

## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Aberdeen*County of *Aberdeen*in Lat. *57° 9' N*, Long. *2° 6' W*, Distance from Sea *1 3/4* miles.Height of Cistern of the Barometer above Mean Sea-level *101.5* feet, above Ground *4* feet.During the MONTH of *January* 186*6*

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.			
	by <i>Catella</i>				Royal daily, at 9 A.M. & 9 P.M.				No.				9 h. A.M. 4 h. P.M.				No. of hours in which it fell.		A.M. P.M.				9 h. A.M.									
	Barometer.	Attach- ed Ther- mometer.	Barometer.	Attach- ed Ther- mometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Direction.	Force.	No. of inches.	No. of inches.	No. of inches.											
	* No. 511.				No.	No.	No.	No.																								
1	28.960	43	29.254	42.3	36.7	32.5	50	30.4	34	33	35.3	34	SW	3	SW	1.5	500	0	0													
2	29.492	41.5	29.034	41.2	42.3	32.5	49	30.3	34	33	42	41.5	SW	1.5	SW	2	500	7	0.320													1
3	29.320	42	29.448	45.7	44.6	36	55	30.5	37.6	35.7	44.3	43.2	SE	1.5	SW	2.5	415	4	0.025													2
4	29.336	48	29.388	47	47.3	36.5	48.2	31.5	46	44.4	38.2	37.6	S	3	S	3.5	480	8	0.152													3
5	29.606	48	29.758	47	40	31.3	58.2	25.3	34	33	33.6	32.7	SW	1.5	SW	1.5	240	1	0.070													4
6	29.810	44	29.616	43.5	38.5	32.2	57.8	26.7	36.3	35.5	36.5	35.3	SW	1.5	SW	0.5	260	4	0.170													5
7	29.072	43	28.970	42.5	39.4	33	57	29.3	37	36.5	36	35.3	SW	1	SW	0.5	335	0	0.008													6
8	28.690	47	28.576	45	38	32	47	27.9	34.3	33.6	38	36.5	SW	1	SW	1	155	1	0.010													7
9	28.500	45.5	28.646	54.8	38.8	31.7	61.5	28.4	32.5	31.5	36.5	36	SW	1	SW	1.5	160	1	0.095													8
10	28.948	47	29.130	43	38	27.4	51	29	35	33	28.7	27.8	SW	1	SW	1	250	3	0.065													9
11	29.196	44	29.236	42	29.8	17.5	50.5	16.5	24	23	18.5	18.3	SW	1	SW	0.5	195	2	0													10
12	29.528	45.5	29.664	45	29.7	18.3	50	13	25.8	25.2	25	24	SW	1.5	SW	0.5	135	6	0.430													11
13	29.066	42	29.202	42	41.7	23.7	48	17	35.5	35	39	37	S	5	SW	1	305	3	0.030													12
14	29.190	42	29.042	42.5	49	35.3	60	31.3	42	41.5	46	44	SE	0.5	SW	3	265	2	0.015													13
15	29.134	49	29.488	47	46	34.5	59	38.0	40.8	37.2	36.2	33.7	SW	2.5	SW	1	440	1	0.015													14
16	29.454	49	29.664	50	40	33	50	29	37	36	37.3	35	SW	0.5	SW	1.5	375	3	0.090													15
17	29.782	51.5	29.598	51	42	32	48.8	27.8	35	33.5	42	41	SW	1	SW	0.5	170	7	0.170													16
18	29.588	54.5	29.222	52	48.2	40.2	59	34.9	46.2	42.3	47	45	SW	1.5	SW	1.5	210	0	0													17
19	28.992	53.5	29.180	51	47	37	64	38.5	42	40	40	38	SW	1.5	SW	1	440	5	0.205													18
20	29.146	47	29.532	47	40.5	34.4	52.7	31	35.7	34.7	39.5	38.3	SW	1	SW	1.5	285	8	0.255													19
21	29.334	46	29.316	47	43	38.4	52.4	32	42	41	42.5	40.4	S	3	S	2	270	1	0.010													20
22	29.396	51	29.444	49.5	43.5	36	52.6	29.7	38.5	36.4	39	37	SW	1.5	SW	1.5	325	0	0													21
23	29.930	49	30.256	47	45.5	36.5	59.4	33	39	36.7	38.3	36.3	SW	1	SW	1	275	1	0.005													22
24	30.280	52	30.282	49	47.5	36.5	58.9	33	45	42.7	41	38	SW	1.5	SW	0.5	215	0	0													23
25	30.202	51	30.272	51	51	37	60	32.4	43.5	41.8	47	45	SW	2.5	SW	1.5	155	0	0													24
26	30.236	53	30.148	51	48	41.7	51.9	37.3	45.2	42.3	44	42	S	0.5	SW	2.5	290	0	0													25
27	30.022	48	29.820	48.2	46.4	39	62.2	39	43.5	42	41	39.2	SW	1.5	SW	1.5	285	0	0													26
28	29.508	47.5	29.254	47.5	45.3	38.8	50.2	33	43.3	41	40.5	36.7	SW	2	SW	2.5	295	0	0													27
29	29.102	57	29.476	47	42	31	55.9	27.8	32.3	30.5	36.7	35.3	SW	1.5	SW	1.5	350	4	0.075													28
30	29.918	48	29.818	48	38	27.5	61.9	23.5	29	27.4	37.7	32	SW	1	SW	1	350	9	0.107													29
31	29.498	57	29.132	52.3	44.4	35.8	44.2	25.3	40.7	40	44.8	44	S	1.5	S	1.5	215	15	0.300													30
ms.	912.236	147.5	912.866	145.9	131.2	102.92	163.60	912.3	116.7	119.4	119.2	114.0	52.5	43.5	914.0	46.2	2.522															31
ans.	29.427	47.56	29.447	47.06	42.3	33.2	54.4	29.4	37.57	36.1	38.46	36.8	16.0	14.0	295	3.1	0.081															
Total errors instru- mental errors.	+0.011		+0.011		0	+0.7	0	+0	+0.4	+0.5	+0.4	+0.5																				
Correc- tions for urnal ange.																																
Correc- tions ans.	29.438	47.6	29.458	47	42.3	33.9	54.4	29.4	38.0	36.6	38.9	37.3	16	14	295	3.1	0.081															
No. of column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{2}$  for Temp. (Col. 2), = *29.438* = *29.388*Corrected Mean of Barometer at 9 P.M., minus the Correction  $\frac{1}{2}$  for Temp. (Col. 4), = *29.438* = *29.410*Mean at Station, corrected, and at 32°, = *29.399*Correction for Height, 102 feet, above Mean Sea-level, = *+0.113*Mean, reduced to 32°, and Sea-level, = *29.512*Highest Reading, corrected for Index error, on the 24th, = *28.5130293*Lowest Do., Do., on the 9th, = *28.511*Difference, or Monthly Range, = *1.882*

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

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by *Alex. Beverly, assisted by George Jolly, Junior Grammar School*(Signed) *Alex. Beverly*

N.B. I have observed the Rainfall as heretofore at 9 a.m. but recorded it for the previous day - so that my Report to the Scottish Meteorological Society may agree with that which I send to Mr. Symonds. If the old way is preferred, strike out the observation recorded for 31<sup>st</sup> January & what is left will be the January Rainfall according to the old plan.

Greater daily range = 17.3 on the 13<sup>th</sup>

P











Andersen  
Feb. 1866.

nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky *overhead* (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the *clouds* column, though their appearances and changes ought to be noted among the 0 to 10 scale. The amount of cloud is entered from a scale of 0 to 10; thus, when the sky *overhead* is *half covered* by clouds, 5 is entered as the *observation*, and so on. Observations of clouds are made at 9 A.M. and at sunset.

as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction,"  $\frac{W}{6}$ ,  $\frac{W}{12}$ , (for example), will indicate that the upper strata of clouds travel with *extreme* velocity from S.W. and these in the lower regions from W., with one-third (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of  $\frac{4}{4}$ ,  $\frac{4}{16}$ , (*exp.*) 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.

*Sundown.*—The number of hours in which oblique in the sun's

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

*Temperature of the Sea*.—Knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. —At or near the time of high water, on the 3<sup>rd</sup>, 15<sup>th</sup>, and 25<sup>th</sup> of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

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

*Electricity.*—Too much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial

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

storms of wind attaining their maximum, as well as such storms as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and the snow-line in winter ought to be recorded.

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

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

phenomenon; that the published Summary is fairly representative of the whole of Scotland. Observation ought to be confined to individual eyes and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

The Council recommend that *year-day* observations be taken;—viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

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

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

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## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Abertree, County of Abertree, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.Height of Cistern of the Barometer above Mean Sea-level 102 feet, above Ground 4 feet.During the MONTH of March 1866.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.		
	by <i>Catella</i>				Read Daily, at 9 A.M.				No. —				No. —				No. —		No. —				No. —								
	9 h. A.M.		9 h. P.M.		Predicted in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		4 h. P.M.		No. of hours in which it fell.		Amount in inches.		0 A.M.		P.M.		9 h. A.M.						
	Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	No.	No.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	No.	Velocity (0-6).	Amount (0-10).	Direction.	Amount (0-10).	No.					No.	No.
1	29.604	46	29.650	44.6	32	25	46.2	20.3	26.4	25.3	32	31.3	N	1	NW	1.5	—	1	0.013								5	6	snow	1	
2	29.596	47	29.548	48.5	38.2	25	52	26.2	34	33.2	35.7	34	NW	1	NW	1	255	3	0.098								7	6		2	
3	29.416	45	29.514	45	38.3	31	71	31.4	34.5	34	33	31	SW	0.5	NW	1.5	150	1	0.005								4	5	snow, sleet, fog	aur.	
4	29.668	42	29.742	40.8	34	26	55.4	23.6	28	26.5	27.3	26	NW	1.5	NW	1.5	225	1	0.003								6	6	snow	aur.	
5	29.606	43.5	29.374	46	36.2	17.8	50	9	22	21	35.5	33	SW	1	SW	1.5	255	2	0.070								4	5	So. ha. 11-12 Am.	aur.	
6	29.198	47	29.200	48	37.9	33.2	37.2	27.3	37	34.5	37	35.2	S	3	S	3	415	14	0.710								5	5	sleet, hail	aur.	
7	29.188	50	29.384	48.5	38.5	33.6	39.9	31.6	35	34.2	37.7	37	E	3	NE	1.5	525	8	0.255								5	3	sleet, snow		
8	29.752	50	29.920	50	40	33.2	61	31.7	36	32.5	35	33	NE	1.5	NW	1	335	1	0.010								3	3	snow	aur	
9	30.094	50	30.310	48	41.8	32	64	29.3	37.3	36.3	33.3	32	NW	1	N	1	260	0	0								6	6		aur	
10	30.352	45	30.252	45	47	31	70.2	24.7	38	36.2	38.3	36.7	N	1	SW	1	155	0	0								3	6	So. ha. 11-12 Am	aur	
11	30.136	46	29.938	47	52	36	67	30	46.6	42.8	45.5	42.3	N	1	N	2	130	0	0.007								4	7		aur	
12	29.520	50	29.458	47.5	46	36.7	67.3	31.2	39.5	37	40.2	39	SW	1.5	NW	2	190	4	0.068								5	9		aur	
13	29.642	48	29.596	58	40.7	29	59	29.3	35	32.8	31	30.2	N	2	NW	2	370	4	0.080								9	7	snow, hail.	aur	
14	29.446	51	29.274	47	39	24.2	65.5	19.5	29	27	31	28.3	SW	0.5	SW	1	225	0	0								5	6	So. ha. forenoon	aur	
15	29.176	49	29.152	48	40	26	54	21.7	32	30	36.8	36	SW	1	SE	2	240	14	0.623								3	5	So. ha. forenoon		
16	29.196	49.5	29.334	51	42	35	43	33.5	39.8	39	41	40.8	SE	2	SE	2	410	2	0.006								8	4	fog		
17	29.338	49	29.358	48	41.6	38.6	42	38	40.7	39.9	41	39.3	E	2	E	1.5	285	3	0.090								5	3			
18	29.418	46	29.506	45	42.8	38.4	43.2	38.3	41.5	41	40	39.4	E	1	E	1.5	215	4	0.065								3	3	fog		
19	29.534	49	29.572	48	40.7	35.2	54.9	33	38	37	37.4	36	NE	1	NE	1	145	5	0.040								3	3	sleet, snow, hail, fog.	aur.	
20	29.564	49.5	29.588	46	40	31.8	58	29	35	34.2	33.5	32	NE	1.5	N	1	240	4	0.090								4	5	sleet, snow, hail.	aur	
21	29.606	48.5	29.684	48	35	28.8	60.5	26.5	33.2	32.4	31	30.7	NW	1.5	NW	1	230	3	0.055								6	7	snow	aur	
22	29.702	48	29.704	48.7	39	24.7	70	19.9	29	27	34	32	N	1	SW	1	200	2	0.030								6	4	snow	aur	
23	29.566	49	29.180	50	40.7	28.8	40	24.3	33.8	32.7	41	39.5	SE	2.5	S	2	150	20	0.585								3	4	sleet, snow.		
24	28.898	47	29.228	47.3	37	45	32	39	38.2	41	40.2	SE	3	NE	2	NE	2	490	9	0.175							10	4			
25	29.788	46.5	29.948	46	43.5	37.5	51.3	36.3	40	39	40.5	39.6	NE	1	E	0.5	245	1	0.008								2	2	fog - Lu. halo.		
26	29.978	49	29.884	48.5	44.2	32	46.8	26.7	40.5	40	42.7	42	S	2	S	2	70	4	0.030								2	2			
27	29.812	51.5	29.892	51	54	41	70.5	40	44	43.8	46	44.2	S	1	SW	1	280	2	0.038								2	2	fog, Lu. Ha.		
28	29.808	52	29.910	53	60	42.7	79	38.7	43	42	46	44.9	SW	1	SW	1	230	2	0.008								3	2			
29	29.848	50.4	29.682	51	53.8	42	62.5	37.3	47.5	46.8	52	50.8	SW	1	SW	2	175	3	0.055								1	2			
30	29.772	53	29.934	52.3	53.5	37.5	69	43	49	45	39.5	37.2	N	2	NW	1.5	350	0	0								8	10			
31	29.798	49.3	29.646	47.3	51	33.4	72.9	25	41.3	38.7	40.3	38.8	SW	0.5	SW	1	235	0	0								5	4	Lu. ha. 10-11 P.M.		
hms.	918.020	146.7	918.302	149.3	132.4	100.4	176.3	90.3	114.5	110.0	117.2	113.7					44.0	45.5	768.0	117.2	321.4						229	117.2			
mins.	29.61555	48.3	29.62265	48.2	42.7	32.4	57.04	29.3	36.95	35.5	37.94	36.5		1.42			1.47	25.6	38	0.103							74	38			
Total corrections for instrumental errors.	+0.011		+0.011		0	+0.7	0	0	-0.1	+0.1	0	+0.1		4.7			4.7														
Corrected means.	29.625	48.3	29.634	48.2	42.7	33.1	57.0	29.3	36.9	35.6	37.8	36.6		4.4			4.5	25.6	38	0.103											
No. of bluns.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{100}$  for Temp. (Col. 2), = 29.573  
Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\frac{1}{100}$  for Temp. (Col. 4), = 29.582  
Mean at Station, corrected, and at 32°, = 29.578  
Correction for height, 102 feet, above Mean Sea-level, = +0.111  
Mean, reduced to 32°, and Sea-level, = 29.689  
Highest Reading, corrected for Index error, on the 10 th, = 30.363  
Lowest Do., Do., on the 24 th, = 28.909  
Difference, or Monthly Range, = 1.454

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index errors), on the 28 th, = 60.0  
Lowest in Month, corrected for Index errors, on the 5 th, = 18.5  
Difference, or Monthly Range, = 41.5  
"Corrected Mean" of all the Highest, (Col. 5), = 42.7  
"Corrected Mean" of all the Lowest, (Col. 6), = 33.1  
Difference, or Mean Daily Range, = 9.6  
\*\* Calculated Mean Temperature of Month, = 37.9  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 28 th, = 79.0  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 57.0  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 5 th, = 9.0  
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 29.3  
Difference of above Means or Range ("exposed"), = 27.7

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 37.84  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 36.1  
# Computed Temperature of Dew-Point, = 34.88  
# Do. Elastic Force of Vapour, = 0.198  
# Do. Weight of Vapour in a Cubic Foot of Air, = 2.829  
# Relative Humidity, (Saturation = 100), = 89.8  
RAIN fell on 26 Days; Amount in Inches, Rose Street = 3.214  
2.66  
WIND. SUMMARY.  

Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	2	4	3	3	3	7	5	4	0	1.42	
P.M.	2	3	3	2	3	8	1	9	0	1.47	
Mean.	2	4	3	2	3	8	3	6	0	1.44	256

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

Observations made and Return verified by Alexander Beverly, assisted by George Lilly, Tutor of Grammar School.

(Signed) Alex Beverly

Greatest daily range = 17.7 on 5th

Report on Clouds & Part of Remarks by Mr. Cruickshank



WITH REMARKS ON THE USE OF INSTRUMENTS.

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cotton, which also so piles it up with water. It must be seen to be kept from the sun, and the thermometer must be placed so that the observer that the mist is always *dew* and *maka*, and that the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as fast as the mist cloth in ordinary circumstances. One form of Mason's Hygrometer is highly objectionable. The frame of the thermometer is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them by the sides so that the forementioned requirements shall be complied with, as far as possible.

*Reading of the Thermometer.*—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or *column* of mercury. The reading ought to be taken to tenths of a degree, and noted in, 40.1; or, thus: The thermometer will be read 40.0-9, 40.0-0, or 40.0-1; or again, 40.4, 40.5, or 40.6; according as it indicates a little less than, under, an exact coincidence with, or a little over 40.0; or 40.5; or 40.6, respectively. So also 40.8, and 40.9, more or less must be registered 40.2 or 40.3 or 40.7 or 40.8 respectively. In indicating Rathford's *°Max.*, *°Min.*, and *°Mm.* Thermometers, the indication of that end of the *index* which is next to the surface of the mercury or alcohol is the one noted. Dry *bulbs*, must be of the thermometer especially of the wet and dry *bulbs*, must be rapidly taken, being so very readily affected by heat from the person observing.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every observation should be furnished with a Hemispherical Cup Anemometer;—and a self-registering instrument which shows the amount of Wind

*Snow-falls* may, for convenience, be registered in the rain-gauges under the following conditions:—when a Snow-shower occurs, the gauge is to be used, and the depth of snowfall is to be noted in the "Remarks," and the depth of snowfall is to be measured in gauge. The depth of the snow must be measured in some open place where no drift has accumulated. The snow must be observed and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indicated in every column, the observer cannot be too careful to register *observations* only; and nothing that partakes of the nature of *deduction* inference.

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

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

*Shade*.—The number of hours in which objects in the sun's rays was shadowed, should be entered in the proper column.

*Underground Thermometers*.—As the germination and health of crops and plants greatly depend on the temperature of the soil, its amount and constancy,—the Council recommend that observations in this interesting department be made at 9 A.M., in thermometers placed in the earth, their bulbs being sunk to 3, 6, 12, and 22 inches, and the stems above ground, protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. Attention must be made of the geological formation and agricultural condition of the soil in which these Thermometers are placed.

*Ozone*.—Mention whether the specimen is of *Mollat's papers* and *the* paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 a.m. and 9 p.m. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus  $5\frac{1}{2}$ , as an *ozone* entry in the following schedule, will indicate that the ozone paper is fixed as  $4\frac{1}{2}$  on the scale 0—6; that the wind is from the N.W.; and that its force is  $5\frac{1}{2}$ ; i.e., that it is blowing fresh.

*Remarks*.—The 4 *Remarks* column is too narrow, but un-avoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences between seasons, and peculiarities of observation.

By the use of abbreviations, the state of the weather at 9 A.M. and 3 P.M. ought to be registered, either in two columns, otherwise unoccupied, or in two ruled off for the purpose, from that headed "Remarks." It is intended that observations by the electrometer should be entered in this manner or on the side-

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

(By Order) A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

Turnips, Potatoes, &c., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc.; and the Agricultural condition of the district generally.

MR ALEXANDER BUCHAN.

*Secretary of the Meteorological Society of Scotland.*

EDINBURGH

BOOK-POST.

Garden  
 March 1866-



## SCOTTISH METEOROLOGICAL SOCIETY.

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Observations taken at Aberedeen, County of Aberedeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.  
Height of Cistern of the Barometer above Mean Sea-level 102 feet, above Ground 4 feet. During the MONTH of April 1866.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Day of Month.
	by <u>Catella</u>		<u>Self-registering</u>				<u>No. 1</u>				<u>No. 2</u>				<u>No. 1</u>		<u>No. 2</u>		<u>No. 1</u>		<u>No. 2</u>								
	9 h. A.M.	9 h. P.M.	Max.	Min.	Max.	Min.	9 h. A.M.	9 h. P.M.	9 h. A.M.	4 h. P.M.	9 h. A.M.	4 h. P.M.	9 h. A.M.	4 h. P.M.	9 h. A.M.	4 h. P.M.	9 h. A.M.	4 h. P.M.	9 h. A.M.	4 h. P.M.	9 h. A.M.	4 h. P.M.							

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{1000}$  for Temp. (Col. 2), = 29.838  
Corrected Mean "of Barometer at 9 P.M., minus the Correction  $\frac{1}{1000}$  for Temp. (Col. 4), = 29.848  
Mean at Station, corrected, and at 32°, = 29.843  
Correction for height, 102 feet, above Mean Sea-level, = +0.110  
Mean, reduced to 32°, and Sea-level, = 29.953  
Highest Reading, corrected for Index error, on the 23d, = 30.597  
Lowest Do., Do., on the 16th, = 29.211  
Difference, or Monthly Range, = 1.386

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 22d, = 60.2  
Lowest in Month, corrected for Index errors, on the 30th, = 29.5  
Difference, or Monthly Range, = 30.7  
"Corrected Mean" of all the Highest, (Col. 5), = 48.8  
"Corrected Mean" of all the Lowest, (Col. 6), = 37.3  
Difference, or Mean Daily Range, = 11.5  
\* Calculated Mean Temperature of Month, = 43.1  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 25th, = 75.3  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 64.5  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 30th, = 21.0  
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 33.2  
Difference of above Means or Range ("exposed"), = 31.3

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 42.9  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 41.1  
Computed Temperature of Dew-Point, = 38.9  
Do. Elastic Force of Vapour, = 0.237  
Do. Weight of Vapour in a Cubic Foot of Air, = 2.74  
Relative Humidity, (Saturation = 100), = 85.6  
RAIN fell on 18 Days; Amount in Inches, = 1.621

WIND.											
Direction	N	NE	E	SE	S	SW	W	NW	Variable	Mean Force	Mean Velocity in miles per day
A.M.	5	5	2	4	3	5	-	6	0	1.52	
P.M.	3	8	-	6	6	4	-	3	0	1.52	
Mean	4	7	1	5	4	4	0	5	0	1.52	203

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

Observations made and Return verified by Alex. Beverly collected by George Lilly 2nd year, Grammar School, Aberdeen

(Signed) M.S.

Sum of daily ranges = 23.4 on the 21st



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

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

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

*Barometer.—Weather glasses, and Aneroids*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations without being supplied with such means of *adjustment or compensation* as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

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

An excellent Barometer is constructed by Mr A. de London, the use of which is attended with the great convenience of requiring no adjustment of the stem. 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 stem. This form of instrument has been adopted by the Board of Trade. This form of instrument has been adopted by the Board of Trade. This form of instrument has been adopted by the Board of Trade.

In another form of the Barometer, the sides of the *cisterna* are of leather, and thus by the use of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and eye of the stem. 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 no exact height from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error will vitiate the readings from the *zenith*.

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

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

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

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

**Self-Regulating Thermometers**—Professor Phillips, and Messrs. Gifford and Zambra's Patent "**Maximum**" Thermometers are the only instruments of their use may be obtained in which, instead of printed divisions for the scale, the scale is marked by the instrument. The "**Maximum**" Thermometer of Gifford is recommended when graduated on the glass stem or on a separate scale, and is called the "**Maximum**" Thermometer; it is liable to two demerits, both of which must be guarded against, and may be easily remedied by an observer. First, the column of liquid is liable to be re-acted by striking the instrument repeatedly against the palm of the hand; when this occurs, the spirit diserts by high temperature, it will be found in the upper globe, and must be dislodged from thence by heating the lower globe with a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments are in use in the form of a thermometer, and are hung horizontally.

The above remarks apply equally to the Thermometers for

The nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from a greater or less obscuration of the sky *at zenith* (*z.*), within an angle of 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 appearances and changes ought to be noticed among 10 to 15 clouds, where the sky *amounts to half* obscured. If the amount of cloud is entered in the *clouds* column, 5 is entered in the *obs.* column, and at sunset Observations of clouds are made at 4 or 5 o'clock.

as illustrating the condition and currents of the tropical and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column “Velocity and Direction,”  $\frac{2}{3} W$  (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W. and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second “Cloud” 4. st.

column, an entry of  $\frac{1}{2}$ , (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

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

*Underground Thermometers*.—As the germination and health of crops and plants greatly depend on the temperature of the soil, its amount and consistency—the Council recommend that observations in this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to 8, 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 toward the bulbs by the stems or wooden frames. Mention must be made of the geological formation and agricultural condition of the soil in which these Thermometers are placed.

*Temperature of the Sea.*—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of the island, a very important branch of Meteorology. The Council therefore recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At, or near the time of high water, on the 26th, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

*Ozone.*—Mention whether Schönbien's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner: thus, *g.w.*, as an *ozone* entry in the schedule, will indicate that the ozone paper is tinted as "g" on the scale, that the wind is from the N.W., and that its force on the scale 0 to 10 is "4.7," that it is *blowing fresh*.

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

*Remarks.*—The *Remarks* column is too narrow, but unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Green-

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, &c. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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

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

(by Order)  
 25. 10.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

It is not necessary to state any more than that the Government may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, Fruits, etc., whether plentiful or in perfection; whether any have suffered from blight, disease, etc. Whether Epizootic disease prevails among cattle; and the Agricultural condition of the district generally.

BOOK-POST.

MR ALEXANDER BUCHAN.

*Secretary of the Meteorological Society of Scotland.*

EDINBURGH.





## SCOTTISH METEOROLOGICAL SOCIETY.

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Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.  
Height of Cistern of the Barometer above Mean Sea-level 102 feet, above Ground 4 feet.

During the MONTH of May 1866

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.	
	By Cistern.		In Shade.		In Sun.		Dry bulb.		Wet bulb.		Direction.		Force.		Amount.		Amount.		Amount.		9 h. A.M.									
	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.	No. 511	Barometer.								
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.								
1	29.830	47	29.720	48	46.4	28.6	62.9	19.3	39.3	54.7	38	36.2	h E	1	h E	1.5	100	3	0.045											
2	29.608	50.5	29.512	48.4	47.6	34.9	62	30.9	42	58.5	39.1	36.8	h E	2	h E	1.5	215	2	0.049											
3	29.380	50	29.506	49.5	48	34	67	31	41	38.8	39	37.8	h W	2	h W	1	300	0	0											
4	29.602	49	29.762	50	48.5	31.5	68	24.9	43	39	41.5	39.8	h W	1	SE	1.5	190	3	0.070											
5	29.738	48	29.914	49.3	57.8	36	74	29	48.5	45.8	48.2	46.2	SW	1.5	S	1	185	1	0.015											
6	30.086	48.5	30.110	49	53	40	73.3	32.3	50	45	47.5	46.8	h W	1	SW	1	125	1 1/2	0.040											
7	30.052	49	29.902	51	61.8	40	76.3	33	54	49	52	47.5	h W	1.5	SW	1.5	170	0	0											
8	29.726	51	29.600	60	59.4	46.7	70	42	53	50	51	50	h W	1.5	SW	1.5	205	3	0.080											
9	29.388	52.8	29.442	52.8	59	45.4	75	39.5	55	50	50	46	h W	2	h W	2	185	1	0.017											
10	29.668	51.8	29.726	51.5	52.2	39.9	66	37.3	47	44.2	44	43.8	h W	1	SE	1	245	7	0.240											
11	29.466	53.5	29.422	52	45.6	41	59	39	45.5	45	43	42	SE	2	h E	2	120	18	0.600											
12	29.648	50.5	29.872	49.7	49.5	39.8	65.7	36.3	46	43	43	40.5	h W	3	h W	3	330	1	0.015											
13	29.972	49	30.062	48.5	47.8	37.2	60	33.3	46.2	41	42	39.7	h W	2	h E	1.5	315	2	0.047											
14	30.142	51	30.228	49	45.8	37	54	33.9	43	40	40.5	38	h W	1.5	h W	1.5	235	0	0.003											
15	30.326	52	30.392	51	48	37.5	55	34.9	46	41	42.5	40.5	h W	1	h E	1	225	0	0											
16	30.356	52	30.264	51	51	32.2	63.7	26	45.5	42	45.5	43.5	h W	1.5	S	2	185	0	0											
17	30.170	53	30.098	53.5	56.9	42.7	75.7	38	49	47.5	49	46	SE	1	S	2	225	0	0											
18	30.060	52	30.064	52.3	61.7	40.7	74	32.3	53	50	52	49	S	1	S	1	140	0	0											
19	30.078	52	30.178	53	63	39.3	76	30.3	54	51.7	53	48	S	1	S	2.5	125	0	0											
20	30.304	52.5	30.424	53.6	58.3	42	71	31.5	52.3	50	48.5	47	SE	1.5	S	2	195	0	0											
21	30.510	53	30.510	52.5	58	41	71.9	31	52.5	49.5	49	47.5	S	2	S	1.5	190	0	0.010											
22	30.454	52.5	30.308	55	62	40.2	82.2	32.5	52.5	48.3	52	47.6	S	1.5	h W	2	200	0	0											
23	30.152	54	30.092	55.3	64	40	86.7	28.3	60	53	48	46.8	h W	1.5	h E	1	210	0	0											
24	30.072	53	30.080	55.3	58.3	38.5	75.9	29.3	50	48	48	46	SE	1	SE	1	105	0	0											
25	30.014	54	29.904	56	61.5	39	77.1	28.3	53	48.5	48	46	SE	1	SE	1.5	150	0	0											
26	29.790	53	29.714	55	59.5	36.9	80	24	52.5	48.8	50	48.6	h W	1	S	1	140	0	0											
27	29.560	54	29.596	54.5	60.5	34.8	76.7	29	54.8	50	47	42.5	SE	0.5	SE	1.5	150	0	0											
28	29.634	52.5	29.642	54	57.6	36	74.7	27	52	45.3	44.7	43.8	h W	1	h W	1.5	205	7	0.305											
29	29.642	51	29.838	54	52.8	35.5	75.7	25	47	42.7	43	41	h W	1	h W	1.5	140	1	0.179											
30	29.806	52.5	29.918	53.6	54.3	37	75.2	27	49	44.4	46.5	44	h W	1.5	h E	1	150	0	0.010											
31	29.974	53	30.008	55	55.1	43.5	71.3	37	50.3	48	48	45	E	1.5	SE	1	125	0	0.003											
MEANS.	29.7208	159.74	29.7808	162.33	169.99	119.14	2196.9	973.1	1542.9	1412.7	1433.5	1363.6		43.5		46.0	56.50	524	1719											
MEANS.	29.9099	51.5	29.929	52.4	54.84	38.43	70.87	31.4	49.77	45.57	46.24	43.99		1.40		1.5	182.2	17	0.055											
Total corrections for instrumental errors.	+0.011	-	+0.011	-	0	+0.7	0	0	-0.1	-0.1	-0.1	-0.1																		
Corrected means.	29.921	51.5	29.940	52.4	54.8	39.1	70.9	31.4	49.745	45.5	46.1	43.9		1.4		1.5	182.2	17	0.055											
No. of column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\frac{1}{100}$  for Temp. (Col. 2), = 29.859  
Corrected Mean " of Barometer at 9 P.M., minus the Correction  $\frac{1}{100}$  for Temp. (Col. 4), = 29.876  
Mean at Station, corrected, and at 32°, = 29.868  
Correction for height, 102 feet, above Mean Sea-level, = +0.010  
Mean, reduced to 32°, and Sea-level, = 29.978  
Highest Reading, corrected for Index error, on the 21<sup>st</sup>, = 30.522  
Lowest Do., Do., on the 3<sup>rd</sup>, = 29.391  
Difference, or Monthly Range, = 1.131

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 23<sup>rd</sup>, = 64.0  
Lowest in Month, corrected for Index errors, on the 1<sup>st</sup>, = 29.3  
Difference, or Monthly Range, = 34.7  
"Corrected Mean" of all the Highest, (Col. 5), = 54.8  
"Corrected Mean" of all the Lowest, (Col. 6), = 39.1  
Difference, or Mean Daily Range, = 15.7  
\*\* Calculated Mean Temperature of Month, = 47.0  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 23<sup>rd</sup>, = 86.7  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 70.9  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1<sup>st</sup>, = 19.3  
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 31.4  
Difference of above Means or Range ("exposed"), = 39.5

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 47.9  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 44.7  
# Computed Temperature of Dew-Point, = 41.2  
# Do. Elastic Force of Vapour, = 0.259  
# Do. Weight of Vapour in a Cubic Foot of Air, = 3.02  
# Relative Humidity, (Saturation = 100), = 78.5  
RAIN fell on 17 Days; Amount in Inches, Rose Sheet = 1.72  
1.58

WIND.											
Direction	N	NE	E	SE	S	SW	W	NW	Calm	Mean Force.	Mean Velocity in Miles per Hr.
A.M.	3	2	1	6	5	5	2	7	0	1.40	
P.M.	3	7	0	6	8	4	0	3	0	1.48	
Mean.	3	4	1	6	6	5	1	5	0	1.44	52.2

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

Observations made and  
Return verified by Alexander Beverly assisted by  
George Kelly, Sanitor of Grammar  
School

(Signed) Alex Beverly

\* Correction for Barometer  
at 30.5 inches is +0.012

23.3 on the 23<sup>rd</sup>  
Greatest daily range = 23.3 on the 23<sup>rd</sup>







## SCOTTISH METEOROLOGICAL SOCIETY.

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Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.Height of Cistern of the Barometer above Mean Sea-level 102 feet, above Ground 4 feet.During the MONTH of June 18 66.

The Hours of Observation are of Greenwich Time.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction  $\pm$  for Temp. (Col. 2), = 29.790  
Corrected Mean" of Barometer at 9 P.M., minus the Correction  $\pm$  for Temp. (Col. 4), = 29.786  
Mean at Station, corrected, and at 32°, = 29.788  
Correction for height, 102 feet, above Mean Sea-level, = +0.168  
Mean, reduced to 32°, and Sea-level, = 29.896 900  
Highest Reading, corrected for Index error, on the 24 th, = 30.233  
Lowest Do., Do., on the 18 th, = 29.287  
Difference, or Monthly Range, = 0.946

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 10 th, = 75.0  
Lowest in Month, corrected for Index errors, on the 19 th, = 34.7  
Difference, or Monthly Range, = 40.3  
"Corrected Mean" of all the Highest, (Col. 5), = 63.3  
"Corrected Mean" of all the Lowest, (Col. 6), = 48.2  
Difference, or Mean Daily Range, = 15.1  
\*\* Calculated Mean Temperature of Month, = 55.8

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 23 th, = 97.4  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 79.7  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 19 th, = 24.0  
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 41.5  
Difference of above Means or Range ("exposed"), = 38.2

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 56.0

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 53.2

Computed Temperature of Dew-Point, = 50.6

Do. Elastic Force of Vapour, = 0.370

Do. Weight of Vapour in a Cubic Foot of Air, = 4.16

Relative Humidity, (Saturation = 100), = 82.8

RAIN fell on 16 Days; Amount in Inches, = 1.453  
Rose Clear = 1.29

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Variable.	Mean Force.
A.M.		1	4	3	4	6	6	1	5	0	1.2
P.M.		1	4	2	6	8	6	1	1	1	1.4
Mean.		1	4	2	5	7	6	1	3	1	1.30

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

Observations made and Return verified by Alexander Beverly, assisted by George Sellar  
Janitor of Grammar School Aberdeen

(Signed) A.B.

Greatest daily range = 27.5 on the 10<sup>th</sup>

Blows & part of Remarks by Mr. Cruickshank



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

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

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

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

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

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

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

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

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

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

The above remarks apply equally to the Thermometers for

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

**Verification of Thermometers.**—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers as are graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the scale, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "Maximum" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing-point of each Thermometer (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers a properly tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

The Hygrometer consists of two Thermometers usually, but not necessarily mounted on one frame. As apparently slight deviations from the approved and *mathematical form* of the apparatus, as seriously vitiate the "Hygrometrical Deductions." Observers are specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch free from the scales and frame to which they are attached; the water-cup must be so such as will bring the tubes forward by an inch, from any board on which it may be suspended; and a little below the level of the water-cup must be a vertical plate, which will support the tubes in their upright position, and which also supplies it with water. It must be seen to, by the observer that the sun is always *clean and moist*, and that the delivery pipe, and must be made with great care. The tube must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of oil thus formed, evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of Messrs.' Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supplies the water-cup underneath. This arrangement must be immediately altered by pulling the boxwood frame off the tin case, and hanging them side by side, so that the fore-and-aft requirements shall be complied with, as far as possible.

**Reading of the Thermometer.**—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39.3, 40.0, or 40.1; or again, 40.4, 40.3, or 40.6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40½°, respectively. So also 40½°, and 40½°, more or less must be registered 40.2 or 40.3 and 40.7 or 40.8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

Wind.—A wind-vane ought to be elevated 12 feet at least above surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc. Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every observatory be furnished with a *Hemispherical Cup Anemometer*—a self-registering instrument which shows the amount of Wind that passes in per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Lind's Anemometer is also recommended; the method of *Estimating Wind Force* by such tables as that given in the schedule is, to say the least, unsatisfactory.

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

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

**Clouds.**—Convenient abbreviations for Luke Howard's nature of delusion or inference.

The temperature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less observation of the sky on *cloud* (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, it ought not to take them into account in the *clouds column*, though their appearance and changes ought to be noted among the "Remarks." The amount of cloud is entered on a scale of 0 to 10; thus, when the sky overhead is half covered by clouds, 5 is entered as the observation, and so on.

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

upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of 2-2-5, (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-fifths by lower forms of the *variable-stratus* kind.

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

**Temperature of the Sea.**—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our islands, a very important branch of Meteorology. The Council therefore recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by tidal or river water. At or near the time of high water, on the 21st, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

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

**Electricity.**—Too much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial magnetism, and as a meteorological phenomenon. A proper Electrometer is necessary to every complete meteorological observatory. The "Tewkes" column is too narrow, but unavoidable. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich, and Southampton, are given at the foot of the column.

Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns, otherwise unoccupied, or in two full off for the purpose, from that headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner or on the side-margin. Additional remarks may be made on the margin. **Observations** in connection with the periodic return of the seasons, possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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

(By Order) A. B.

Secretary, 21st December 1866.

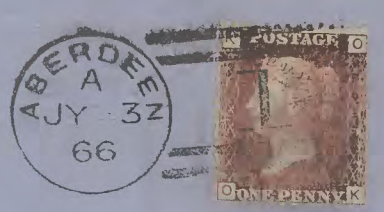
BOOK-POST.



Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.



Aberdeen  
June 1866

Have the goodness also to state any information you may be able to collect from blight disease, etc. Whether Potatoes, Turnips, Earths, etc., whether plentifully or in perfection; and the Agricultural condition of the district generally.

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit.	First in Maturity.	First in Harvest.
Barberry, . . . . .	Apple, . . . . .				
Bouquet or Elder, . . . . .	Black Currant, . . . . .				
Broom, . . . . .	Cherry, . . . . .				
Hazel, . . . . .	Gooseberry, . . . . .				
Hawthorn, . . . . .	Peach, . . . . .				
Laburnum, . . . . .	Plum, . . . . .				
Mezereum, . . . . .	Strawberry, . . . . .				
Mountain Ash or Rowan, . . . . .					
Red Flowering Currant, . . . . .					
Rhododendron Ponticum, . . . . .					
Whin, . . . . .					

FOREST TREES.	In Flower.	In Leaf.	In Fruit.	In Harvest.	First Cut.
Alder, . . . . .					
Beech, . . . . .					
Birch, . . . . .					
Elm, . . . . .					
Larch, . . . . .					
Line, . . . . .					
Oak, . . . . .					
Sycamore or Plane, . . . . .					

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

GROUPS.	Planted or sown in early spring.	Planted or sown in late spring.	Planted or sown in summer.	Planted or sown in autumn.	Planted or sown in winter.
Barley, . . . . .					
Beet or Bigg, . . . . .					
Oats, . . . . .					
Wheat, . . . . .					
Beans, . . . . .					
Peas, . . . . .					
Potatoes, . . . . .					
Turnips, . . . . .					
Root Cress, . . . . .					



## SCOTTISH METEOROLOGICAL SOCIETY.

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Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.Height of Cistern of the Barometer above Mean Sea-level 101.5 feet, above Ground 4 feet.During the MONTH of July 1866.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. _____				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.				SEA.	OZONE.  Sch. 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 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.		9 h. A.M.		4 h. P.M.		Readings of the T.Cup Anemometer No. _____ 8 h. A.M.		No. of hours in which it fell.		Amount in inches.		9 h. A.M.		P.M.							SUNSHINE.  Hours.		9 h. A.M.		P.M.																																																																																																																																																																																																																																		
	Barometer. * No. _____	Attached Thermometer No. _____	Barometer. No. _____	Attached Thermometer 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. No. _____	Force No. _____	Direction. No. _____	Force No. _____	Amount, (0-10), and Species. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____						Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. No. _____	Amount, (0-10), and Species. No. _____	Direction. 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Barometer, "corrected Mean" at 9 A.M., minus the Correction  $\pm$  for Temp. (Col. 2), = 29.774  
Corrected Mean " of Barometer at 9 P.M., minus the Correction  $\pm$  for Temp. (Col. 4), = 29.809  
Mean at Station, corrected, and at 32°, = 29.792  
Correction for height, 102 feet, above Mean Sea-level, = +0.108  
Mean, reduced to 32°, and Sea-level, = 29.904  
Highest Reading, corrected for Index error, on the 16th, = 30.229  
Lowest Do., Do., on the 3rd, = 29.073  
Difference, or Monthly Range, = 1.166

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 11th, = 78.2  
Lowest in Month, corrected for Index errors, on the 5th, = 41.7  
Difference, or Monthly Range, = 36.5  
Corrected Mean " of all the Highest, (Col. 5), = 63.2  
Corrected Mean " of all the Lowest, (Col. 6), = 49.5  
Difference, or Mean Daily Range, = 13.7  
Calculated Mean Temperature of Month, = 56.4

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index errors), on the 11th, = 105.0  
Corrected Mean " of all the Highest, (Col. 5), = 78.8  
Lowest at Night, (Col. 6), = 27.9  
Corrected Mean " of all the Lowest, (Col. 6), = 40.8  
Difference, or Mean Daily Range, = 38.0

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 55.7  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 53.4  
Computed Temperature of Dew-Point, = 51.2  
Do. Elastic Force of Vapour, = 0.379  
Do. Weight of Vapour in a Cubic Foot of Air, = 4.25  
Relative Humidity, (Saturation = 100), = 85.486  
RAIN fell on 19 Days; Amount in Inches, = 3.487

WIND.		SUNSHINE.		THERMOMETERS.		SEA.		OZONE.		GENERAL REMARKS.	
Direction	No.	Hours	No.	No.	No.	No.	No.	No.	No.	No.	No.
A.M.	8	2	3	0	2	4	1	8	3	1.2	2.8
P.M.	11	3	0	6	0	5	2	4	0	1.60	1.60
Mean.	9	2	2	3	1	4	2	6	2	1.40	1.69

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

Observations made and Return verified by Mr. Beverly assisted by George Lolly, Jani  
for Grammar School Aberdeen

(Signed) M.B.

Greatest daily range = 26.2 on the 11th







The Hours of Observation are of Greenwich Time.

WIND.	SUMMARY.										Mean Force.	Mean Velocity in miles per day
	Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.		
A.M.	2	1	2	5	8	2	1	9	1	1.5 <sup>54</sup>		
P.M.	2	2	1	11	6	2	1	6	0	1.8 <sup>31</sup>		
Mean.	2	1	2	8	7	2	1	7	1	1.34	195	

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the “Principal Towns” should be in Edinburgh not later than the 31<sup>st</sup>; those from Other Places, not later if possible than the 6<sup>th</sup>. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and  
Return verified by { Alex Beverly assisted by George Lolly, Sanctor  
of Grammar School Aberdeen

(Signed) Alex Beverly

Greatest daily range =  $20.0^{\circ}$  on the 31<sup>st</sup>







SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 4' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.

Height of Cistern of the Barometer above Mean Sea-level 101.5 feet, above Ground 4 feet.

During the MONTH of September 1866.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.	CLOUDS.		THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
		by <u>Catella</u>		Read daily, at 9 P.M.				No. ....				No. ....					No. ....		No. ....																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		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.			4 h. P.M.		Readings of the H-Cup Anemometer.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		Barometer. No. 511	Attached Thermometer	Barometer. No. 511	Attached Thermometer	Max. No.	Min. No.	Max. No.	Min. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.		Direction.	Force.	8 h. A.M.	9 h. P.M.	No. 3 inches.					No. 19 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 29.522 438  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 29.453  
Mean at Station, corrected, and at 32°, = 29.463 446  
Correction for Height, 101.5 feet, above Mean Sea-level, = +0.109 112  
Mean, reduced to 32°, and Sea-level, = 29.572 558  
Highest Reading, corrected for Index error, on the 30 th, = 30.207  
Lowest Do., Do., on the 21 st, = 28.991  
Difference, or Monthly Range, = 1.216

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 1 st, = 63.0  
Lowest in Month, corrected for Index errors, on the 4 th, = 34.7  
Difference, or Monthly Range, = 28.3  
"Corrected Mean" of all the Highest, (Col. 5), = 57.0  
"Corrected Mean" of all the Lowest, (Col. 6), = 44.7  
Difference, or Mean Daily Range, = 12.3  
\*\* Calculated Mean Temperature of Month, = 50.9  
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 6 th, = 96.5  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 76.6  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 4 th, = 23.5  
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 36.3  
Difference of above Means or Range ("exposed"), = 40.3

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 50.8  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 49.0  
Computed Temperature of Dew-point, = 48.2  
Do. Elastic Force of Vapour, = 0.338  
Do. Weight of Vapour in a Cubic Foot of Air, = 3.379  
Relative Humidity, (Saturation = 100), = 91  
RAIN fell on 22 Days; Amount in Inches, = 2.991  
Rose Street 2.810

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		1	0	1	4	4	11	2	5	7	1.20
P.M.		1	1	0	7	9	5	3	3	1	1.12
Mean.		1	1	1	5	7	8	2	4	1	1.16

1.16 = 1.35 lb

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gimmied or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by Alexander Beverly, Assisted by George John, Janitor, Grammar School, Aberdeen

(Signed) Alex Beverly

greatest daily range = 21.6 on the 24th



Sept 1866

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

Observations of the conditions are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction,"  $26\frac{1}{2}$  W.S.W. (for example) will indicate that the *upper* strata of clouds travel with *westerly* velocity from S.W. and thence in the lower regions from W.S.W. with one-third the (*average*) speed of the former. Again, in the second "Cloud" column, an entry of  $\frac{2}{3}$  *strata*, (*i.e.*,  $\frac{2}{3}$  of the sky) 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.

the soil, its abundance and constancy; the Council remarked that observations in this interesting department be made at 9 A.M. by thermometers placed in the earth, their bulbs being sunk to 8, 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 wood-crofters. Mention must be made of the geological formation, and the general condition of the soil in which these thermometers are placed.

*Temperature of the Sea.*—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks toward the coast, where it is not influenced by that of the river water. At or near the time of high water, on the 5th, 15th, 20th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes are elapsed,

the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of the river water. At or near the time of high water, on the 5th, 15th, 25th, and 26th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, nothing always the temperature of the air and the hour of observation; and continuing to observe for particular depths.

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

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

ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

By the use of abbreviations, the state of the weather at 9 A.M.

The Council recommend that *ten-day* observations be taken; viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

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

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

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

(By Order,) A. B.

EDINBURGH, 17th July 1861.

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

FOREST TREES.		SHRUBS, ETC.		FRUITS.		MIGRATORY BIRDS.		OTHER BIRDS, naming them.	
In Flower.	In first appear.	In Leaf.	Divided or Leaves.	CRUFS mentioning variety.	Sowing or planting.	Apparing or above ground.	In Ear	First Cut	
Alder,				Barley,			Cuckoo,		
Asch,				Bore or Hyge,			Cartw,		
Beech,				Oats,			House-Swallow,		
Birch,				Wheat,			Lapwing,		
Elm,				Beans,			Plover,		
Larch,				Pease,			Sand-Martin,		
Lime,				Potatoes,			Starling,		
Oak,				Turnips,			Swan,		
Sycamore or Plane,				Rye Grass,			Rail or Corn Crane,		
							Other Birds, naming them.		

FOREST TREES.		SHRUBS, ETC.		FRUITS.		MIGRATORY BIRDS.		OTHER BIRDS, naming them.	
In Flower.	In first appear.	In Leaf.	Divided or Leaves.	CRUFS mentioning variety.	Sowing or planting.	Apparing or above ground.	In Ear	First Cut	
Alder,				Barley,			Cuckoo,		
Asch,				Bore or Hyge,			Cartw,		
Beech,				Oats,			House-Swallow,		
Birch,				Wheat,			Lapwing,		
Elm,				Beans,			Plover,		
Larch,				Pease,			Sand-Martin,		
Lime,				Potatoes,			Starling,		
Oak,				Turnips,			Swan,		
Sycamore or Plane,				Rye Grass,			Rail or Corn Crane,		
							Other Birds, naming them.		

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

BOOK-POST.

Mr ALEXANDER BUCHAN.

*Secretary of the Meteorological Society of Scotland.*

10, *St Andrew Square,*

EDINBURGH.

A circular postmark from Berdeed, AZ, dated Aug 22, 1966. To the right of the circle is a large, bold number '1' and the text 'ONE PENNY!' below it. The background is a textured, aged paper.

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EDINBURGH  
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# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.

Height of Cistern of the Barometer above Mean Sea-level 101.5 feet, above Ground 4 feet.

During the MONTH of October 1866.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER. by <i>Casella</i> .				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE. 0-10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc.  <i>Mention the hour at which Storms 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.		9 h. A.M.		4 h. P.M.		No. of hours in which it fell.	Amount in inches.	A.M.		P.M.		No. 3 inches.	No. 12 inches.	No. 22 inches.						
		Barometer. No. <i>511</i>	Attached Thermometer.	Barometer. No. <i>511</i>	Attached Thermometer.	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.			No. of hours in which it fell.	Amount in inches.	Velocity (A-5), and Direction.	Amount (A-5), and Species.								Velocity (A-5), and Direction.	Amount (A-5), and Species.
1		30.238	53	30.164	53.6	56.4	40.4	88.2	34	48	47.6	53.5	53.4	ba	0.5	72	1	50	3	0.015								evening	1			
2		30.114	53.7	30.166	54	52	50	55	48.2	51.6	51.5	53	53	E	0.5	E	0.5	100	6	0.033								fog & lightning, evening	2			
3		30.154	54	30.122	54	55.7	51	55.8	49.5	52	53.8	52.6	52.5	SE	0.5	SE	0.5	70	18	0.024								fog all day	3			
4		30.152	54	30.190	54.1	55	51	56.2	49.9	52.6	52.4	52.8	52.5	SE	0.5	SE	0.5	95	6	0.007								fog all day	4			
5		30.320	54	30.430	56.8	56.5	50.5	57	48.9	53	52.5	53	52.7	W	0.5	W	0.5	50	0	0								fog	5			
6		30.444	55	30.392	55	58.7	46.3	92	40	51.9	51.4	51.5	50.6	SW	0.5	S	0.5	65	0	0										6		
7		30.330	54	30.356	54.3	64.2	40.2	98.8	33	49	48.5	48.4	47.6	SW	0.5	W	0.5	165	0	0										7		
8		30.378	53	30.402	54	57.8	41.3	94	33.8	49	48	53.9	53	SW	0.5	SE	0.5	110	0	0									aur. evening	8		
9		30.328	53.8	30.252	54	57.2	45	57	41	51.8	51	46.5	45.8	SE	0.5	S	1	60	0	0									fog evening	9		
10		30.202	52.5	30.166	54.6	55	38.8	63.6	32	45	44.7	49	48.3	SW	0.5	SW	0.5	165	0	0									aurora 10 p.m.	10		
11		30.160	52.5	30.106	55	54	47	57.4	41.6	50.1	49.7	50.2	49.6	W	0.5	S	1	25	3	0.105										11		
12		29.984	55	29.844	55.3	54.5	46	75	42.3	48.7	48.2	50	48	S	0.5	SW	1	70	5	0.137									fog all day	12		
13		29.770	53	29.884	53	50	37	59.5	41	45	44	43.5	42.2	W	0.5	SW	0.5	145	3	0.025									fog, morning	13		
14		29.948	48	30.010	49.5	47	35	70	26.2	42.5	40.5	40	38.8	W	1	W	1	145	0	0.003									fog, morning	14		
15		29.914	49	30.408	50	50.8	36	79	30	44	42	43.1	42.5	W	1	W	1.5	195	1	0.005									aur. 9 p.m.	15		
16		30.158	49.2	30.148	52	47.2	33.8	74.2	28	39	38.4	47	45.2	W	0.5	SE	1	120	4	0.068											16	
17		30.052	52.5	30.002	53.5	52.5	45	60	42.5	50.1	48.2	51.2	48.9	SE	2	SE	2	215	0	0											17	
18		29.962	54	29.896	54	55	49	67	48.2	51.4	49.4	52.3	51	SE	2	SE	2	535	8	0.393												18
19		29.876	53	29.904	53	54.2	50	56.8	47	51.5	51.5	52	54	SE	2	S	1.5	475	0	0.003											19	
20		30.082	54	30.122	53.8	56.5	48.4	75	41.4	53.5	53.3	53.4	53.2	S	1	S	0.5	280	4	0.190										fog till afternoon	20	
21		30.008	53.6	29.852	53.5	53.2	50.5	56.4	44.5	52.5	52.4	53.1	53	SE	1	SE	1	210	6	0.078												21
22		29.760	56	29.820	56	55.6	49.5	56.3	49.7	55.3	55.2	57	50.4	S	1	W	1	135	3	0.015											fog all day	22
23		29.922	56	29.832	55	53.9	43	80	33.2	46	45.2	50	49.5	W	0.5	SW	1	105	4	0.125												23
24		29.562	56	29.548	65	52.1	45	52.9	40.4	52	51.8	46	44.9	SE	1.5	S	1	205	3	0.138												24
25		29.682	54	29.838	54.5	46.7	35	62.2	29.4	39	38.6	42	41	SW	0.5	W	0.5	205	0	0												25
26		29.904	52	29.832	54	48	35.3	82.5	29.6	38.8	37.8	46	44.8	SW	0.5	S	0.5	90	3	0.035												26
27		29.784	52.5	29.626	52	61	42.3	53	38.2	48	47.8	50	50	S	1	S	1	220	6	0.115												27
28		29.800	50.8	30.032	50	53.8	39.2	67.3	38.2	46	42.8	42	39.5	W	2.5	W	1	290	0	0											fog all day	28
29		29.788	49.8	29.650	49.6	52.3	38.8	68.4	34	45	43.5	47	46.6	SW	1.5	SW	1	390	10	0.390												29
30		29.420	49	29.752	48.4	47	39	66.5	40.3	43.2	43	40.6	38.5	W	1	W	1.5	220	1	0.008												30
31		29.850	48	29.632	47	45.6	33	52.8	31	42	39.4	45.6	45.6	W	1	W	0.5	235	7	0.435												31
Sums.		30.086	43.9	30.010	43.9	43.9	33.2	52.8	31	42	39.4	45.6	45.6	W	1	W	0.5	235	7	0.435												
Means.		30.086	43.9	30.010	43.9	43.9	33.2	52.8	31	42	39.4	45.6	45.6	W	1	W	0.5	235	7	0.435												
Total Corrections for Instrumental Errors.		+0.011		+0.011		0	+0.7	0	0	-0.1	-0.1	-0.1	-0.1																			
Corrected Means.		30.014	52.9	30.017	53.9	53.2	43.7	67.4	38.9	47.9	47.1	48.7	47.9	0.9	0.9	176																
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 29.948

"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 29.949

Mean at Station, corrected, and at 32°, = 29.948

Correction for Height, 101.5 feet, above Mean Sea-level, = +0.112

Mean, reduced to 32°, and Sea-level, = 30.060

Highest Reading, corrected for Index error, on the 6 th, = 30.455

Lowest Do., Do., on the 30 th, = 29.431

Difference, or Monthly Range, = 1.024

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 7 th, = 64.2

Lowest in Month, corrected for Index errors, on the 31 st, = 33.7

Difference, or Monthly Range, = 30.5

"Corrected Mean" of all the Highest, (Col. 5), = 53.2

"Corrected Mean" of all the Lowest, (Col. 6), = 43.7

Difference, or Mean Daily Range, = 9.5

\*\* Calculated Mean Temperature of Month, = 48.5

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 7 th, = 98.8

"Corrected Mean," Bulb, Max. in Sun, = 67.4

Lowest at Night, Bulb, Min. on grass, = 26.2

"Corrected Mean," Bulb, Min. on grass, = 38.9

Difference of above Mean, = 20.5

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 48.3

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 47.5

Computed Temperature of Dew-point, = 46.6

Do. Elastic Force of Vapour, = 0.319

Do. Weight of Vapour in a Cubic Foot of Air, = 3.59

Relative Humidity, (Saturation = 100), = 94.4

RAIN fell on 22 Days; Amount in Inches, = 2.647

at Koro Street = 2.720

WIND, SUMMARY.

Direction. N NE E SE S SW W NW Calm or Variable. Mean Force. Mean Velocity in miles per day.

A.M. 1 1 1 8 4 7 4 4 1 0.90

P.M. 3 2 1 7 8 4 1 5 0 0.90

Mean. 2 2 1 7 6 5 3 4 1 0.90 176

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by Alex. Newbery, assisted by George Lally, Janitor, Grammar School, Aberdeen.

(Signed) Alex. Newbery

Greatest daily range = 23.3 on 7 th



INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

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

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

**The Hygrometer** consists of two Thermometers usually, but not necessarily, mounted on one frame. As applied to slight deviations from the approved and *well-tested* form of apparatus, it seriously vitiate the "Hygrometrical Deductions," and observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb,—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by a cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

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

**Reading of the Thermometer.**—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read 39.9, 40.0, or 40.1; or 40.3, 40.4, 40.5, or 40.6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40.1, 40.2, 40.3, 40.4, or 40.5, more or less, must be registered. So also 40.4, and 40.7 or 40.8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 6 S.W. (for example) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again in the second "Cloud" column, an entry of 2, 4, 5, 6, 7, 8, 9, 10, will indicate that the higher regions are covered to the "amount" of 4-fifths with *stratus* clouds; and that the sky is further obscured to the extent of 2-thirds by lower clouds of the *cumulo-stratus* kind.

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

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

**Temperature of the Sea.**—A knowledge of the temperature of the sea is not only in itself, but in its relation to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At or near the time of high water, on the 3d, 15th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra set observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

**Ozone.**—Mention whether Schönbein's or Moffat's papers are used—Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3 S. as an ozone entry in the schedule, will indicate that the ozone paper is tinted as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0-6 is 4.1; i.e., that it is *blowing fresh*.

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

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

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

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

The Council recommend that *two-day* observations be taken; viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

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

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

(By Order.) A. B.

Anderson  
Oct/1866

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	In leaf.	Diseased leaves.	CROPS.	Sowing or planting.	Above ground.	In flower or fruit.	First cut or raised.										
Alder.				Barley.														
Aspen.				Bare or Diggs.														
Beech.				Oats.														
Birch.				Wheat.														
Elm.				Beans.														
Larch.				Pease.														
Maple.				Potatoes.														
Oak.				Rye Grass.														
Sycamore or Plane.																		
SHRUBS, ETC.	First in blossom.	First in leaf.	First in blossom.	Fruit in blossom.	Fruit in leaf.	Fruit in blossom.	Fruit in leaf.	Fruit in blossom.	Fruit in leaf.	Fruit in blossom.	Fruit in leaf.	Fruit in blossom.	Fruit in leaf.	Fruit in blossom.	Fruit in leaf.	Fruit in blossom.	Fruit in leaf.	Fruit in blossom.
Marberry.				Apple.														
Broom.				Black Currant.														
Hazel.				Cherry.														
Hawthorn.				Gooseberry.														
Holly.				Laburnum.														
Lilac.				Plum.														
Myrtle.				Swallow.														
Red Flowering Currant.				Other Birds, naming them.														
Rhododendron Ponticum.																		
Whin.																		

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



## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at AberdeenCounty of Aberdeenin Lat.  $57^{\circ}9'N$ , Long.  $2^{\circ}6'W$ , Distance from Sea  $1\frac{3}{4}$  miles.Height of Cistern of the Barometer above Mean Sea-level 101.5 feet, above Ground 4 feet.During the MONTH of November 1866.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.				SEA.	OZONE.	GENERAL REMARKS.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		4 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 h. A.M.		9 h. P.M.		Temperature of Well, at Depth of feet. No.	Temperature at Surface and Depth.	9 A.M.	9 P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		Barometer, Corrected, No. 511.	Attached Thermometer, No. 511.	Barometer, Corrected, No. 511.	Attached Thermometer, No. 511.	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.			Veloc. (4-10) and Species.	Amount, (0-10), and Species.	Veloc. (4-10) and Species.	Amount, (0-10), and Species.									No. 3 inches.	No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), =  $29.614 - 0.048$  = 29.571  
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), =  $29.660 - 0.049$  = 29.611  
 Mean at Station, corrected, and at 32°, = 29.591  
 Correction for Height, 101.5 feet, above Mean Sea-level, = +0.111  
 Mean, reduced to 32°, and Sea-level, = 29.702  
 Highest Reading, corrected for Index error, on the 28th, = 30.063  
 Lowest Do., Do., on the 8th, = 29.133  
 Difference, or Monthly Range, = 0.930

\* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.  
 † The Diurnal Range for Scotland is as yet unknown.  
 ‡ These "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.

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gunned or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by

Alex. Beverly assisted by George Liley, Sanitor  
Grammar School Aberdeen.

(Signed) Alex. Beverly,

Hygrometer.

Correction for wet Bulb is  
 at 32° +0.1  
 42 -0.1

Minimum on Grass

Instruments probably wrong before 10th  
 Readings from 13th to end of month, from  
 minimum (in glass sheath) by Regatta's Lanthorn  
 verified by Mr. Glaisher, reading 0.2 too high,  
 but corrections are applied in recording to make  
 them harmonious as far as possible with the  
 min. formerly used which had no error help 53.0

N.B. Rain of 16th, 18th, 19th consisted chiefly of melted snow &amp; sleet

Greatest daily range = 22.0 on 1st

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

TABLE FOR ESTIMATING FORCE OF WIND.  
 Estimated Force, 0-6. Common Designation. Estimated Force, 7-9. Common Designation. Estimated Force, 10-12. Common Designation. Estimated Force, 13-15. Common Designation.  
 0 Calm  
 0.5 Very light air  
 1 Light air  
 1.5 Light breeze  
 2 Fresh breeze  
 3 Very fresh  
 4 Blowing hard  
 5 Blowing a gale  
 6 Violent gale

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry

Bulb, = 39.2Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 37.5 38.2†† Computed Temperature of Dew-point, = 35.3 36.9†† Do. Elastic Force of Vapour, = 0.267 0.220



INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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

**Barometer.**—Weather-glasses and Aneroids, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of adjustment as compensate for the influence of temperature on the expansion of the fluid in the tube being used. It is also necessary that every Barometer shall have been compared with a Standard.

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

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

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

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

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

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

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

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays, and the least from radiation during night. Their bulbs have a black coating, which may easily be made, or mounted, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "Maximum" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; and the Sun's heat to affect the alcohol by distillation.

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

**The Hygrometer** consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the bulb;—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always clean and moist, and that the water-pipe is not dried up. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the wet cloth in ordinary circumstances. One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water-cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

**Reading of the Thermometer.**—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—38°·9, 40°·0, or 40°·1; or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°; or 40°·5, respectively. So also 40°·3, and 40°·7 or 40°·8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

**Hour of Observation.**—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd and 4th of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

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

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

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

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

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

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

nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky 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 "cloud" column, though their appearance and changes ought to be noted among the "Remarks."—The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is half-covered by clouds, 5 is entered as the observation, and so on.

Observations of the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 2, W. (for example), will indicate that the upper strata of clouds travel with extreme velocity from S.W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of 2, east, (i.e., *left*) will indicate that the higher regions are covered to the amount of 4-tenths with stratus clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the cumulo-stratus kind.

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

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

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

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

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

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

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns otherwise unoccupied, or in two ruled off for the purpose, from that headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner, or on the side-margin. Additional remarks may be made on the margin. **Observations** in connection with the periodic return of the seasons, possess not only great scientific value, but are of considerable interest to the agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. 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 Council recommend that *semi-daily* observations be taken;—viz., on the 21st days of March, June, September, and December—for these hourly observations separate schedules will be furnished to observers.

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

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

(By Order.) A. B.

Examiner, 20th December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	FRUIT.	FRUIT IN BLOSSOM.	FRUIT IN GENERAL.	First Appearance.	First Cut.
Alder, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Aspen, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Beech, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Birch, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Elm, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Larch, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Lime, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Oak, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Sycamore or Plane, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut

SHRUBS, ETC.	FRUIT.	FRUIT IN BLOSSOM.	FRUIT IN GENERAL.	First Appearance.	First Cut.
Apple, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Black Currant, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Cherry, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Hazel, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Hawthorn, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Holly, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Laburnum, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Lilac, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Mountain Ash or Rowan, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Red Flowering Currant, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Rhododendron Ponticum, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut
Whin, .....	Berry, .....	Blossom, .....	Blossom, .....	First Cut	First Cut

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

EDINBURGH.

10, St Andrew Square,

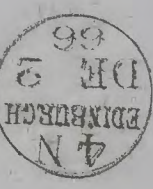
Secretary of the Meteorological Society of Scotland,

Mr ALEXANDER BUCHAN,

To

BOOK-POST.

Edinburgh Nov. 1866





## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Aberdeen, County of Aberdeen, in Lat. 57° 9' N, Long. 2° 6' W, Distance from Sea 1 3/4 miles.

Height of Cistern of the Barometer above Mean Sea-level 101.5 feet, above Ground 4 feet.

During the MONTH of December 1866

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER. by Casella.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 A.M. & 3 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE. Schell. 0-10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.	
	9 h. A.M.		9 h. P.M.		Shade, 4 feet above Ground.		Exposed Black Balls.		9 h. A.M.		9 h. P.M.		9 h. A.M.		4 h. P.M.		Readings of the H-Cup Anemometer.		No. of hours in which it fell.		No.		9 h. A.M.		No.					
	Barometer. No. 511	Attached Ther- mometer	Barometer. No. 511	Attached Ther- mometer	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force in lbs. per sq. ft.	Direction.	Force in lbs. per sq. ft.	Direction.	Force in lbs. per sq. ft.	Direction.	Force in lbs. per sq. ft.	Direction.	Force in lbs. per sq. ft.	Direction.	Force in lbs. per sq. ft.	Direction.					Force in lbs. per sq. ft.
1	29.884	45.7	29.728	44.5	41.3	33.5	42.4	28.8	39.8	37.1	40.5	39.9	SE	1.5	SE	0.5	4.45	3	0.065	10.5	0						3	3	hail	1
2	29.660	44	29.488	43.8	41.5	33	39.5	33	36	34.6	36	35	SW	0.5	SW	0.5	2.53	3	0.020	10.5	0						3	4	snow	2
3	29.210	46.6	29.142	45.5	45.7	33.8	48	29.2	38	37.7	42	39.1	SW	1	SW	1.5	1.80	3	0.115	7.2	2						3	6		3
4	29.240	47.6	29.130	46	43.6	36	43.3	30.8	40	39.4	41	39.8	SW	1	SW	1.5	4.25	7	0.280	10.5	0						5	4	mist, am.	4
5	29.346	47	29.444	46.5	42	34.8	54.4	32	39	37.9	39	37.1	SW	1	SW	0.5	3.00	0	0	4.5	5 1/2						6	4		5
6	29.566	47.8	29.216	46.6	40	34.8	44.4	27.9	38.5	36.7	38.6	38.3	SW	1.5	SW	0.5	3.05	15	0.535	8.5	1						6	3		6
7	28.708	48	29.410	45	43.9	34	41.2	32.5	39.7	39	36.7	35	SW	1.5	SW	2	2.05	5	0.165	9.2	0						6	8	sleet	7
8	29.984	42.6	30.170	41.7	38.7	25.5	55.5	26.5	31.3	30	31.4	29.4	SW	1.5	SW	1	4.45	1	0.005	3.5	5						9	4	snow.	8
9	29.744	42	29.400	41.5	44	30	47	18.4	39.7	39.2	40.3	39	SW	2.5	SW	1	3.20	2	0.008	7.5	1 1/2						6	3		9
10	29.790	46.8	30.114	44	45.4	34	57	29.5	40.5	39.2	36.5	34.5	SW	2	SW	1	3.75	2	0.010	7.5	4						8	7	sleet	10
11	30.208	45	30.020	43.2	37.8	30.3	51.5	23.3	31.7	30.5	34.6	32.7	SW	0.5	SW	1	2.30	3	0.100	7.5	1 1/2						5	3	moist sun. warm	11
12	29.550	46.8	29.354	43.3	37	31.6	40	27	34	33.7	36.8	36.3	SW	0.5	SW	0.5	1.80	5	0.213	9.5	0 1/2						3	3	sleet, snow.	12
13	29.150	46.5	29.054	45.5	39	31	42.6	29.3	36.7	36	32.7	32	SW	1	SW	0.5	9.5	4	0.119	9.5	0 1/2						3	3		13
14	28.990	46.7	29.086	45	41.5	30.5	57.6	23.8	41.3	40.7	37.5	37	SW	1	SW	1	1.45	0	0	6.5	3 1/2						4	3		14
15	29.136	42	29.092	42.8	39.2	30	51.4	23.8	31.7	31	37.5	37.3	SW	0.5	SW	1	2.10	4	0.063	8.5	5						3	3	moist sun 11-1	15
16	29.282	42	29.690	41.5	42.3	33	62.2	25.3	36	35.5	37.4	36.2	W	1	SW	1	1.60	4	0.055	5.5	5 1/2						3	4		16
17	29.758	45.5	29.698	45.6	50.5	30.3	54	24.3	39	38.9	50.5	50	SW	1	SW	1.5	1.75	2	0.030	8.5	0						4	3		17
18	29.722	48.5	29.508	49	53.5	48	60.4	37	53	52	51.7	50.3	SW	1.5	SW	2	3.80	3	0.058	7.5	3						4	4		18
19	29.766	50	30.058	48.5	51.8	36	60.5	33.4	38.2	36	41	39.8	SW	1	SW	1	3.85	0	0	2.5	5						6	5		19
20	30.084	50.5	30.016	49	45	39.5	59.1	32.8	42.8	41.6	45	44	SW	1.5	SW	0.5	3.05	0 1/2	0.003	4.5	3						5	5	Lunar Rainbow 7 1/2 PM	20
21	29.832	51.5	30.222	50	51.6	39	53.8	36.6	48.3	46.9	41	40	SW	2	SW	1	3.00	0 1/2	0.002	5.5	2						5	5		21
22	30.268	47.8	30.042	46.5	41	30.8	59	24.2	36.6	36	36.6	34.9	SW	1	SW	1	2.15	0	0	2.5	5 1/2						4	4		22
23	29.904	45.8	29.940	45	47.8	35	49.6	27.8	39.5	38.5	42	40.7	SW	0.5	SW	1.5	2.90	0	0	7.5	0						4	4		23
24	30.008	45	29.964	45	47	37	70	31.4	44	43	39	38.3	SW	0.5	SW	0.5	1.65	0	0	8.5	2						3	3		24
25	29.854	44.7	29.640	45	45.7	34.5	46.7	29.4	42	41.7	44	43	SW	1	S	1.5	1.65	3	0.065	7.5	0						3	4		25
26	29.504	44	28.886	44	44.5	35.3	60	31	37.2	36	42.4	42	SW	1	W	1.5	3.20	5	0.070	6.5	4 1/2						4	5		26
27	29.368	43	29.456	43	44	35.5	63.2	31.2	37.4	35.2	39	38	SW	2	SW	2	2.95	6	0.145	5.5	5						9	7		27
28	29.508	42.8	29.498	42.8	42.8	36.5	42.3	32	42	41	38.7	38.4	SW	2	SW	2	2.95	20	0.705	10.5	0						9	6		28
29	29.192	42.5	28.958	42.5	45.5	35.3	45.5	35.3	40	40.1	38.5	36.7	S	0.5	var	0.5	1.50	3	0.045	8.5	0 1/2						3	4		29
30	28.844	41.6	29.154	41.6	38.3	34.5	38.3	34.5	31.4	31	36.5	35.2	SW	0.5	SE	1	1.60	4	0.185	8.5	0						4	3		30
31	29.444	40.3	29.488	38.8	37.8	34.5	34	25.8	31.1	29.8	26	25	E	1	NE	1	2.05	4	0.128	10.5	0						5	3	hail, snow	31
Sums.	916.504	1410.6	916.066	1394.7	1346.6	1041.7	1580.3	877.9	1196.4	1165.9	1210.4	1174.7	355	325	825.5	112	8.9	3.169	214	64							147	129		
Means.	29.565	45.5	29.555	45.0	43.54	33.6	50.97	28.97	38.6	37.6	39.05	37.9	1.15	1.05	2.663	36	0.102										4.744	16		
Total corrections for instrumental errors.	+0.011		+0.011		+0	+0.7	0	0	-0.1	+0.1	-0.1	+0.1															4.4			
Corrected means.	29.576	45.5	29.562	45.0	43.5	34.3	50.9	29.0	38.5	37.7	38.9	38.0	1.15	1.05	2.66	36	0.102										4.744	16		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++ = 29.531 inches.

for Temp. (Col. 2), = 29.576... - 0.045 = 29.531

corrected Mean " of Barometer at 9 P.M., minus the Correction ++ = 29.518

for Temp. (Col. 4), = 29.562... - 0.044 = 29.518

Mean at Station, corrected, and at 32°, = 29.525

Correction for Height, 101.5 feet, above Mean Sea-level, = +0.111

Mean, reduced to 32°, and Sea-level, = 29.636

Highest Reading, corrected for Index error, on the 22<sup>nd</sup>, = 30.279

Lowest Do., Do., on the 7<sup>th</sup>, = 28.719

Difference, or Monthly Range, = 1.560

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 18<sup>th</sup>, = 53.5

Lowest in Month, corrected for Index errors, on the 31<sup>st</sup>, = 24.1

Difference, or Monthly Range, = 29.4

"Corrected Mean" of all the Highest, (Col. 5), = 43.5

"Corrected Mean" of all the Lowest, (Col. 6), = 34.3

Difference, or Mean Daily Range, = 9.2

\*\* Calculated Mean Temperature of Month, = 38.9

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 24<sup>th</sup>, = 70.0

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 50.9

Lowest at Night, Black Bulb, (corrected for Index errors), on the 7<sup>th</sup>, = 18.4

"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 29.0

Difference of above Means or Range ("exposed"), = 20.9

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 38.7

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 37.8

Computed Temperature of Dew-point, = 36.6

Do. Elastic Force of Vapour, = 0.218

Do. Weight of Vapour in a Cubic Foot of Air, = 2.57

Relative Humidity, (Saturation = 100), = 93

RAIN fell on 25 Days; Amount in Inches, = 3.169

at Rose Street = 3.05

WIND.		SUMMARY.					
Direction.	N	NE	E	SE	S	SW	W
A.M.	0	0	1	1	22	1	5
P.M.	0	1	0	2	1	19	1
Mean.	0	1	0	2	20	1	10

\* 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 "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.

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by Alex. Beverly, assisted by George Liley, Janitor  
of Grammar School Aberdeen.

(Signed) Alex. Beverly

Greatest daily range = 20.2 on the 17<sup>th</sup>



Dec. 1866.

illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are made in the following manner:—In the column “Velocity and Direction,”  $\frac{1}{2}$  S.W., (for example,) will indicate that the upper strata of clouds travel with *gentle* velocity from S.W.  $\frac{1}{2}$  S. and those in the lower regions from W., with one-third the *average* speed of the former. Again, in the second “Cloud” column, an entry of  $\frac{2}{3}$  cumuli, (cumuli,) will indicate that the higher strata are covered to the amount of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of one-tenth by lower clouds of the *nimbo-stratus* kind.

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

The *Hygrometer* consists of two thermometers usually, one of which is necessarily mounted on one frame. As apparently slight variations from the approved and *well-tested form* of this apparatus specially vitiate the "Hygrometrical Deductions," Observers are especially requested to attend to the following conditions:—The bulbs must hang down by at least an inch free from the

such as will bring the tubes forward by an inch, from any poles and frame to which they are attached;—the frame must be suspended, the water-cup must be placed above it, and on which it may be suspended; the water-cup must be lowered, and placed to the side, and a little below the level of the bulb,—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the same thread with which it is sewed up.

It must be seen that the bulb must be kept in a position, which also supplies it with water. The observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much importance, and must be made with great care. The bulb must be

One form of "Mason's" Hygrometer is highly objectionable. The frame of the thermometer is enclosed in a tin case, which supposedly protects the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned thermometer should be corrected, as far as possible.

[illegible]

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

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

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

The Anemometer-Cup Anemometers were furnished with a Hemispherical-Cup Anemometer, which shows the amount of Wind passing it per day; from which also the Velocity of the Wind may be ascertained. For indicating the time of observation may be ascertained. The Force of the Wind, at any particular hour of observation, may be ascertained by the method of Observation.

Lands Anemometer is also recommended: the method of Observing Wind Force by such tables as that given in the schedule annexed, is to say the least, unsatisfactory.

*Waves, and Tides.*—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situations for observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge should be placed in thicket land; its edges are on a level with the

illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are made in the following manner:—In the column “Velocity and Direction,”  $\frac{1}{2}$  S.W., (for example,) will indicate that the upper strata of clouds travel with *gentle* velocity from S.W.  $\frac{1}{2}$  S. to  $\frac{1}{2}$  S. in the lower regions from W., with one-third the *average* speed of the former. Again, in the second “Cloud” column, an entry of  $\frac{2}{3}$  *cast.*, (anonym.) will indicate that the higher strata are covered to the amount of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of one-tenth by lower clouds of the *nimbo-stratus* kind.

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The sea is not only, in itself, but in its relations to that of our land, a very important branch of Meteorology. The Council, therefore, recommended that the temperature of the sea be carefully taken by a properly constructed apparatus, from the end of the piers and rocks round the coast, where it is not influenced by the current of river water. At or near the time of high water, on the 1st, 15th, and 25th of each month, the thermometer ought to be lowered exactly six fathoms (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, noting always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

*Remarks*.—The "Remarks" column is too narrow, but unnecessary. Save of the most valuable observations that can be made.

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

The Council recommend that *term-day* observations be taken—viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

(B. Order.) A. I.

EDINBURGH

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

[illegible]

(By Order,) A. B.