulb in Sun, Highest,</b> (corrected for Index Errors), on the <u>11</u> th, .....	=	<u>55.0</u>
"Corrected <b>Mean,</b> " (Col. 7), of <b>Black Bulb, Max. in Sun,</b> .....	=	<u>55.0</u>
<b>Lowest at Night,</b> Black Bulb (corrected for Index errors), on the <u>11</u> th, .....	=	<u>0.7</u>
"Corrected <b>Mean,</b> " (Col. 8), of <b>Black Bulb, Min.</b> on grass, .....	=	<u>24.6</u>
Difference of above means or range ("exposed"), ....	=	<u>54.3</u>

<b>HYCROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11),</b>	=	32.0
<b>Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12),</b>	=	30.5
<b>‡ Computed Temperature of Dew-Point,</b>	=	
<b>‡ Do. Elastic Force of Vapour,</b>	=	
<b>‡ Do. Weight of Vapour in a Cubic Foot of Air,</b>	=	
<b>‡ Relative Humidity (Saturation = 100),</b>	=	
<b>RAIN</b> fell on 9 Days; Amount in Inches,	=	2.40

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	13	1	1	4	6	1	3	2	0	1.51	
P.M.	15	1	1	1	8	1	2	2	0	1.74	
Mean.	14	1	1	2	7	1	3	2	0	1.62	

2.62 *hly*

Observations made and  
Return verified by

(Signed) Robert Warburton







Height of Cistern of the Barometer above Mean Sea-Level\_\_\_\_\_feet, above Ground\_\_\_\_\_feet.

During the MONTH of January 1897

The Hours of Observation are of Greenwich Time.

<b>BAROMETER,</b> "corrected Mean" at 9 A.M., <i>minus</i> the Correction $\uparrow\uparrow$	=	29.8912
for Temp. (Col. 2), = 29.9220		
<b>"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction <math>\uparrow\uparrow</math></b>	=	29.849
for Temp. (Col. 4), = 29.872		
<b>Mean at Station, corrected, and at 32°,</b>	=	29.872
Correction for height, feet above Mean Sea-level,	=	
<b>Mean, reduced to 32°, and Sea-level,</b>	=	
Highest Reading, corrected for Index error, on the 10th,	=	30.340
Lowest Do. Do., on the th,	=	29.390
Difference, or <b>Monthly Range,</b>	=	0.950

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

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day
A.M.	4	2	0	1	3	5	12	1	0	1.57	
P.M.	6	-	-	-	5	-	14	-	0	1.86	
Mean.	5	1	0	1	4	2	14	1	0	1.72	= 2.98

Observations made and  
Return verified by

(Signed) W Warburton











# FOR TAKING METEOROLOGICAL

## WITH REMARKS ON THE USE OF INSTRUMENTS.

The Council of the Society recommend that, the Self-Registering Thermometers, and the Dry and Wet Bulb Hygrometers, be kept in Stevenson's Louver-boarded Box for the protection of the Thermometers, painted white inside and outside, and secured to four stout posts, also painted white, firmly fixed in the ground. The posts must be of such a length that the Thermometers are hung in position the Bulbs of the Minimum Thermometer, and of the Dry and Wet Bulb Thermometers, will be exactly at the same height of FOUR FEET above the ground, the Maximum Thermometer being hung immediately above the Minimum Thermometer. The thermometer box is to be placed over a plot of grass, and in a free open space to which the sun's rays have free access during the day, and the thermometer should enable the Observer to observe the sun. The Thermometers should be placed in the centre of the Box and the door, which should open to the north, the course of the Box and face the door, should open to the north.

The Council regard the question of UNIFORMITY OF HEIGHT ABOVE GROUND, AND METHOD IN PROTECTING THE THERMOMETERS, as vital in every system of Meteorological Observation, since without it Observations made at different Stations are incompatible, thus rendering it impossible to compare the Climates of places with each other as regards their most important features.

as vital parts of every system, and at different stations are incomparable. The observations made by the various observers, at places with each other is impossible to compare, and it is therefore recommended that each observer register their most important features.

Professor Phillips, and Negretti and Zambra's Maximum Thermometers, and Kutherford's Minimum Thermometer, these self-registering are recommended. It is recommended that these thermometers be graduated on the glass stem. The Minimum Thermometer is liable to two demerits—viz, the column of spirit breaking, and part of the spirit disilling by high temperature and lodging at the top of the tube. This derangement is of occasional concurrence with protected Thermometers, but of frequent concurrence with exposed Thermometers. Hence a systematic examination of Minimum Thermometers ought to be a regular part of the work carried on by each Observer.

Fortunately, Spirit Thermometers may be easily set right by any one, when the column of spirit chances to separate. Let the thermometer be taken in the hand by the end farthest from the bulb, raised above the head, and then forcibly swung down towards the feet; this will, in all probability, restore the column of spirit to its level position; or, on the principle of centrifigal force, to the bottom of the tube. If the spirit still remains separated, with the column below, a few drops of oil, swirled round the interior of the

is sufficient for the purpose; after which the Thermometer should be placed in a slanting position, to allow the rest of the spirit to fall, and clearing to the sides of the tube to drain down to the column. But another method must be adopted if the Thermometer should be of the tube be small. Here should be applied slowly and cautiously to the top end of the tube where the detached portion of spirit is, which, being turned into vapour by the heat, will condense on the surface of the unbroken column of spirit. Care must be taken that the heat is not applied too quickly; for if this be done, the tube will break and the instrument be destroyed. The best way to apply the requisite amount of heat is by bringing the end of the tube slowly down towards a heated flame from a gas-burner; or, if gas be not at hand, a piece of heated metal will serve instead.

The bulbs of the Thermometers for registering the greatest heat from the sun's rays, and the least for radiation

**Thermometers**

during night, have a black coating, which may easily be removed, by means of a cloth or brush. They are placed in shallow boxes of lampblack and primers 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 them. The Minimum Thermometer by distillation. Back-bulls enclosed in glass jackets may also be used, being indeed preferable to the above. It must, however, be added, that the whole surface of the observation of Solar and terrestrial radiation is not yet in a sufficiently advanced state to warrant the exclusive recommendation of any one of these methods.

The Hygrometer in use at the Society's Stations consist of two **Dry and Wet Bulb** on one frame. As apparently slight deviations in the hygrometric observations would produce very great errors in the hygrochemical Observations. Observers are specially requested to attend to the following conditions—The bulbs must hang down 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 must be covered, and altogether placed to the side, and a little below the level of the wet bulb, but in no case under the bulb; the muslin must be of medium fineness and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the Observer that the muslin is always clean and moist, and the water pure. In frosty weather, observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of the thus formed evaporation will be evaporated as from the moist cloth in ordinary circumstances.

In reading the thermometer great care must be taken to bring the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken on the thermometer.

The Thermometer will be read  $-59.0^{\circ}$ ,  $40.0^{\circ}$ , or  $40.1^{\circ}$ ; or again,  $40.0^{\circ}$ ,  $40.0^{\circ}$ ,  $40.0^{\circ}$ , according as it indicates a little under, an exact coincidence with, or a little over  $40^{\circ}$ , or  $40.1^{\circ}$ , respectively. So also  $40.0^{\circ}$ ,  $40.0^{\circ}$ , and  $40.0^{\circ}$ , more or less, must be registered  $40.2^{\circ}$ , or  $40.3^{\circ}$ , and  $40.1^{\circ}$ , or  $40.1^{\circ}$ , respectively. In reading Rutherford's Minimum Thermometer, the indication of that end of the index which is next to the surface of the spirit is alone noted. On opening the Thermometer Box, the Dry and Wet Bulb Thermometers are to be first, and rapidly, read, inasmuch as they are readily affected by heat from the person of the observer.

The Hygrometer is read at 9 A.M. and 9 P.M. The Self-Registering Thermometers are read at 9 P.M. only, as in connection of observing floating the greatest and least degrees of temperature.

Temperature. In the 24 hours preceding. It is not a matter of difference 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 day are those of a series of phenomena commencing at 9 p.m. on the 4<sup>th</sup>, and extending till 9 p.m. on the 3d.

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.

In selecting instruments, the following points require attention.—The divisions of the vernier of Barometers refer to their scales, and the perfect freedom of the Barometer from air, the

correct numbering of the scale of every instrument; the rejection of Thermometers the frameworks of which are not likely to stand exposure to the weather, as shown in the past by repeated and annoying breakages of Thermometers of similar construction; and as regards Maximum Thermometers, either Negretti and Zambra's, or Phillips's, whether they will act at the highest temperatures they may be required to register. By the laws of the Society, Members and Observers have a right to have their instruments compared by the Secretary, and to advise with him regarding the purchase of instruments. Very great care should be bestowed on the Observations of the Wind. Wind, the accuracy of which, both as regards Direction and Force, is so essential towards the right discussion of many of the more important problems of the science. As regards Wind ought to be elevated at least 12 feet above surrounding objects. When it oscillates incessantly, the mean direction should be taken. In all cases, the Direction, especially when the Vane is stationary, should when the

Wind is recible, reference may be made to the direction of smoke, etc. in well-protected situations. Careful observations are recommended to be made on the changes in the direction of the wind; and during storms, extra observations at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, is likely to give highly valuable and important results, particularly in connection with the system of thickly-planted Stations over a limited district round Edinburgh called STORM STATIONS, in the course of being established by the Society for the systematic investigation of the relation of the force of the wind to BAROMETRIC GRADIENTS, and other points connected with storms.

The Council would recommend the Hemispherical Cup Anemometer, a self-registering instrument which shows the amount of Wind that passes in any day; from which it is also the mean Velocity of the Wind in the time of observation may be ascertained. This instrument is now in use.

2. As regards Velocity and Pressure.

Force of the Wind at any particular hour of observation, the Force of the Wind being the same. The Anemometers recently brought under the notice of the Society by Mr. T. Stevenson, the Honorary Secretary, and Mr. R. Ballingall, the Secretary, at Allalabas, are recommended as being likely to secure uniformity in making observations on the Force of the Wind.

Many causes conspire to produce anomalies in Rain Returns arising partly from the difficulty of obtaining a perfectly unobstructed situation for observation, and partly from the defective nature of the instruments used. The Rain Gauge should not be placed on a slope or terrace, but on a level piece of ground, in as open a situation as the Observer can secure for it. As it is often difficult to obtain a position free from unobstructed by surrounding objects as is desirable, trees and buildings should be taken to places at some distance from shrubs, trees, buildings, &c. and the observations, at least as many feet from their base as they are in height, should be taken. The observations towards which it is most desirable to be more important traditions, are those taken at the base of the mountain, and the observations at the rim of the gauge must be perfectly level, and fixed so that it will remain level in all weathers, and be at a height of one foot above ground, over grass. In such gauges Flemings, which are furnished

with a measuring-rod attached to a float, the rod ought to be fixed down, and the float rise to its height only at the time the instrument is read, it being found that a stem projecting above the rim of the gauge seriously interferes with the proper measurement of the Rain-fall. When a measuring-glass is used, care should be taken to hold it quite perpendicular. The Rain Gauge ought to be read daily at 9 A.M., and the reading entered in the Returns of the previous day. If the Gauge is read once a month, the Reading is to be made on the first of the month, and the amount entered for the previous month. Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—When a Snow shower occurs, it should 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, register in every column, the Observer cannot be too careful to distinguish between the various only; and nothing that partakes of the nature of deduction or approximation for the non-attendance of Clouds will be found correct.

to be estimated from the amount of Clouds observed in 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 made to judge of their amount, we ought not to take them into account in the Clouds' column, though their appearance and changes may be noted among the Remarks. The amount of Cloud is entered from a scale of 0 to 10; thus, when the sky overhead is free from Clouds it is entered 0, when half-covered by Clouds, 5, wholly covered, 10, 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:—Thus, in the column Velocity and Direction, 6, S. W. will indicate that the upper strata of Clouds travel with

2. W. extreme velocity from S.W., and those in the lower regions from N.W., with one-third the speed of the former. Again, in the second 4. st. Cloud column, an entry of  $\frac{2}{4}$  cu-st. will indicate that the higher regions are covered to the amount of 4-tenths with stratus Clouds; and that the sky is further obscured to the extent of 2-tenths by lower Clouds of the cumulo stratus kind.

Remarks on peculiar Clouds accompanied with drawings, will assist materially in the development of a more exact nomenclature of Clouds, as well as throw light on the electrical, and other of the more obscure phenomena of Meteorology.

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

Sunshine.

As the germination and growth of crops and plants generally depend greatly 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 recently placed in the soil, then at 3 P.M. at depths of 3, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping iron collars to prevent rain-water being conveyed to the bulbs by the stems or wooden frames.

A knowledge of the Temperature of the Sea is not only in itself, but in its relations to that of our island, a most important branch of Meteorology. The Council therefore recommend that the Temperature of the Sea be carefully taken by a properly constructed apparatus, from boats, or, if practicable, from the ends of piers and rocks round the coast, where it is less influenced by that of river water, and as little influenced as possible by currents sweeping along the coast, and thus acquiring the temperature of the atmosphere.

By observing the temperature of the land, or the water, or the air, or cooled by nocturnal radiation. At or near the top of high


Shulman

March 1897

To the SECRETARY

Scottish

RY  
the *Meteorological Society*,  
122 George Street,



*EDINBURGH.*


[illegible][illegible]

Dep.	First Arrival.	MIORATORY BIRDS.
		Cuckoo, . . . . .
		Curlew, . . . . .
		House-Swallow, . . . . .
		Lapwing, . . . . .
		Plover, . . . . .
		Sand-Martin, . . . . .
		Starling, . . . . .
		Swan, . . . . .
		Rail or Corn Crake, . . . . .

[illegible]

Apple,	Barberry,
Black	Broom,
Cherry	Hazel,
Gean,	Hawthorn,
Goose,	Holly,
Peach,	Laburnum,
Pear,	Lilac,
Plum,	Mezereum,
Strawb.	Mountain Ash or Kovan,
	Red Flowering Currant,
	Rhododendron Ponticum,
	Whin,



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *The Forest of Glen Tanar*, County of *Aberdeenshire*, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea *35* miles.

Height of Cistern of the Barometer above Mean Sea-Level\_\_\_\_\_feet, above Ground\_\_\_\_\_feet.

During the MONTH of April 1897.

The Hours of Observation are of Greenwich Time.

[illegible]

<b>BAROMETER,</b>	“corrected Mean” at 9 A.M., <i>minus</i> the Correction $\uparrow\uparrow$	=	29.804
	for Temp. (Col. 2), = 29.828.....0.55}		
<b>“Corrected Mean” of Barometer at 9 P.M.,</b>	<i>minus</i> the Correction $\uparrow\uparrow$	=	29.7975
	for Temp. (Col. 4), = 29.827.....0.52}		
<b>Mean at Station, corrected, and at 32°.....</b>		=	29.791
Correction for height, feet above Mean Sea-level,.....		=	
<b>Mean, reduced to 32°, and Sea-level,.....</b>		=	
Highest Reading, corrected for Index error, on the 22th,.....		=	30.290
Lowest Do. Do., on the 14th,.....		=	29.210
Difference, or <b>Monthly Range,</b> .....		=	1.080

<b>S.-R. THERMOMETER,</b> (in shade, etc.), <b>Highest in Month,</b> (corrected for Index Errors), on the <u>29</u> th.....	=	<u>56.0</u>
<b>Lowest in Month,</b> corrected for Index errors, on the      th, .....	=	<u>12.0</u>
Difference, or <b>Monthly Range,</b> .....	=	<u>44.0</u>
"Corrected <b>Mean</b> " of all the <b>Highest,</b> (Col. 5), .....	=	<u>47.5</u>
"Corrected <b>Mean</b> " of all the <b>Lowest,</b> (Col. 6).....	=	<u>30.0</u>
Difference, or <b>Mean Daily Range,</b> .....	=	<u>17.5</u>
** Calculated <b>Mean Temperature</b> of Month, .....	=	<u>38.8</u>
<b>S.-R. THERMOMETER, Black Bulb in Sun, Highest,</b> (corrected for Index Errors), on the      th,.....	=	_____
"Corrected <b>Mean,</b> " (Col. 7), of <b>Black Bulb, Max. in Sun,</b> .....	=	_____
<b>Lowest at Night,</b> Black Bulb (corrected for Index errors), on the      th, =	=	_____
"Corrected <b>Mean,</b> " (Col. 8), of <b>Black Bulb, Min. on grass,</b> .....	=	_____
Difference of above means or range ("exposed"), ....	=	_____

<b>HYGROMETER, Mean</b> (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), .....	=	39.0
<b>Mean</b> (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), .....	=	37.6
## Computed <b>Temperature of Dew-Point</b> , .....	=	35.8
## Do. <b>Elastic Force of Vapour</b> , .....	=	.210
## Do. <b>Weight of Vapour in a Cubic Foot of Air</b> , .....	=	
## <b>Relative Humidity</b> (Saturation = 100), .....	=	89
<b>RAIN</b> fell on 8 Days; Amount in Inches, .....	=	2.54

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day
A.M.	6	4	-	1	11	1	7	-	-	1.60	
P.M.	6	1	-	-	9	3	9	2	-	1.57	
Mean.	6	2	0	1	10	2	8	1	0	1.58	

2. 52 lbs

Observations made and  
Return verified by

(Signed) Robert Warburton







# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Forest of Glen Tanu, Aberdeenshire*, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea *35* miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of *May* 1897.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				Rain.	WIND.				CLOUDS.				THERMOMETERS under Ground.				SEA.	OZONE.	GENERAL REMARKS.  As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.  Mention the hour at which Storms, including Thunder and Lightning, began and ended.	Days of Month.						
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.			9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.													
		Barometer.	Attached Ther- mometer	Barometer.	Attached Ther- mometer	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.		No. of hours in which it fell.	Amount in inches.	Direction.	Force.	Direction.	Force.	Velocity (0-6) and Direction.	Amount (0-10), and Species.	Velocity (0-6) and Direction.	Amount (0-10), and Species.	No.	3 inches.					No.	12 inches.	No.	23 inches.		
		* No.		No.		No.	No.	No.	No.							No.																				
		inches.	°	inches.	°																															
	1	29.80	51	30.07	51	52	33			46	42	42	40		H	1	SW	2		NE	6	10	3							very rough	1					
	2	30.13	50	29.54	54	52	24			37	36	40	38		H	1	H	1			10	10	2							do	2					
	3	29.60	52	29.75	50	53	38			45	38	43	41		H	3	N	2		NE	7		6							showers of hail throughout the day	3					
	4	29.92	51	29.48	50	52	31			42	36	37	35		SW	1	N	4			10		6							fall of snow 2 in deep	4					
	5	29.53	52	29.69	51	49	36			45	40	36	33	0.010	NH	4	N	2		NE	5		7							showers of snow	5					
	6	29.91	53	29.99	50	52	32			43	38	37	35	0.040	NH	3	S	2			10	10	6							stormy	6					
	7	30.03	52	29.91	54	50	30			40	37	39	38	0.055	H	1	H	2			10		5							very stormy	7					
	8	29.71	57	29.80	53	59	35			46	44	41	37		S	2	N	3			10	NH	3	6						very stormy showers of snow through the day	8					
	9	29.98	52	29.91	54	57	33			41	40	40	36		N	4	N	3			10	10	3							do	9					
	10	29.71	57	29.84	55	57	35			40	38	35	38		N	2	N	2			10	10	6							fall of snow 1 1/2" deep	10					
	11	29.92	53	29.97	50	48	30			37	36	35	34	0.017	N	3	N	3			10	10	3									11				
	12	30.10	49	30.18	49	42	29			35	34	35	33	0.038	N	3	N	2			10	10	-									12				
	13	30.27	51	30.10	51	41	30			38	35	40	38		N	1	N	1			10	10	4									13				
	14	30.10	54	30.18	55	53	35			41	40	50	47		N	1	N	1			10	10	2									14				
	15	30.35	58	30.44	45	58	39			54	48	53	50		S	1	S	1			10		5									15				
	16	30.49	37	30.41	58	60	31			60	53	50	45		N	1	S	2			10		9									16				
	17	30.43	56	30.48	59	66	33			55	50	49	46		N	1	N	2					10									17				
	18	30.45	56	30.39	56	63	35			45	45	45	42		N	1	N	1			10	10	4									18				
	19	30.39	53	30.28	55	57	29			43	39	39	37		N	1	N	1			10		5									19				
	20	30.29	57	30.19	54	55	28			42	39	49	46		N	1	N	1			10		7									20				
	21	30.21	52	30.03	35	63	39			52	48	47	45		N	1	NE	1			10		9									21				
	22	30.07	53	29.99	52	67	36			43	41	41	38		NE	1	N	1			10	10	4									22				
	23	30.00	57	30.04	50	53	35			49	46	45	42		N	1	N	1					9									23				
	24	30.08	52	29.98	57	59	28			44	40	46	42		N	2	NH	1			10	10	7									24				
	25	29.84	50	29.60	51	56	39			44	40	41	39	0.015	S	1	H	1			10	10	2									25				
	26	29.47	49	29.39	52	46	37			43	42	43	41		NE	1	NH	1			10	10	3									26				
	27	29.52	50	29.50	54	51	29			38	35	43	41	0.020	H	1	SW	1	SE	6	10	5										27				
	28	29.54	56	29.34	56	57	42			47	46	47	46	0.050	N	1	H	2			10	10	3									28				
	29	29.25	54	29.40	55	55	41			46	41	49	47		SH	3	H	1			10	10	5									29				
	30	29.63	57	29.79	56	56	43			43	49	47	45		S	3	S	1			10	10	4									30				
	31	29.85	58	29.98	55	60	42			37	50	55	51		H	1	S	1			10		8									31				
Sums.		1411	14	1614	11	15	14			115	113	113	118	1.90	54		50		274		183	158														
Means.		29.95	52.4	29.97	52.4	52.4	34.1			44.7	41.4	43.2	40.4				168		9.0		6.0															
+ Total Corrections for Instrumental Errors.																																				
+ Corrections for Diurnal Range.																																				
"Corrected Means."																																				
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					

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

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

## NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
cl.	" cirrus.	ms.	" meteors.
ci-cu.	" cirro-cumulus.	n.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" sleet.
f.	" fog.	sc.	" squall.
fr.	" frost.	s.	" snow.
h-fr.	" hoar-frost.	so. ha.	" solar halo.
h.	" haze.	sq.	" squall.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sq.	" squall.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t. s.	" thunder-storm.
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0	Calm	1.5	Light breeze	4	Blowing hard
0.5	Very light air	2	Fresh breeze	5	Blowing a gale
1	Light air	3	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{10}$  for Temp. (Col. 2), = 29.95

"Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\frac{1}{10}$  for Temp. (Col. 4), = 29.97

Mean at Station, corrected, and at 32°, = 29.97

Correction for height, feet above Mean Sea-level, = 0.02

Mean, reduced to 32°, and Sea-level, = 29.95

Highest Reading, corrected for Index error, on the 6th, = 30.490

Lowest Do. Do., on the 25th, = 29.250

Difference, or Monthly Range, = 1.240

S-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 17th, = 64.0

Lowest in Month, corrected for Index errors, on the 2th, = 21.0

Difference, or Monthly Range, = 43.0

"Corrected Mean" of all the Highest, (Col. 5), = 54.7

"Corrected Mean" of all the Lowest, (Col. 6), = 31.1

Difference, or Mean Daily Range, = 23.6

\*\* Calculated Mean Temperature of Month, = 44.4

S-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 17th, = 64.0

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 54.7

Lowest at Night, Black Bulb (corrected for Index errors), on the 2th, = 21.0

"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 31.1

Difference of above means or range ("exposed"), = 23.6

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 44.0

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 41.1

Computed Temperature of Dew-Point, = 37.7

Do. Elastic Force of Vapour, = .226

Do. Weight of Vapour in a Cubic Foot of Air, = .78

Relative Humidity (Saturation = 100), = 78

RAIN fell on 8 Days; Amount in Inches, = 1.90

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		14	2	-	-	4	2	7	2	-	1.68
P.M.		15	1	-	-	4	2	6	2	-	1.61
Mean.		14	2	1	0	4	2	6	2	0	1.64

2.69 lbs

Observations made and Return verified by \_\_\_\_\_

(Signed) *R. Warburton Glen Tanu*







## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Glen Tana Abnaye, County of Ulster, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea 35 miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of June 1897.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				Rain.		WIND.				CLOUDS.				THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.		
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.								
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.			Direction.	Force.	Direction.	Force.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 25 inches.						
	1	30.15	59	30.06	59	63	37			53	50	50	49			H	1	H	1	S	1	10	6								1	
	2	30.19	60	30.11	57	65	47			51	50	52	50			H	1	S	1			10	10	8							2	
	3	30.27	60	30.12	60	70	46			50	48	58	46			N	1	N	1			10	10	6							3	
	4	30.15	64	30.18	60	63	44			48	47	46	44			N	1	N	1			10	10	5							4	
	5	30.20	58	30.06	65	64	46			63	59	68	58			NE	1	H	1	NE	6	10	7								5	
	6	30.11	62	30.11	57	74	49			53	52	45	43	0.414		NE	1	N	1			10	10	6							6	
	7	30.21	58	30.16	55	58	38			43	41	46	44	0.412		N	1	N	1			10	10	4							7	
	8	30.17	54	30.01	54	53	31			43	40	47	45			N	1	S	1			10	10	3							8	
	9	29.98	53	29.98	53	52	38			44	40	41	39			S	1	SH	2			10	10	7							9	
	10	30.11	55	30.10	58	59	36			57	49	56	53			NE	1	N	1			10	10	5							10	
	11	30.10	61	30.06	60	64	36			56	53	59	56	0.202		SH	2	S	1			10	10	4							11	
	12	30.11	66	30.11	61	71	54			65	63	58	50			SW	2	S	1	NE	6	10	6								12	
	13	30.13	65	30.01	66	70	53			62	58	49	48			S	1	NH	1			10	10	2							13	
	14	29.91	64	29.91	60	66	51			54	52	50	47	0.491		N	1	N	1			10	10	8							14	
	15	30.00	58	29.89	60	56	34			50	46	50	48			NH	1	H	2			10	10	2							15	
	16	29.51	57	29.51	59	50	40			49	47	48	46	1.400		N	1	N	1			10	10	0							16	
	17	29.61	58	29.61	56	47	39			43	41	41	39			N	3	S	1			10	10	5							17	
	18	29.45	57	29.53	54	56	38			44	42	45	43	0.431		H	1	N	1			10	10	2							18	
	19	29.90	52	29.78	53	62	38			44	40	41	39			N	2	NH	2			10	10	1							19	
	20	29.80	54	29.41	56	59	39			47	43	45	43			H	1	S	1			10	10	2							20	
	21	29.70	55	29.84	52	59	44			46	44	43	41			N	1	NH	1			10	10	4							21	
	22	29.99	54	29.99	56	66	48			57	55	56	54			H	1	SH	1			10	10	4							22	
	23	30.03	58	29.94	57	64	46			59	56	46	45			S	1	S	1			10	10	7							23	
	24	30.08	56	29.94	57	65	45			49	48	57	49			S	1	SH	1			10	10	6							24	
	25	30.08	57	30.01	55	64	46			55	48	50	47	0.485		S	1	H	2			10	10	7							25	
	26	30.05	57	30.06	57	64	47			55	54	59	56	0.435		S	1	S	1			10	10	4							26	
	27	30.10	56	30.10	54	70	38			57	49	53	56			N	1	S	1			10	10	10							27	
	28	30.04	55	30.00	56	64	36			57	52	57	49			NE	1	S	1			10	10	2							28	
	29	30.10	58	29.91	60	67	48			56	55	60	56			S	1	N	1			10	10	10							29	
	30	30.03	62	30.00	64	72	53			64	59	53	52			N	1	SH	1			NE	6	10	9						30	
	31																															31
Sums.		99	15	1110	12	12	17			13	12	12	16	21																		
Means.		30.010	58.1	29.950	57.4	62.2	42.8			57.8	49.0	50.4	47.8	1.41																		
+ Total Corrections for Instrumental Errors.																																
+ Corrections for Diurnal Range.																																
"Corrected Means."																																
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

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

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{10}$  for Temp. (Col. 2), = \_\_\_\_\_

"Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\frac{1}{10}$  for Temp. (Col. 4), = \_\_\_\_\_

Mean at Station, corrected, and at 32°, = \_\_\_\_\_

Correction for height, feet above Mean Sea-level, = \_\_\_\_\_

Mean, reduced to 32°, and Sea-level, = \_\_\_\_\_

Highest Reading, corrected for Index error, on the 3th, = 30.270

Lowest Do. Do., on the 16th, = 29.510

Difference, or Monthly Range, = 0.760

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 6th, = 74.0

Lowest in Month, corrected for Index errors, on the 8th, = 31.0

Difference, or Monthly Range, = 43.0

"Corrected Mean" of all the Highest, (Col. 5), = 62.2

"Corrected Mean" of all the Lowest, (Col. 6), = 42.8

Difference, or Mean Daily Range, = 19.4

\*\* Calculated Mean Temperature of Month, = 52.5

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

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

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

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

Difference of above means or range ("exposed"), = \_\_\_\_\_

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 51.1

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 48.4

† Computed Temperature of Dew-Point, = 45.6

† Do. Elastic Force of Vapour, = .308

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

† Relative Humidity (Saturation = 100), = 81

RAIN fell on 8 Days; Amount in Inches, = 1.41

WIND.		SUMMARY.			
Direction.		N	NE	E	SE
A.M.		10	4		7
P.M.		9			10
Mean.		10	2	0	8

Mean Velocity in miles per day  
1.16  
1.13  
1.15

Observations made and  
Return verified by(Signed) Robt Warburton Glen Tana Abnaye



# OBSERVATIONS,

water, in cases where the observations cannot be taken daily, the observation may be made on the 6th, 15th, and 25th of each month. When convenient, extra Sea Observations might be taken for other purposes, and greater depths, noting always the Temperature of the Air, and the Hour of Observation. It is also very desirable that observations on the daily Maxima and Minima by thermometers suitably immersed, be instituted at points along the coast, by the method proposed by Mr. T. Svensson, and already commenced at Peterhead and Liverpool. The temperature of the water at the bottom of Wells ought, when practicable, to be taken, both the depth of the temperature Well and of the water being noted.

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 0-5 is 4, or blowing fresh.

Too much importance cannot be attached to the electric condition of the atmosphere in connection with terrestrial magnetism, barometrical, thermometrical, and meteorological phenomena generally. A proper Electrometer is, in truth, necessary to every complete meteorological observatory.

Storms, great prominence ought to be given in this *Trumf* to Peccant Diseases, differences in *character*, colour, velocity, and direction, between the Lower and Upper Storms of clouds, the Colour of the sky, &c. Remarks ought to be made on the occurrence of Meteors, and on the Boreas, remarkable depressions, elevations, and fluctuations of the Barometer, Thunder-Storms, and remarkable falls of Snow, Hail, or Rain, the Hour of Storms of Wind commencing, attaining their maximum, and ending as well as such Notes on Storms as have been inserted at above. And, lastly, hills sit in the vicinity of a station, the height of a Cloud, and of the Storm, the direction of the Wind, &c.

maximum, and ending, as well as such Notes on Storms as have been inserted above. When lofty hills are in the vicinity of a Station, the height of Clouds and of the Snow-line in winter should be recorded. By the use of abbreviations, the state of the weather at 9 A.M. and P.M. can be registered, either in two columns, otherwise unoccupied, or ruled off for the purposes from the column of 'Remarks.' Observations in connection with the Periodic Return of the 'Seasons' in Seasons, possess not only great scientific value, but are of considerable importance in connection with the Periodic Return of Agriculture, Horticulture, and Natural History. The Council would direct the special attention of Observers to the registration of such phenomena, so that the published Summaries may fairly represent the whole of Scotland. Observations ought to be confined to individual trees and shrubs; to particular species of birds, and, in the case of crops, to specified crops. Particular reference should be made to the date of the first appearance of the year to year on a selected piece of ground or farm. The Annual Table, published yearly in the Society's Journal, will indicate the species of plants and animals to which special attention

particular species of birds, and, in the case of crops, to specified portions thereof from year to year on a selected piece of ground or farm. The Annual Table, published yearly in the Society's Journal, will indicate the species of plants and animals to which special attention will more particularly directed.

The Council recommend Observers, before purchasing new instruments, and in repairing old ones, to communicate with the Meteorological Secretary, in order that every instrument may be examined and improved before being used; and they consider it necessary that he should have full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

(By Order)  
A. E.

Ежевник, December 1891. . . . .

[illegible]

Barley, . . . . .	indetermining variety.	Seeds, Plant
Bere or Bigr, . . . . .		
Oats, . . . . .		
Wheat, . . . . .		
Beans, . . . . .		
Pease, . . . . .		
Potatoes, . . . . .		
Turnips, . . . . .		
Rye Grass, . . . . .		

OBSERVATIONS IN CONNECTION		FOREST TREES.	
In	1st Appearance.	In Flower.	
			Alder,
			Ash,
			Beech,
			Birch,
			Elm,
			Larch,
			Time,
			Oak,
			Sycamore or Plane,

122 George Street.

EDINBURGH.



Whether crops of grain, hay, potatoes, legumes, etc., are able to contract the disease, and the agricultural condition of the district generally, zoonotic disease prevails among cattle, and the agricultural condition of the district generally.

[illegible][illegible]

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

EDINBURGH, December 1891.

By Order)

A. B.



## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Glen Tana, Abayre, County of Aberdeenshire, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea 35 miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of July 1897.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				Rain.		WIND.				CLOUDS.				THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.  As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.  <i>Mention the hour at which Storms, including Thunder and Lightning, began and ended.</i>	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.		No. of hours in which it fell.	Amount in inches.	9 h. A.M.		9 h. P.M.		Readings of the H. Cup Anemometer No.	9 A.M.		P.M.		9 h. A.M.						
		Barometer. * No.	Attached Ther- mometer	Barometer. No.	Attached Ther- mometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.			Direction.	Force.	Direction.	Force.		Velocity (0-6) and Species.	Amount (0-10), and Species.	Velocity (0-6) and Direction.	Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.					No. 22 inches.
		inches.	°	inches.	°																										
1	30.11	62	30.11	56	72	50			54	53	56	54			S	1	N	1		10			10							1	
2	30.10	59	29.80	62	63	49			58	55	57	55			NE	1	H	2		NE	6		10	9						2	
3	29.68	60	29.64	59	74	47			53	48	55	53			SW	3	NW	4		10			10	8						3	
4	29.80	58	29.90	57	62	48			54	51	56	55			N	4	N	2		10			10	9						4	
5	29.66	56	29.29	60	59	45			57	56	56	54			N	2	N	2		10			10	6						5	
6	29.55	58	29.28	54	68	47			55	51	45	43			H	2	N	3		10			10	5						6	
7	29.49	56	29.63	49	60	45			48	45	50	45			N	3	N	1		10			—	6						7	
8	29.77	52	29.60	53	58	31			54	48	53	49	0.05		N	1	S	2		10			10	7						8	
9	29.70	55	29.89	54	57	48			55	50	54	53			W	1	H	1		10	SW	9	9							9	
10	30.15	56	30.19	59	66	34			57	50	51	49			W	1	H	1		10			10	9						10	
11	30.27	57	30.22	60	70	37			57	55	54	50			W	1	H	1		—			—	10						11	
12	30.33	59	30.21	59	75	35			58	50	52	47			H	1	H	1		—			—	11						12	
13	30.31	56	30.16	59	75	33			53	49	58	56			H	1	W	1		—			—	9						13	
14	30.21	58	30.00	61	69	36			60	54	60	56			W	1	W	1		—	SE	8	10							14	
15	30.07	59	29.99	63	73	41			65	54	60	56			N	1	N	1		—			10							15	
16	30.14	60	30.11	61	79	41			64	52	54	52			W	2	W	1		—			10							16	
17	30.18	59	30.01	57	71	38			61	55	60	56			W	1	W	1		NE	6		10	4						17	
18	30.11	58	29.99	56	71	43			61	57	56	50			W	1	W	1		—			10							18	
19	29.96	59	29.79	60	76	42			61	55	55	53			N	1	N	1		NE	7		10	9						19	
20	29.81	59	29.71	59	71	50			53	50	54	52			N	1	N	1		10			10	3						20	
21	29.82	58	29.81	58	65	47			52	50	56	55	0.05		N	1	W	1		10			10	—						21	
22	29.94	60	29.89	58	59	49			60	57	59	57			N	1	W	1		10			10	6						22	
23	29.98	61	29.99	62	71	45			63	59	60	59	0.025		W	1	W	1		SE	6		10	4						Heavy thunder storm	23
24	30.00	65	29.81	63	76	57			66	61	59	58	0.050		S	1	S	2		10			10	4						24	
25	29.65	62	29.72	59	70	55			62	57	54	51			SW	1	H	1		10			10	7						25	
26	29.75	60	29.80	61	69	46			56	53	55	51			S	1	S	2		10			10	6						26	
27	29.90	59	29.72	60	64	47			45	41	45	41			W	2	W	2		10			10	11						27	
28	29.90	59	29.91	60	64	47			47	43	57	55			W	2	W	1		10			10	7						28	
29	30.08	62	30.11	60	65	52			64	63	57	55			W	1	N	1		—			10	9						29	
30	30.19	61	30.29	60	75	55			64	63	59	56			N	1	N	1		10			10	9						30	
31	30.26	62	30.12	60	70	50			66	61	55	52	0.023		N	1	N	1		10	SW	6	10							31	
Sums.		1412	16	1611	12	14	15			233	100	160	78	11		43		43													
Means.		29.86	58.9	29.88	58.6	68.5	44.8			57.5	53	55.2	52.5			139		139													
+ Total Corrections for Instrumental Errors.																															
+ Corrections for Diurnal Range.																															
"Corrected Means."																															
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

## NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ch.	"	ms.	"
ci.-cu.	"	ms.	"
ci.-s.	"	ms.	"
cu.	"	ms.	"
cu.-s.	"	ms.	"
d.	"	ms.	"
f.	"	ms.	"
fr.	"	ms.	"
h.-fr.	"	ms.	"
h.	"	ms.	"
h. d.	"	ms.	"
hl.	"	ms.	"
l.	"	ms.	"
li. cl.	"	ms.	"
li. sh.	"	ms.	"
lu. co.	"	ms.	"
lu. ha.	"	ms.	"

## TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\ddagger$  = \_\_\_\_\_  
for Temp. (Col. 2), = \_\_\_\_\_  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\ddagger$  = \_\_\_\_\_  
for Temp. (Col. 4), = \_\_\_\_\_  
Mean at Station, corrected, and at 32°, = \_\_\_\_\_  
Correction for height, feet above Mean Sea-level, = \_\_\_\_\_  
Mean, reduced to 32°, and Sea-level, = \_\_\_\_\_  
Highest Reading, corrected for Index error, on the \_\_\_\_\_ th, = \_\_\_\_\_  
Lowest Do. Do., on the \_\_\_\_\_ th, = \_\_\_\_\_  
Difference, or Monthly Range, = \_\_\_\_\_

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the \_\_\_\_\_ th, = \_\_\_\_\_  
Lowest in Month, corrected for Index errors, on the \_\_\_\_\_ th, = \_\_\_\_\_  
Difference, or Monthly Range, = \_\_\_\_\_  
"Corrected Mean" of all the Highest, (Col. 5), = \_\_\_\_\_  
"Corrected Mean" of all the Lowest, (Col. 6), = \_\_\_\_\_  
Difference, or Mean Daily Range, = \_\_\_\_\_  
\*\* Calculated Mean Temperature of Month, = \_\_\_\_\_

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

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

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day
A.M.	11	1			3	2	14			139	
P.M.	11				3	16	1			139	
Mean.	11	1	0	0	3	1	15	0	0	139	

Observations made and \_\_\_\_\_  
Return verified by \_\_\_\_\_

(Signed) Robt Warburton Glen Tana







# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Glen Tana Abertay, County of Abertay, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea 35 miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of August 1897.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				Rain.	WIND.				CLOUDS.				SUNSHINE.	THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.		Days of Month.			
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.			9 h. A.M.		9 h. P.M.		9 A.M.		P.M.			9 h. A.M.										
		Barometer.	Attached Ther- mometer	Barometer.	Attached Ther- mometer	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.		No. of hours in which it fell.	No.	9 h. A.M.	9 h. P.M.	9 h. A.M.	Amount (0-10), and Direction.	Amount (0-10), and Direction.	No.		No.	No.									
		* No.		No.		No.	No.	No.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.		No.	No.	Direction.	Force	Direction.	Force	No.	9 h. A.M.		Amount (0-10), and Direction.	Amount (0-10), and Direction.	No.						3 inches.	12 inches.	22 inches.
		inches.	°	inches.	°		°		°	°	°	°	°				Direction.	Force	Direction.	Force						°								
	1	30.11	63	30.05	60	72	42			62	58	61	59		N	1	N	1		10	10	10								1				
	2	30.10	62	30.13	62	75	49			58	57	60	57		N	1	N	1		10	10	9								2				
	3	30.26	64	30.14	60	78	54			57	55	54	52		NE	1	S	2		10	10	8								3				
	4	30.13	62	29.99	62	73	47			62	59	59	58	0.007	NE	1	S	1		10	10	10								4				
	5	29.90	65	29.71	62	78	55			64	61	60	58		N	1	N	1		10	10	7								5				
	6	29.65	65	29.61	61	77	54			58	57	57	55	0.018	NW	1	S	2		10	10	6								6				
	7	29.73	64	29.79	59	77	51			61	59	50	49	0.030	N	1	N	1		10	10	6								7				
	8	29.75	61	29.70	59	69	43			57	55	58	55	0.052	NE	1	S	2		10	10	5								8				
	9	29.77	61	29.86	62	67	47			58	55	57	55	0.009	N	2	N	1		10	10	4								9				
	10	29.90	60	29.91	59	57	45			54	53	56	53	0.010	S	1	SW	1		10	10	5								10				
	11	29.86	62	29.80	60	65	51			53	54	53	50	0.024	H	1	NW	2		10	10	3								11				
	12	29.84	62	29.89	63	57	50			55	52	56	55		N	2	S	1		10	10	2								12				
	13	29.90	60	29.79	58	62	45			54	51	57	53	0.014	S	1	S	2		10	10	7								13				
	14	29.73	61	29.75	57	64	47			60	54	59	57	0.006	SE	1	N	1		NE	2										14			
	15	29.72	60	29.69	59	65	44			56	53	56	54	0.024	S	1	S	1		10	10	6								15				
	16	29.71	59	29.56	60	65	46			56	51	56	54		H	2	S	1		SE	3	10	8							16				
	17	29.31	62	29.52	60	66	49			58	54	57	53	0.010	S	2	H	3		10	10	6								17				
	18	29.53	62	29.60	58	66	49			55	49	49	46		H	1	N	1		SE	9	NW	6	10						18				
	19	29.63	55	29.59	57	64	45			57	47	50	48		H	1	S	2		SE	7	10	7							19				
	20	29.38	59	29.21	60	65	43			54	52	53	50		S	1	N	1		10	10	8								20				
	21	29.22	60	29.30	61	64	35			53	54	54	51		S	1	SW	2		SW	6	10	5							21				
	22	29.39	60	29.48	58	68	39			53	51	50	49		SW	2	H	1		10	10	2								22				
	23	29.59	61	29.59	61	64	36			55	52	56	54		N	1	N	2		10	10	4								23				
	24	29.67	59	29.70	60	67	38			51	48	52	52		N	1	N	1		10	10	8								24				
	25	29.83	58	29.79	62	44	44			50	50	56	54		H	1	S	1		10	10	6								25				
	26	29.76	63	29.59	60	64	47			57	55	55	53		SE	1	SE	3		10	10	5								26				
	27	29.59	63	29.60	58	62	54			61	53	50	47	0.020	H	1	SW	1		10	10	5								27				
	28	29.71	61	29.80	61	65	47			55	52	53	50	0.025	SW	2	S	2		10		6								28				
	29	29.76	59	29.38	57	64	43			59	53	54	53		S	1	S	2		SW	9	10	6							29				
	30	29.37	60	29.36	56	64	51			57	53	54	53	0.037	S	2	S	3		NE	6	10	5							30				
	31	29.44	59	29.48	58	60	46			56	50	50	48		S	1	S	1		NE	6	10	7							31				
Sums.		2224	32	2156	299	211	194			205	107	152	91	344	38	47			278	286	86													
Means.		29.71	61.0	29.69	59.6	66.8	46.3			56.6	53.5	54.9	52.9		1.23	1.57			9.0	9.0														
+ Total Corrections for Instrumental Errors.																																		
+ Corrections for Diurnal Range.																																		
"Corrected Means."																																		
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			

## NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	cirrus.	ms.	meteors.
ci-cu.	cirro-cumulus.	n.	nimbus.
ci-s.	cirro-stratus.	r.	rain.
cu.	cumulus.	c. h. r.	heavy rain.
cu-s.	cumulo-stratus.	s.	stratus.
d.	dew.	sc.	scud.
f.	fog.	s.	sleet.
fr.	frost.	s.	snow.
h-fr.	hoar-frost.	so. ha.	solar halo.
h.	haze.	sq.	squall.
h. d.	heavy dew.	sq.s.	squalls.
li.	light.	t.	thunder.
li. cl.	light clouds.	t. s.	thunder-storm.
li. sh.	light showers.	w.	wind.
lu. co.	lunar corona.	g.	gale of wind.
lu. ha.	lunar halo.		

## TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\ddagger$  = 29.631  
 for Temp. (Col. 2), = 0.047, ..... 0.086.  
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\ddagger$  = 29.614  
 for Temp. (Col. 4), = 0.045, ..... 0.081.  
 Mean at Station, corrected, and at 32°, ..... = 29.622  
 Correction for height, feet above Mean Sea-level, ..... =  
 Mean, reduced to 32°, and Sea-level, ..... =  
 Highest Reading, corrected for Index error, on the 32d, ..... = 30.260  
 Lowest Do. Do., on the 30th, ..... = 29.210  
 Difference, or Monthly Range, ..... = 1.050

S-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 32d, ..... = 78.0  
 Lowest in Month, corrected for Index errors, on the 23d, ..... = 36.0  
 Difference, or Monthly Range, ..... = 42.0  
 "Corrected Mean" of all the Highest, (Col. 5), ..... = 66.8  
 "Corrected Mean" of all the Lowest, (Col. 6), ..... = 46.3  
 Difference, or Mean Daily Range, ..... = 20.5  
 \*\* Calculated Mean Temperature of Month, ..... = 56.6  
 S-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the th, ..... =  
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, ..... =  
 Lowest at Night, Black Bulb (corrected for Index errors), on the th, ..... =  
 "Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, ..... =  
 Difference of above means or range ("exposed"), ..... =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), ..... = 55.8  
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), ..... = 53.2  
 Computed Temperature of Dew-Point, ..... = 50.8  
 Do. Elastic Force of Vapour, ..... = 373  
 Do. Weight of Vapour in a Cubic Foot of Air, ..... =  
 Relative Humidity (Saturation = 100), ..... = 83  
 RAIN fell on 14 Days; Amount in Inches, ..... = 3.44

WIND.		SUMMARY.					
Direction.		N	NE	E	SE	S	SW
A.M.		8	3	-	2	9	2
P.M.		8	-	-	1	14	3
Mean.		8	2	0	2	11	2

Observations made and  
 Return verified by

(Signed) R. Warburton Glen Tana



# FOR TAKING METEOROLOGICAL

## WITH REMARKS ON THE USE OF INSTRUMENTS.

The Council of the Society command that their Regiments of Thermometers, and the Dry and Wet Bulb Hygrometers, be kept in Stevenson's Louver-boarded Box, and Thermometers painted white inside and outside, and Thermometers reserved to four stout posts, also painted white, firmly secured in the ground. The posts must be of such a length that when the Thermometers are hung in position the Bulbs of the Minimums will be level with the tops of the posts, and the Thermometers of the Dry and Wet Bulb Thermometers will be exactly at the same height of your eyes above the ground, the Maximums being hung immediately above the Minimums Thermometer. The Thermometer Box is to be placed over a plot of grass and in a free open space to which the sun's rays have free access, and so much of the day as surrounding conditions enable the Observer to secure. The Thermometers are suspended on cross-pieces in the centre of the Box and face the door, which should open to the north-west. The Council regard the question of height of the louver-board above ground, and mention in protecting the thermometer, as vital, in every system of Meteorological Observations, and

thus its observations made at different Stations are comparable, and it is therefore the only instrument of the kind in which it is impossible to compare the climates of places with each other as regards their most important features.

Professor Phillips, and Negretti and Zambra's Maximum Thermometer, and Kutherford's Minimum Thermometer, are recommended. It is recommended that these Thermometers be graduated on the gas-stem. The Minimum Thermometer is liable to two derangements—viz, the column of spirit breaking, and part of the spirit distilling by high temperature and lodging at the top of the tube. This derangement is of occasional occurrence with protected Thermometers, but of rare occurrence with exposed Thermometers. Hence a systematic examination of Minimum Thermometers ought to be a regular part of the work carried on by each Observer.

Fortunately, Spirit Thermometers may be easily set right by

any one, when the column of spirit chances to separate. Let the Thermometer be taken in the hand by the end farthest from the bulb, raised above the head, and then forcibly swung down towards the feet; the object being, on the principle of centrifugal force, to throw down the detached portion of spirit till it unites with the column. A few throws, or swinging strokes, will generally be sufficient for the purpose; after which the Thermometer should be placed in a slanting position, to allow the rest of the spirit still adhering to the sides of the tube to drain down to the column. But no other method must be adopted, if the portion of spirit in the top of the tube be small. Here should be reached slowly and cautiously to the top and of the tube, those where the detached portion of spirit is, and then, by a slight turning of the hand, to cause the spirit to rise on the surface of the unbroken column of spirit. Care must be done, the tube is not applied too quickly; for if this be done, the tube will break and the instrument be destroyed. The best way to apply the requisite amount of heat is by bringing the end of the tube slowly down towards a minute flame from a gas-burner; or, if gas be at hand, a piece of heated metal will serve instead.

The bulbs of the Thermometers for registering the greatest heat from the sun's rays and the least from radiation

**Black Bulb**—The black bulb thermometer is made, or manded, by the application of a mixture of lampblack and printer's ink. They are placed in shallow enamelled boxes, whose sides protect the bulbs from the wind, and the thermometer is placed in the box. 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 station. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Maximum. Thermometer by distillation. Black-bulbs enclosed in glass jackets may also be used; indeed preferable to the

It must, however, be added, that the violet object in the spectrum of Solar and Terrestrial Radiation is not, yet, in sufficient evidence to warrant the exclusive recommendation of any one of these methods.

The Hygrothermometer in use at the Societ's Stations consists of two thermometers mounted on one frame, but usually, but not always, with a separate bulb. The one thermometer is a *Wet Bulb* thermometer, the other a *Dry Bulb* thermometer. The approved form of this apparatus seriously vitiates the Hygrometrical Observations. Observers are specially requested to attend to the following conditions—The bulbs must hang down at least an inch free from the scales and frame to which they are

detached; the frame must be such as will bring the tubes forward from an inch from any point on which it may be suspended; this variation in position is necessary, in order to allow the tubes to follow the level of the wet bulb, but in no case under the bulb; the thermometer 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 kept 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 immersed from 15 to 30 minutes before the hour of observation. From the time of thus formed condensation will be observed, the size of the cloud will be seen to increase.

In reading the Thermometer great care must be taken to bring the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken *standing* and the Thermometer held vertically. Thus the Thermometer will be read—39°-9, 40°-0, or 40°-1; or again, 39°-4, 40°-5, 40°-6, according as it indicates a little under, an exact, or a little over 40° or 40½° respectively. So also

40°-42°, and 40° or more must be registered 40°-2, 40°-3, and 40°-4, respectively. In reading Rutherford's Minimum thermometer, the indication of that end of the index which is next to the surface of the spirit is alone noted. On opening the Thermometer Box, the Dry and Wet Bulb Thermometers are to be first, and rapidly read, inasmuch as they are readily affected by heat from the person of the observer. The Dry Bulb thermometer is read on the lygonous scale, and the W. B. on the Fahrenheit scale. The Soft Register Thermometers are read at 9 p.m. only, as in the course of observing the digressions and least degrees of temperature in the 24 hours preceding. It is not matter of

difference 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 hour. In the Society's schedules, the indications registered on the day are those of a series of phenomena commencing at 9 p.m. on the day, and extending till 9 p.m. on the 3d.

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.

In selecting instruments, the following points require attention.—The divisions of the verner of Barometers in reference to the scales, and the perfect freedom of the Barometer in air; the

water, in cases where the observations cannot be taken daily, the observation may be made on the 5th, 15th, and 25th of each month. 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. It is also very desirable that observations on the daily Maxima and Minima by Thermometers continuously immersed be instituted at points along the coast, by the method proposed by Mr. Stevenson, and that such be commenced at Fethihead and Liverpool. The Temperature of the water at the bottom of Wells ought, whenever practicable, to be taken, both the depth of the Temperature Well and of the water in the open air. See also the Note on the subject of the Temperature Well and of the water in the open air. See also the Note on the subject of the Temperature Well and of the water in the open air. See also the Note on the subject of the Temperature Well and of the water in the open air.

The Paper is affixed by a pin to a board in the Atmosphere Box and the wind indications are registered at 3 A.M. and 9 P.M. It is desired that these indications be connected with the force and direction of the wind in observation, in the following manner—thus 93° W., as an Ozome entry in the schedule will indicate that the Ozome paper is tilted at 3 on the scale, that the wind is from the N.W., and that its force on the scale 0—5 is 4, or blowing fresh.

Too much importance cannot be attached to the electric condition of the atmosphere in connection with terrestrial magnetism, barometrical, meteorological, and electrical meteorological phenomena generally. A proper electrometer is, in truth, necessary to every complete meteorological observatory.

The Remarks column is unavoidably too narrow. Some of the most valuable Observations, that can be taken are

**Remarks.**—those for which no rule can be given nor taken assigned. The use of contractions ought, therefore, to be taken as an advantage of, and a list of such as are in general use is given at the foot of the column. Besides special and extraordinary Observations, great prominence ought to be given in this column to Prevailing Diseases, differences in character, colour, velocity, and direction between the Lower and Upper Strata of clouds, the Colour of the Sky, &c. Remarks ought to be made on the occurrence of Meteors, Auroræ Boreales, remarkable depressions, elevations, and fluctuations of the Barometer, Thunder-Storms, and remarkable falls of Snow, Hail,

on Rain, the Hour of Storms of Wind commencing, arising from the maximum, and ending, as well such *Nodés* on Storms as have been hinted at above. When lofty hills are in the vicinity of a Station, the Height of Clouds and the Snow-line in winter should be recorded.

By the use of abbreviations, the state of the weather at 3 A.M. and 9 P.M. could be registered, either in two columns, otherwise uncoupled, or ruled off for the purpose, from the column of Remarks.

Observations on Seasons, possess not only great scientific value, but are connected with are of considerable importance in connection with the Periodic Recurrence of the Seasons, and the various seasons of the Periodic Rec. Agriculture, Horticulture, and Natural History. The

Council would direct the special attention of Observers to the registration of such phenomena, so that the published Summaries may fairly represent the whole of Scotland. Observations 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 Annual Table, published yearly in the Society's Journal, will indicate the species of plants and animals to which special attention is more particularly directed.

The Council recommend Observers, before purchasing new instruments, and in repairing old ones, to communicate with the Meteorological Secretary, in order that every instrument may be examined and improved before being used; and they consider it necessary that he should have full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

A. B.  
(By Order)

Edinburgh, December 1891.

[illegible]

Barley, . . . Bere or Bigg, . . . Oats, . . . Wheats, . . . Beans, . . . Peas, . . . Potatoes, . . . Turneps, . . . Rye Grass, . . .	of mixed seeds of various kinds
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[illegible][illegible]

\* *Plantago* Aug 11 1883

*To the SL*

BOOK POST.

SECRETARY

*Scottish Meteorological*

122 *George*

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398</
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[illegible]

	Blossom.	First in	Fruit ripe, generally.
C			
C			
H			
L			
P			
S			
S			
R			

[illegible][illegible]

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS

[illegible]

Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, Fruits, etc., whether planted, or in perfection, and the Agricultural condition of the district generally. Epidemic diseases prevail among cattle; and the Agricultural condition of the district generally. Epidemic diseases prevail among cattle; and the Agricultural condition of the district generally. Epidemic diseases prevail among cattle; and the Agricultural condition of the district generally.



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Forest of Glen Tanar, Abernethy, County of Aberdeenshire, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea 36 miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of September 1897.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				Rain.		WIND.				CLOUDS.				SUNSHINE. Hours.	THERMOMETERS under Ground.			SEA. Temperature at 1 fathom, and Density.	OZONE.  0-10.	GENERAL REMARKS.  As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.  <i>Mention the hour at which Storms, including Thunder and Lightning, began and ended.</i>	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.		No. of hours in which it fell.	Amount in inches.	9 h. A.M.		9 h. P.M.		Readings of the H. Cup Anemometer.  9 h. A.M.	9 A.M.		P.M.										
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max.	Min.	Max. in Sun's rays.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.			Direction.	Force.	Direction.	Force.		Velocity (0-10), and Species.	Amount (0-10), and Species.	Velocity (0-10), and Direction.		Amount (0-10), and Species.								
		* No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.			No.	No.	No.	No.		No.	No.	No.		No.	No.	No.						
		inches.	°	inches.	°																				No. 8 inches.	No. 12 inches.	No. 22 inches.					Temperature of Well at depth of feet, No.	
	1	29.55	54	29.41	58	63	37			48	47	49	45			S	1	SH	1			10	10	8							1		
	2	29.36	61	29.59	59	69	55			47	46	46	45	0.022		N	2	W	2			10	10	1							2		
	3	29.74	55	29.63	56	65	40			45	41	43	40			W	1	W	1			10		6							3		
	4	29.72	50	29.79	47	54	38			45	41	41	39	0.010		W	2	N	1			SE	6	10							4		
	5	29.14	55	29.5	54	55	34			52	47	46	43	0.05		W	1	W	2			10	10	4							5		
	6	29.53	57	29.82	50	53	32			50	48	40	37	0.02		W	1	W	1			10	10	2							6		
	7	30.61	54	29.93	51	54	36			47	43	37	35			NW	1	N	2			N	6								7		
	8	29.96	53	29.94	55	52	29			44	41	39	38	0.09		N	3	N	2			10	10	6							8		
	9	30.09	52	30.2	56	55	31			43	41	40	38			N	1	W	1			NE	8	10	5							9	
	10	30.32	54	30.35	45	52	37			45	42	34	32			W	1	W	1			10		8							10		
	11	30.89	48	30.3	58	57	29			43	42	43	40			N	1	N	1			SH	6		9							11	
	12	30.33	61	30.4	65	65	30			63	57	59	57			W	1	W	1			SE	4	10	7							12	
	13	30.45	64	30.48	62	70	54			57	58	51	49			N	1	N	1			10	10	3								13	
	14	30.43	60	30.31	56	64	48			55	54	43	40			N	1	N	1	*		10		6								14	
	15	30.21	57	30.3	55	68	38			50	49	49	47			W	1	W	1			10	10	7								15	
	16	29.99	57	29.67	58	65	40			50	46	45	41			W	1	W	1			10	SH 6	6								16	
	17	29.64	57	29.61	58	58	39			45	42	42	45			W	2	NW	2			10	10	7								17	
	18	29.65	57	29.72	47	54	38			45	40	43	41			N	3	N	1			10	10	5								18	
	19	29.95	45	29.91	54	52	37			45	43	40	37			N	2	N	1			10	10	4								19	
	20	29.9	56	29.7	57	53	39			46	44	50	48			N	1	N	1			10	10	6								20	
	21	29.47	60	29.6	59	55	42			53	50	51	47			N	3	W	3			10	10	7								21	
	22	29.57	58	29.41	54	55	44			50	48	43	40			SW	1	SW	2			10	10	4								22	
	23	29.46	56	29.18	57	58	38			47	45	43	40	0.03		SH	1	SH	4			10	10	7								23	
	24	29.39	60	29.49	59	63	43			53	48	52	49			SW	1	W	2			10	10	8								24	
	25	29.8	57	29.81	58	61	43			50	45	50	45			W	3	SW	4				10	7								25	
	26	29.67	60	29.83	59	57	46			50	50	50	47			SW	4	W	3			SE	9	11	7							26	
	27	30.07	57	30.11	60	60	38			48	44	50	47			W	2	SW	1			SE	6	10	8							27	
	28	30.6	59	29.91	60	61	42			48	46	50	49			SH	1	S	1			10	10	6								28	
	29	29.84	62	29.68	60	62	45			53	52	47	46	0.036		S	1	SH	1			10	10	8								29	
	30	29.75	57	29.81	61	56	41			45	44	47	45			W	1	NW	1			10	10	5								30	
	31																																31
Sums.						17	15			262	181	168	94		47		46		47														
Means.						58.9	38.8			48.7	46.0	45.6	43.1				153		157														
+ Total Corrections for Instrumental Errors.																																	
+ Corrections for Diurnal Range.																																	
"Corrected Means."																																	
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		

## NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	cirrus.	ms.	meteors.
ci.-cu.	cirro-cumulus.	n.	nimbus.
ci.-s.	cirro-stratus.	r.	rain.
cu.	cumulus.	h. r.	heavy rain.
cu.-s.	cumulo-stratus.	c. h. r.	continued heavy rain.
d.	dew.	s.	stratus.
f.	fog.	sc.	scud.
fr.	frost.	s.	sleet.
h.-fr.	hoar-frost.	s.	snow.
h.	haze.	so. ha.	solar halo.
h. d.	heavy dew.	sq.	squall.
h.	hail.	sq.	squalls.
li.	lightning.	t.	thunder.
li. cl.	light clouds.	t. s.	thunder-storm.
li. sh.	light showers.	w.	wind.
lu. co.	lunar corona.	g.	gale of wind.
lu. ha.	lunar halo.		

## TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\ddagger$  for Temp. (Col. 2), = \_\_\_\_\_

"Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\ddagger$  for Temp. (Col. 4), = \_\_\_\_\_

Mean at Station, corrected, and at 32', = \_\_\_\_\_

Correction for height, feet above Mean Sea-level, = \_\_\_\_\_

Mean, reduced to 32', and Sea-level, = \_\_\_\_\_

Highest Reading, corrected for Index error, on the \_\_\_\_\_ th, = \_\_\_\_\_

Lowest Do. Do., on the \_\_\_\_\_ th, = \_\_\_\_\_

Difference, or Monthly Range, = \_\_\_\_\_

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

Lowest in Month, corrected for Index errors, on the \_\_\_\_\_ th, = \_\_\_\_\_

Difference, or Monthly Range, = \_\_\_\_\_

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

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

Difference, or Mean Daily Range, = \_\_\_\_\_

\*\* Calculated Mean Temperature of Month, = \_\_\_\_\_

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

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

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

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

Difference of above means or range ("exposed"), = \_\_\_\_\_

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

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

Computed Temperature of Dew-Point, = \_\_\_\_\_

Do. Elastic Force of Vapour, = \_\_\_\_\_

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

Relative Humidity (Saturation = 100), = \_\_\_\_\_

RAIN fell on \_\_\_\_\_ Days; Amount in Inches, = \_\_\_\_\_

WIND.		SUMMARY.							
Direction.		N	NE	E	SE	S	SW	W	NW
A.M.		10	-	-	-	2	5	12	1
P.M.		9	-	-	-	1	6	12	2
Mean.		9	0	0	0	2	5	12	2

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

† Enlarging corrections for both capillary and Index Errors.

‡ The Diurnal Range for Scotland is as yet unknown.

§ Practically, though not absolutely a minus correction.

|| These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.

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

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

Observations made and  
Return verified by \_\_\_\_\_

(Signed) P. H. Warburton







# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Glen Tana Aboyne, County of Aberdeenshire, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea 35 miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of October 1897.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				Rain.		WIND.				CLOUDS.				SUNSHINE.	THERMOMETERS under Ground.			SEA.	OZONE.		GENERAL REMARKS.  As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.  Mention the hour at which Storms, including Thunder and Lightning, began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 h. A.M.		9 h. P.M.		Readings of the H. Cup Anemometer. No. _____	9 A.M.		P.M.		9 h. A.M.				0-10.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		Barometer. * No. _____	Attached Ther- mometer No. _____	Barometer. No. _____	Attached Ther- mometer No. _____	Max. No. _____	Min. No. _____	Max. in Sun's rays No. _____	Min. on Grass. No. _____	Dry bulb. No. _____	Wet bulb. No. _____	Dry bulb. No. _____	Wet bulb. No. _____			Direction.	Force	Direction.	Force		Velocity (0-5) and Direction.	Amount (0-10), and Species.	Velocity (0-5) and Direction.		Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.		No. 22 inches.	Temperature of WELL at depth of feet, No. _____			Temperature at 1 fathom, and Density.	9 A.M.	9 P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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## NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	cirrus.	ms.	meteors.
ci.-cu.	cirro-cumulus.	n.	nebulous.
ci.-s.	cirro-stratus.	r.	rain.
cu.	cumulus.	h. r.	heavy rain.
cu.-s.	cumulo-stratus.	c. h. r.	continued heavy rain.
d.	dew.	s.	sleet.
f.	fog.	sc.	squall.
fr.	frost.	sq.	squall.
h. fr.	hoar-frost.	sq.	squall.
h.	haze.	sq. h.	solar halo.
h. d.	heavy dew.	sq.	squall.
hl.	hail.	sq.	squall.
l.	lightning.	t.	thunder.
li. cl.	light clouds.	t. s.	thunder-storm.
li. sh.	light showers.	w.	wind.
lu. co.	lunar corona.	g.	gale of wind.
lu. ha.	lunar halo.		

## TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\ddagger$  for Temp. (Col. 2), = 29.925  
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\ddagger$  for Temp. (Col. 4), = 29.919  
 Mean at Station, corrected, and at 32°, = 29.922  
 Correction for height, feet above Mean Sea-level, = \_\_\_\_\_  
 Mean, reduced to 32°, and Sea-level, = \_\_\_\_\_  
 Highest Reading, corrected for Index error, on the 9 th., = 30.560  
 Lowest Do. Do., on the 16 th., = 29.290  
 Difference, or Monthly Range, = 1.270

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 22 th., = 66.0  
 Lowest in Month, corrected for Index errors, on the 14 th., = 23.0  
 Difference, or Monthly Range, = 43.0  
 "Corrected Mean" of all the Highest, (Col. 5), = 55.6  
 "Corrected Mean" of all the Lowest, (Col. 6), = 32.7  
 Difference, or Mean Daily Range, = 22.9  
 \*\* Calculated Mean Temperature of Month, = 44.2  
 S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the th., = \_\_\_\_\_  
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = \_\_\_\_\_  
 Lowest at Night, Black Bulb (corrected for Index errors), on the th., = \_\_\_\_\_  
 "Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = \_\_\_\_\_  
 Difference of above means or range ("exposed"), = \_\_\_\_\_

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 42.8  
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 41.3  
 Computed Temperature of Dew-Point, = 39.5  
 Do. Elastic Force of Vapour, = 24.3  
 Do. Weight of Vapour in a Cubic Foot of Air, = \_\_\_\_\_  
 Relative Humidity (Saturation = 100), = 88  
 RAIN fell on \_\_\_\_\_ Days; Amount in Inches, = 1.87

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Mean Force.
A.M.		2	1			9	2	1		1.55
P.M.		2			1	8	2	10	2	1.58
Mean.		2	1	0	1	8	2	10	2	1.56

2.43

(Signed) Robert Warkenton

Observations made and  
 Return verified by \_\_\_\_\_

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







# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Glen Tana, Abernethy, County of Aberdeen, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea 35 miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of November 1897.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				Rain.	WIND.				CLOUDS.				THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.  As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.  Mention the hour at which Storms, including Thunder and Lightning, began and ended.		Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.			9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.										
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max. No.	Min. No.	Max. in Sun's rays.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.		No. of hours in which it fell.	Amount in inches.	Direction.	Force.	Direction.	Force.	Readings of the H. Cup Anemometer.	9 A.M.	P.M.	No. 3 inches.	No. 12 inches.						No. 22 inches.
		* No.	inches.	°	inches.	°	°	°	°	°	°	°	°		°	°	°	°	°	°	°	°	°	°	°						°
	1	30.39	56	30.38	50	50	43			46	44	37	35		SW	1	NW	1		10	10	5						1			
	2	30.41	46	30.41	46	30	32			27	26	39	38		NW	1	N	1		NE	9	10	-						2		
	3	30.35	50	30.50	47	42	23			32	29	35	35		N	1	N	1		NE	8	10	6						3		
	4	30.34	44	30.23	52	50	20			25	25	32	31		N	1	N	1		NE	9	10	3						4		
	5	30.33	50	30.39	53	47	22			39	38	41	38		W	1	W	2		10	10	-							5		
	6	30.45	51	30.52	50	44	36			40	40	39	37	0.05	N	1	NW	1		10	10	2							6		
	7	30.38	53	30.29	56	45	36			44	43	48	47	0.11	E	2	S	2		10	10	-							7		
	8	30.19	54	30.21	55	48	40			47	46	42	41	0.39	S	2	S	2		10	10	-							8		
	9	30.29	52	30.30	59	49	38			40	40	51	49		W	1	S	3		10	10	-							9		
	10	30.25	58	30.12	53	52	36			50	48	47	46		S	2	S	2		10	10	-							10		
	11	30.10	56	30.10	58	51	40			45	44	47	46	0.05	SW	1	S	2		10	10	2							11		
	12	29.53	60	29.32	59	56	42			50	49	48	47	0.07	S	2	S	2		10	10	-							12		
	13	29.27	58	29.49	54	58	44			47	47	42	41	0.10	W	1	W	1		10	10	-							13		
	14	29.46	52	29.82	51	55	34			40	40	37	36	0.25	W	1	N	1		10	10	-							14		
	15	30.10	49	30.29	46	44	29			30	30	29	28	0.35	N	1	N	1		10	10	4							15		
	16	29.25	43	29.94	50	54	12			23	22	42	40	0.05	S	1	SW	2		10	10	5							16		
	17	29.69	55	29.71	59	51	20			50	50	48	47		SW	2	W	2		10	10	4							17		
	18	29.86	55	29.92	58	56	40			45	45	53	52		W	2	W	2	NW	6	10	4							18		
	19	29.97	60	30.08	56	58	41			55	50	48	46		H	4	H	2		11	10	3							19		
	20	30.44	58	30.40	60	58	36			54	52	49	47		H	1	W	2		10	10	5							20		
	21	30.47	58	30.41	61	58	37			47	44	50	48		SW	1	W	2		10	10	5							21		
	22	30.45	60	30.31	62	54	46			51	48	38	36		H	3	W	2		10	10	6							22		
	23	30.33	60	30.40	56	55	42			35	34	39	38	0.10	H	3	H	1		10	10	-							23		
	24	30.41	61	30.20	57	58	30			37	37	43	40	0.10	NW	1	S	1		10	10	-							24		
	25	30.33	55	30.29	55	59	32			51	47	53	45		S	1	H	1		10	10	-							25		
	26	30.05	58	29.99	55	48	34			48	44	43	40		W	1	W	2		10	10	1							26		
	27	29.71	56	29.68	62	51	37			37	35	40	37		W	1	SW	1		10	10	2							27		
	28	29.98	50	28.58	52	49	32			41	39	34	32	0.36	S	4	N	4		10	10	-							28		
	29	29.53	57	29.64	52	42	31			33	31	35	33	0.25	N	3	NW	2		10	10	3							29		
	30	29.23	50	29.12	51	40	28			39	38	30	28	0.05	W	1	NW	1		10	10	2							30		
	31																												31		
Sums.		1214	10	1212	12	13	10			11	13	14	15	2.17																	
Means.		30.052	533	30.032	542	498	337			41.6	40.1	42.0	40.3																		
+ Total Corrections for Instrumental Errors.																															
+ Corrections for Diurnal Range.																															
"Corrected Means."																															
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

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

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

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

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm.	1-5	Light breeze.	4	Blowing hard.
0-5	Very light air.	2	Fresh breeze.	5	Blowing a gale.
1	Light air.	3	Very fresh.	6	Violent gale.

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{2}$  for Temp. (Col. 2), = 29.986  
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\frac{1}{2}$  for Temp. (Col. 4), = 29.964  
 Mean at Station, corrected, and at 32°, = 29.975  
 Correction for height, feet above Mean Sea-level, = \_\_\_\_\_  
 Mean, reduced to 32°, and Sea-level, = \_\_\_\_\_  
 Highest Reading, corrected for Index error, on the 6th, = 30.520  
 Lowest Do. Do., on the 28th, = 28.580  
 Difference, or Monthly Range, = 1.940

S-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 23rd, = 59.0  
 Lowest in Month, corrected for Index errors, on the 16th, = 12.0  
 Difference, or Monthly Range, = 47.0  
 "Corrected Mean" of all the Highest, (Col. 5), = 49.8  
 "Corrected Mean" of all the Lowest, (Col. 6), = 33.7  
 Difference, or Mean Daily Range, = 16.1  
 \*\* Calculated Mean Temperature of Month, = 41.8  
 S-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the \_\_\_\_\_th, = \_\_\_\_\_  
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = \_\_\_\_\_  
 Lowest at Night, Black Bulb (corrected for Index errors), on the \_\_\_\_\_th, = \_\_\_\_\_  
 "Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = \_\_\_\_\_  
 Difference of above means or range ("exposed"), = \_\_\_\_\_

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 41.8  
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 40.2  
 Computed Temperature of Dew-Point, = 38.2  
 Do. Elastic Force of Vapour, = 230  
 Do. Weight of Vapour in a Cubic Foot of Air, = \_\_\_\_\_  
 Relative Humidity (Saturation = 100), = 88  
 RAIN fell on 14 Days; Amount in Inches, = 2.14

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day
A.M.	5	1			6	4	12	2		160	
P.M.	6				7	2	11	4		167	
Mean.	5.0	1.0			7.3	11.3	0			164	

2.69

Observations made and Return verified by \_\_\_\_\_

(Signed) Robert Warburton, Glen Tana







## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Glen Tana Alayne* County of *Abderdeenshire*, in Lat. \_\_\_\_\_, Long. \_\_\_\_\_, Distance from Sea *35* miles.

Height of Cistern of the Barometer above Mean Sea-Level \_\_\_\_\_ feet, above Ground \_\_\_\_\_ feet.

During the MONTH of *December* 189 *7*.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER.				Rain.		WIND.				CLOUDS.				THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.  As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.  Mention the hour at which Storms, including Thunder and Lightning, began and ended.	Days of Month.		
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.								
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max. No.	Min. No.	Max. in Sun's rays.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.			Direction.	Force.	Direction.	Force.	No.	Velocity (0-6) and Direction.	Amount (0-10), and Species.	Velocity (0-6) and Direction.	Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.					No. 22 inches.	
																																*No.
		Inches.	°	Inches.	°																											
1	29.44	49	29.85	48	40	25			34	33	31	30			NE	1	N	1		10	NE	7	2							1		
2	30.24	50	30.30	48	35	24			33	33	29	27			N	1	N	1		10			1							2		
3	30.22	46	30.48	50	36	27			26	25	40	39			NW	1	S	2		10			-							3		
4	30.02	52	30.09	50	42	23			39	38	40	39			SH	1	S	2		10			2								4	
5	30.01	49	29.82	58	40	30			38	38	45	44			S	2	S	2		10			-								5	
6	29.70	55	29.51	50	44	35			42	42	36	33			S	2	S	2		10			4								6	
7	29.55	53	28.92	54	45	30			40	39	42	40	0.020		S	3	S	2		10			2								7	
8	28.84	52	29.66	50	49	30			34	32	57	35	0.023		H	3	H	2		SE 8			2								8	
9	28.75	52	29.02	54	45	32			55	53	40	39	0.020		S	2	H	2					-								9	
10	29.23	57	30.05	52	42	30			36	35	37	31	0.010		H	1	H	2					10	1							10	
11	30.17	57	29.40	50	37	29			34	33	36	34	1.02		NW	1	N	2		10											11	
12	29.53	47	29.52	46	39	26			30	28	20	18			H	1	H	1		H	3		4								12	
13	29.30	48	29.37	52	41	16			37	36	41	40	0.032		SE	1	S	2		10			10								13	
14	29.19	54	29.30	56	47	33			40	39	40	39	0.050		S	2	S	1		10			10	4							14	
15	29.20	54	29.45	50	49	33			43	42	36	34			S	2	H	1		10			10	4							15	
16	29.48	54	29.42	56	51	32			44	43	44	43	0.017		S	2	S	4		10			10								16	
17	29.67	54	29.85	49	51	32			47	45	43	42			S	3	S	2		10			10	-							17	
18	30.15	51	30.32	47	51	30			41	39	32	30	0.07		SH	2	N	1					-	3							18	
19	30.41	44	30.45	45	45	19			22	21	24	22			N	1	N	1		10			10	3							19	
20	30.45	48	30.45	50	35	20			34	32	39	37			S	1	S	2		10			10	4							20	
21	30.54	52	30.51	45	41	52			36	34	30	28			S	1	NW	1		10			-	3							21	
22	30.54	41	31.49	43	41	17			22	20	23	20			H	1	H	1					-	3							22	
23	30.47	42	29.40	42	31	12			17	15	21	19			SW	1	SH	1		S	3		2								23	
24	29.27	45	30.15	43	30	12			29	28	27	25			SH	1	H	1		10			-	2							24	
25	30.08	41	30.09	45	37	19			39	37	41	39			SH	2	S	1					-								25	
26	29.99	44	29.61	50	39	32			43	41	45	44			S	4	S	3		10			10	1							26	
27	29.57	55	29.38	52	40	25			44	43	41	39	0.06		S	1	S	2		10			10	1							27	
28	29.48	57	29.29	50	46	28			39	37	40	38	0.025		S	2	S	2		10			10	-							28	
29	29.20	52	28.92	48	42	34			37	37	40	39			SH	1	S	3		10			10	-							29	
30	28.67	46	28.95	52	30	34			45	41	42	40			S	4	S	2		10			10	2							30	
31																																31
Sums.		12 5	11	13 11	10	11	11			14	13	9	15	9.3						51					50							
Means.		29.719	49.4	29.732	49.5	42.7	26.7			36.7	35.2	36.1	34.4	3.12						1.65					1.68							
+ Total Corrections for Instrumental Errors.																																
+ Corrections for Diurnal Range.																																
"Corrected Means."																																
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

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

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0	Calm	1-5	Light breeze	4	Blowing hard
0.5	Very light air	2-	Fresh breeze	5	Blowing gale
1-	Light air	3-	Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{100}$  for Temp. (Col. 2), = *29.664*  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\frac{1}{100}$  for Temp. (Col. 4), = *29.677*  
Mean at Station, corrected, and at 32', = *29.670*  
Correction for height, feet above Mean Sea-level, = \_\_\_\_\_  
Mean, reduced to 32', and Sea-level, = \_\_\_\_\_  
Highest Reading, corrected for Index error, on the 21 th, = *29.570*  
Lowest Do. Do., on the 30 th, = *28.630*  
Difference, or Monthly Range, = *1.870*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 16 th, = *51.0*  
Lowest in Month, corrected for Index errors, on the 23 th, = *12.0*  
Difference, or Monthly Range, = *39.0*  
"Corrected Mean" of all the Highest, (Col. 5), = *42.7*  
"Corrected Mean" of all the Lowest, (Col. 6), = *26.7*  
Difference, or Mean Daily Range, = *16.0*  
\*\* Calculated Mean Temperature of Month, = *34.7*  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the \_\_\_\_\_ th, = \_\_\_\_\_  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = \_\_\_\_\_  
Lowest at Night, Black Bulb (corrected for Index errors), on the \_\_\_\_\_ th, = \_\_\_\_\_  
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = \_\_\_\_\_  
Difference of above means or range ("exposed"), = \_\_\_\_\_

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = *43.64*  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = *34.8*  
Computed Temperature of Dew-Point, = *32.8*  
Do. Elastic Force of Vapour, = *185*  
Do. Weight of Vapour in a Cubic Foot of Air, = \_\_\_\_\_  
Relative Humidity (Saturation = 100), = *86*  
RAIN fell on 11 Days; Amount in Inches, = *3.12*  
WIND. SUMMARY.  
Direction. N NE E SE S SW W NW Calm or Variable. Mean Force. Mean Velocity in miles per day  
A.M. 4 16 1 8 1 1.65  
P.M. 2 1 14 6 4 2 1.68  
Mean. 3 1 0 15 3 6 2 0 1.66  
2.78

Observations made and Return verified by \_\_\_\_\_

(Signed) *Robt. Warburton Glen Tana Alayne*



# INSTRUCTIONS

## FOR TAKING METEOROLOGICAL

### WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the chief objects that the SCOTTISH METEOROLOGICAL SOCIETY proposed to itself when the Society was established in 1855, was to secure PERFECT UNIFORMITY in the system of observation pursued at all its Stations. Uniformity in the observations is absolutely necessary to justify the publication of Monthly Results from different observations, it being found that differences between the Returns from two Stations so very considerable as to render them quite incomparable, many hours of observation, or even from the use of differently constructed instruments. It is therefore hoped that those who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions secure for their Monthly Returns an accuracy and value commensurate with the labour and pains involved in making them; and for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

The Council recommend that Observations be made precisely at 9 A.M. and 9 P.M. (Greenwich or Railway Time only), of the columns of the following remarks, or at the top of the nearest punctuality in the time of reading the instruments pursued in observed. Observers in some few cases, may find this impossible; in such instances, they are specially requested not to make opposite every reading the time at which it is taken, if not at 9 A.M. or 9 P.M.

Weather-Glasses and Aneroids, though well suited to indicate barometer, fitted for scientific purposes. No barometer should be used for Meteorological Observation that is not supplied with some means of adjustment or compensation which will secure that the height of the mercury in the tube is accurately measured from the floating surface of the mercury in the cistern.

The barometer in which the error arising from the fluctuating surface of the mercury in the cistern is entirely got rid of is FORTIN'S barometer; the arrangement consisting in applying pressure by means of a screw to the bottom of the cistern, which is made of flexible leather, thus raising or depressing the surface till it just meets the ivory point which forms the zero point of the fixed scale.

The barometer originally constructed by Mr. Adie of London, and usually called the Board of Trade Barometer, has 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 is an excellent barometer for ordinary Observers, inasmuch as it entirely eliminates the error of observation likely to arise in not a few cases in setting the instrument to the zero point of the fixed scale when the light is not good. To show the accuracy with which these Barometers are made, it may be stated, that one was compared, during a whole year, with the Society's Standard Barometer, particular care being given to make the comparison when atmospheric pressure was rising or falling very rapidly, with the result that none of the readings differed from those of the Standard more than 0.003 inch.

A modification of Fortin's Barometer is used at a number of the Society's Stations, by which the coincidence of the zero point with the surface of the mercury is 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.

It is absolutely necessary that the Barometer which is to be used shall have been compared with a Standard Barometer.

The Barometer should be suspended in as good a light as can be secured, and to facilitate the reading, a piece of white paper may be put behind the tube. It must be hung truly perpendicular, and exposed to neither the sun's direct rays nor the heat of a fire, and must not be hung against a wall heated by a fire. The object being to secure that the whole instrument, including the brass fittings, the contained mercury, and the attached Thermometer, shall be, when read, at one uniform temperature, it is evident that the best position is that which is least liable to sudden changes of temperature.

In taking an Observation, the Attached Thermometer is first noted; the tube must then be gently tapped, and the cistern-adjustment carefully made. The eye, by raising and lowering 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 so as 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 facilitate an accurate adjustment and reading of the Barometer. A mistake not unfrequently made by those beginning to observe, consisting in setting the edge of the vernier to the level of the clear surface of the mercury which is in direct contact with the glass tube, must be carefully avoided.

The errors most frequently made in reading the Barometer are errors of 1.000 inch, 0.500 inch, and 0.050 inch; that is to say, instead of 29.365 inches, either of the following is sometimes set down—viz. as 30.365 inches, 28.365 inches, 29.865 inches, or 29.815 inches. Experience having shown that even the very best Observers make these mistakes, particular attention is directed to the matter. When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must first be screwed so as to form a tight plug to the cistern, thus preventing the escape of the mercury. Then screw up the mercury not quite to the top of the tube, but to within a quarter of an inch of it, and take down the instrument; it should 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 if, on inclining the instrument, a sharp tap is produced when the mercury strikes the top of the tube. If a dull tap is heard, there is air in the tube, which must be got rid of.

As Barometers are liable to be damaged by the introduction of air into their tubes, on removal from place to place, or in being roughly handled, it may be useful to Observers to know how the air may be expelled. First close up the cistern by screwing the ivory peg tight, so as to prevent the escape of mercury; then screw up the mercury to about half an inch from the top of the tube; and having slowly inverted the instrument, place the top of it on a yielding substance, such as the book, and gently tap on the cistern with the palm of the hand, so as to induce the air to ascend through the column to the cistern, whence it may escape. Since there is the weight of two atmospheres—the pressure of the mercury in the Barometer, and the air outside—pressing on any air that may be inside the tube, it is usually a tedious operation to get it wholly expelled. After repeated trials, however, it is generally accomplished; and the clear metallic sound of the mercury, when gently struck against the top of the glass tube, will show when the whole of the air has been expelled. On hanging up the Barometer, care must be taken to screw down the mercury in the tube before untwisting the float of the cistern, for, if this be not attended to, the mercury will flow out, and the instrument be seriously damaged.

The Council of the Society recommend that the Self-Registering Thermometers, and the Dry and Wet Bulb Hygrometers, be kept in Stevenson's Lonsdale-board Box for protection to the reader, as shown in the past by repeated and annoying breakages of Thermometers of similar construction; and as regards Maximum Thermometers, either Negretti and Zamboni's, or Philip's, whether they will act at the highest temperatures they may be required to register. By the laws of the Society, Members and Observers have a right to have their instruments compared by the Secretary, and to advise with him regarding the purchase of instruments.

Very great care should be bestowed on the Observations of the Wind. Wind, and Force, is so essential towards the "right" discussion of many of the more important problems of the science. A Wind-Vane ought to be elevated at least 12 feet above surrounding objects. When it oscillates excessively, the "right" direction should be taken. In all cases, but especially when the Vane is stationary, and when the wind is feeble, reference may be made to the direction of smoke, etc., in well-exposed situations. Careful observations are recommended to be made on the changes in the direction of the wind; and during storms, extra observations at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, is likely to give highly valuable and important results, particularly in connection with the system of thickly-planted Stations over a limited district round Edinburgh called STORM STATIONS, in the course of being established by the Society for the systematic investigation of the relation of the force of the wind to BAROMETRIC GRADIENTS, and other points connected with storms.

The Council would recommend the Hemisphere Cup Anemometer, a self-registering instrument which shows the amount of Wind that passes it per day; from which also the mean 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 Pressure Anemometer recently brought under the notice of the Society by Mr. T. Stevenson, the Honorary Secretary, and Mr. R. Ballingall, the Society's Observer at Edinburgh, are recommended as likely to secure uniformity in making observations on the Force of the Wind.

Many causes conspire to produce anomalies in Rain Returns, arising partly from the difficulty of obtaining a perfectly unobstructed situation for observation, and partly from the defective nature of the instruments used. The Rain Gauge should not be placed on a slope or terrace, but on a level piece of ground, in as open a situation as the Observer can secure for it. As it is often difficult to obtain a position as free and unobstructed by surrounding objects as is desirable, trees, buildings, or other obstructions, at least as many feet from their base as they are in height. The more important directions, towards which it is most desirable to have a free exposure, are, in the order of their importance, S.W., N.E., S.E., S., and W. The rim of the gauge must be perfectly level, and fixed so that it will remain level in all weathers, and be at a height of one foot above ground, over grass. In such gauges as Fleming's, which are furnished with a measuring-rod attached to a float, the rod ought to be fixed down, and the float rise to its height only at the time the instrument is read. It being found that a stem projecting above the rim of the gauge seriously interferes with the proper measurement of the Rain, when a measuring-glass is used, care should be taken to hold it quite perpendicular. The Rain Gauge ought to be read daily at 9 A.M., and the reading entered in the Returns of the previous day. If the Gauge is read once a month, the reading is to be made on the first of the month, and the amount entered for the previous month.

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

Convenient abbreviations for the nomenclature of Clouds will be found on the other side. The amount of Cloud 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 appearance and changes may be noted among the Remarks. The amount of Cloud is entered from a scale of 0 to 10; thus, when the sky over-Clouds is free from Clouds it is entered 0, when half-covered by Clouds, 5, wholly covered, 10, 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.—Thus, in the column Velocity and Direction, 9, S. W. will indicate that the upper strata of Clouds travel with an extreme velocity from S.W. and those in the lower regions from W., with one-third the speed of the former. Again, in the second column, an entry of 2, ch-st. will indicate that the higher regions are covered to the amount of 4-tenths with stratus Clouds; and that the sky is further obscured to the extent of 2-tenths by lower Clouds of the cumulo stratus kind.

Remarks on peculiar Clouds, accompanied with drawings, will assist materially in the development of a more exact nomenclature of Clouds, as well as throw light on the electrical, and other of the more obscure phenomena of Meteorology.

The approximate number of Hours in which objects in the sun's rays cast shadows, should be entered in the proper sunshine column.

As the germination and growth of plants generally depend greatly on the temperature of the soil,—this amount and consistency,—the Council recommend that Observations in this interesting department be made at 9 A.M., by Thermometers permanently fixed in the soil, their bulbs being sunk to depths of 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.

A knowledge of the Temperature of the Sea is not only in itself, but in its relations to that of our island, a most important branch of Meteorology. The Council therefore recommend that the Temperature of the Sea be carefully taken by a properly-constructed apparatus, from boats, or, if this be impracticable, from the ends of piers and rocks round the coast, where it is not influenced by that of river water, and as little influenced as possible by currents sweeping along the coast, and thus acquiring the temperature of the land, either greatly heated by the sun or cooled by nocturnal radiation.

correct numbering of the scale of every instrument; the rejection of Thermometers the frameworks of which are not likely to stand exposure to the reader, as shown in the past by repeated and annoying breakages of Thermometers of similar construction; and as regards Maximum Thermometers, either Negretti and Zamboni's, or Philip's, whether they will act at the highest temperatures they may be required to register. By the laws of the Society, Members and Observers have a right to have their instruments compared by the Secretary, and to advise with him regarding the purchase of instruments.

Very great care should be bestowed on the Observations of the Wind. Wind, and Force, is so essential towards the "right" discussion of many of the more important problems of the science. A Wind-Vane ought to be elevated at least 12 feet above surrounding objects. When it oscillates excessively, the "right" direction should be taken. In all cases, but especially when the Vane is stationary, and when the wind is feeble, reference may be made to the direction of smoke, etc., in well-exposed situations. Careful observations are recommended to be made on the changes in the direction of the wind; and during storms, extra observations at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, is likely to give highly valuable and important results, particularly in connection with the system of thickly-planted Stations over a limited district round Edinburgh called STORM STATIONS, in the course of being established by the Society for the systematic investigation of the relation of the force of the wind to BAROMETRIC GRADIENTS, and other points connected with storms.

The Council would recommend the Hemisphere Cup Anemometer, a self-registering instrument which shows the amount of Wind that passes it per day; from which also the mean 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 Pressure Anemometer recently brought under the notice of the Society by Mr. T. Stevenson, the Honorary Secretary, and Mr. R. Ballingall, the Society's Observer at Edinburgh, are recommended as likely to secure uniformity in making observations on the Force of the Wind.

Many causes conspire to produce anomalies in Rain Returns, arising partly from the difficulty of obtaining a perfectly unobstructed situation for observation, and partly from the defective nature of the instruments used. The Rain Gauge should not be placed on a slope or terrace, but on a level piece of ground, in as open a situation as the Observer can secure for it. As it is often difficult to obtain a position as free and unobstructed by surrounding objects as is desirable, trees, buildings, or other obstructions, at least as many feet from their base as they are in height. The more important directions, towards which it is most desirable to have a free exposure, are, in the order of their importance, S.W., N.E., S.E., S., and W. The rim of the gauge must be perfectly level, and fixed so that it will remain level in all weathers, and be at a height of one foot above ground, over grass. In such gauges as Fleming's, which are furnished with a measuring-rod attached to a float, the rod ought to be fixed down, and the float rise to its height only at the time the instrument is read. It being found that a stem projecting above the rim of the gauge seriously interferes with the proper measurement of the Rain, when a measuring-glass is used, care should be taken to hold it quite perpendicular. The Rain Gauge ought to be read daily at 9 A.M., and the reading entered in the Returns of the previous day. If the Gauge is read once a month, the reading is to be made on the first of the month, and the amount entered for the previous month.

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

Convenient abbreviations for the nomenclature of Clouds will be found on the other side. The amount of Cloud 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 appearance and changes may be noted among the Remarks. The amount of Cloud is entered from a scale of 0 to 10; thus, when the sky over-Clouds is free from Clouds it is entered 0, when half-covered by Clouds, 5, wholly covered, 10, 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.—Thus, in the column Velocity and Direction, 9, S. W. will indicate that the upper strata of Clouds travel with an extreme velocity from S.W. and those in the lower regions from W., with one-third the speed of the former. Again, in the second column, an entry of 2, ch-st. will indicate that the higher regions are covered to the amount of 4-tenths with stratus Clouds; and that the sky is further obscured to the extent of 2-tenths by lower Clouds of the cumulo stratus kind.

Remarks on peculiar Clouds, accompanied with drawings, will assist materially in the development of a more exact nomenclature of Clouds, as well as throw light on the electrical, and other of the more obscure phenomena of Meteorology.

The approximate number of Hours in which objects in the sun's rays cast shadows, should be entered in the proper sunshine column.

As the germination and growth of plants generally depend greatly on the temperature of the soil,—this amount and consistency,—the Council recommend that Observations in this interesting department be made at 9 A.M., by Thermometers permanently fixed in the soil, their bulbs being sunk to depths of 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.

A knowledge of the Temperature of the Sea is not only in itself, but in its relations to that of our island, a most important branch of Meteorology. The Council therefore recommend that the Temperature of the Sea be carefully taken by a properly-constructed apparatus, from boats, or, if this be impracticable, from the ends of piers and rocks round the coast, where it is not influenced by that of river water, and as little influenced as possible by currents sweeping along the coast, and thus acquiring the temperature of the land, either greatly heated by the sun or cooled by nocturnal radiation.

water, in cases where the observations cannot be taken daily, the observation may be made on the 5th, 15th, and 25th of each month. 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. It is also very desirable that observations on the daily Maxima and Minima by Thermometers continuously immersed, be instituted at points along the coast, by the method proposed by Mr. T. Stevenson, and already commenced at Peterhead and Liverpool. The Temperature of the water at the bottom of Wells ought, when practicable, to be taken, both the depth of the temperature well and Test-Papers are used, Schönbein's or Moffat's, etc. The Paper is affixed by a pin to a board in the Thermometer Box, and the indications 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 35°, 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—5 is 4, or blowing fresh.

Too much importance cannot be attached to the electric condition of the atmosphere in connection with terrestrial magnetism, barometrical, thermometrical, and meteorological phenomena generally. A proper Electrometer is, in truth, necessary to every complete meteorological observatory.

The Remarks column is unavoidably too narrow. 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 in general use is 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, elevations, and fluctuations of the Barometer, Thunder-Storms, and remarkable falls of Snow, Hail, or Rain, the Hour of Storms of Wind commencing, attaining their maximum, and ending as well as such Notes on Storms as have been hinted at above. When lofty hills are in the vicinity of a Station, the Height of Clouds and of the Snow-line in winter should be recorded.

By the use of observations, the state of the weather at 9 A.M. and 9 P.M. should be registered, either in two columns, otherwise uncoupled, or ruled off for the purpose, from the column of "Remarks." Observations in connection with the Periodic Return of the "Seasons," possess not only great scientific value, but observation with are of considerable importance in connection with the Periodic Agriculture, Horticulture, and Natural History. The Council would direct the special attention of Observers to the registration of such phenomena, so that the published Summaries may fairly represent the whole of Scotland. Observations 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 Annual Table, published yearly in the Society's Journal, will indicate the species of plants and animals to which special attention is more particularly directed.

The Council recommend Observers, before purchasing new instruments, and in resuming old ones, to communicate with the Meteorological Secretary, in order that every instrument may be examined and improved before being used, and they consider it necessary that he should have full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

(By Order)

EDINBURGH, December 1891.

EDINBURGH.

122 George Street,

Scottish Meteorological Society,

To the SECRETARY

BOOK POST.

# OBSERVATIONS,

gluntana  
Dec 1891

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

Barberry, . . . . .	SHRUBS, ETC.	Apple, . . . . .	FRUITS.	Strawberry, . . . . .	Whin, . . . . .
Broom, . . . . .		Cherry, . . . . .		Plum, . . . . .	Red Flowering Currant, . . . . .
Hazel, . . . . .		Gean, . . . . .		Pear, . . . . .	Mountain Ash or Rowan, . . . . .
Black Currant, . . . . .		Gooseberry, . . . . .		Peach, . . . . .	Rhododendron Ponticum, . . . . .

FOREST TREES.	In Flower.	Leaf Buds in first Appear.	In Leaf.	Divested of Leaves.	GRASSES, or mentioning variety.	Barley.	Oats.	Wheat.	Beans.	Peas.	Potatoes.	Turnips.	Rye Grass.
Alder,													
Beech,													
Birch,													
Elm,													
Larch,													
Lime,													
Oak,													
Sycamore or Plane,													

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

First Cut	In Bar or Island	Barley,	Oats,	Wheat,	Beans,	Peas,	Potatoes,	Turnips,	Rye Grass,
First Cut	In Bar or Island	Barley,	Oats,	Wheat,	Beans,	Peas,	Potatoes,	Turnips,	Rye Grass,