

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Præmar*, County of *Abdeen*, in Lat. *57° N*, Long. *3° 24' W*, Distance from Sea *60* miles.

Height of Cistern of the Barometer above Mean Sea-level *1110* feet, above Ground *3* feet. During the MONTH of *January* 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.	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.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.									
	Barometer. No.	Attached Thermometer	Barometer. No.	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, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	No.	No.	No.					
	inches.		inches.		No.	No.	No.	No.																3 inches.	12 inches.					22 inches.
1	27.932		28.256		37.8	26.0	37.5	26.0	29.2	28.3	31.8	30.8	SW	3	SW	2	0.108	4.6	4.6	4.6	4.6	4.6	4.6				9.9		1	
2	28.300		27.900		37.9	30.0	37.5	28.0	35.0	33.6	36.0	34.0	SW	3	SW	0	0	4.6	4.6	4.6	4.6	4.6	4.6				9.9		2	
3	28.136		28.268		44.5	36.0	46.6	36.0	37.3	36.0	40.8	39.0	SW	0	SW	1	0.244	4.6	4.6	4.6	4.6	4.6	4.6				9.9		3	
4	28.180		28.260		44.8	34.4	44.8	33.2	38.8	37.8	34.5	34.0	S	4	SW	1	0.554	4.6	4.6	4.6	4.6	4.6	4.6				9.8		4	
5	28.460		28.574		41.2	31.0	63.0	28.2	31.6	30.0	34.5	32.8	SW	0	SW	1	0.530	4.6	4.6	4.6	4.6	4.6	4.6				9.9		5	
6	28.672		28.464		46.3	34.0	67.8	33.2	35.0	33.3	35.3	33.0	SW	1	SW	1.5	0	4.6	4.6	4.6	4.6	4.6	4.6				9.8		6	
7	28.162		28.872		37.0	33.0	65.0	31.2	32.8	32.0	35.2	35.0	SW	1.5	SW	0	0.03	4.6	4.6	4.6	4.6	4.6	4.6				9.9		7	
8	27.600		27.512		37.8	35.0	57.0	32.3	36.0	34.8	35.0	34.0	S	0.2	SW	1.5	0.03	4.6	4.6	4.6	4.6	4.6	4.6				9.9		8	
9	27.456		27.586		36.2	33.0	40.2	30.7	33.4	31.8	35.0	34.0	SW	1	SW	2	0	4.6	4.6	4.6	4.6	4.6	4.6				10.10		9	
10	27.874		28.026		36.0	25.8	66.8	24.8	29.8	29.0	25.8	25.0	S	3	SW	2	0.04	4.6	4.6	4.6	4.6	4.6	4.6				10.9		10	
11	28.072		28.076		28.9	15.3	63.8	11.8	19.9	19.5	15.3	15.0	W	1	SW	0	0	4.6	4.6	4.6	4.6	4.6	4.6				9.9		11	
12	28.480		28.472		27.0	11.8	57.0	13.0	23.8	23.0	14.0	13.7	W	0.2	SW	0.2	0	4.6	4.6	4.6	4.6	4.6	4.6				9.9		12	
13	27.450		28.130		42.4	20.0	41.8	19.8	33.0	32.3	40.0	38.1	SE	2	SW	1	0.04	4.6	4.6	4.6	4.6	4.6	4.6				10.9		13	
14	28.108		27.950		47.5	33.3	47.3	34.5	44.0	40.2	44.7	42.2	SW	0.5	SW	2	0.10	4.6	4.6	4.6	4.6	4.6	4.6				9.9		14	
15	28.050		28.380		45.2	32.0	55.0	29.0	34.3	34.0	33.2	32.5	SW	1.5	SW	1	0.05	4.6	4.6	4.6	4.6	4.6	4.6				10.3		15	
16	28.308		28.574		41.2	32.8	44.3	29.2	34.7	34.3	34.8	33.0	S	0.5	W	0	0.06	4.6	4.6	4.6	4.6	4.6	4.6				9.8		16	
17	28.632		28.500		45.1	33.0	46.0	30.0	37.1	35.2	45.1	44.0	SW	0.5	SW	0.2	0.04	4.6	4.6	4.6	4.6	4.6	4.6				8.8		17	
18	28.470		28.124		47.0	43.7	47.0	42.3	44.3	42.2	44.2	43.2	SW	2	SW	2	0.16	4.6	4.6	4.6	4.6	4.6	4.6				9.8		18	
19	28.930		28.058		45.0	34.8	67.8	32.3	39.1	38.0	37.2	35.3	SW	2	SW	1	0.18	4.6	4.6	4.6	4.6	4.6	4.6				9.9		19	
20	28.524		28.076		45.0	33.2	68.0	32.2	34.0	33.8	35.0	34.5	E	0	SW	0	0.15	4.6	4.6	4.6	4.6	4.6	4.6				5.8		20	
21	28.200		28.214		40.2	34.8	55.2	33.2	37.2	36.3	37.0	37.3	SW	1.5	SW	1	0.20	4.6	4.6	4.6	4.6	4.6	4.6				9.9		21	
22	28.256		28.350		41.2	34.8	63.0	31.3	37.3	36.3	38.0	36.4	S	0.3	SW	1.5	0.17	4.6	4.6	4.6	4.6	4.6	4.6				9.8	Thunder at 10 Am. Lunar Halo	22	
23	28.850		29.150		41.8	36.0	72.3	30.2	36.8	36.2	38.1	36.0	W	0.3	W	1	0.03	4.6	4.6	4.6	4.6	4.6	4.6				9.9	Lunar Halo	23	
24	29.200		29.150		45.3	37.0	61.0	36.3	41.3	40.3	42.1	40.2	SW	1.5	SW	1	0	4.6	4.6	4.6	4.6	4.6	4.6				9.9	do do	24	
25	29.104		28.170		47.2	41.0	51.8	40.0	44.0	42.3	46.8	45.0	S	2	SW	1.5	0	4.6	4.6	4.6	4.6	4.6	4.6				9.9		25	
26	29.104		29.000		47.3	42.0	51.0	42.0	45.2	42.3	44.0	41.2	S	1.5	SW	2	0	4.6	4.6	4.6	4.6	4.6	4.6				9.9		26	
27	29.880		28.708		44.0	38.3	47.2	41.0	42.1	40.3	42.0	39.0	SW	2	SW	2	0	4.6	4.6	4.6	4.6	4.6	4.6				10.9		27	
28	28.384		28.104		43.3	35.0	46.4	32.3	41.0	39.3	35.0	32.8	SW	0.5	SW	1.5	0	4.6	4.6	4.6	4.6	4.6	4.6				10.10	Lunar Halo	28	
29	27.984		28.400		39.0	27.8	56.8	24.2	29.0	28.8	31.2	30.8	SW	1	W	1	0.12	4.6	4.6	4.6	4.6	4.6	4.6				10.10		29	
30	27.750		28.622		38.0	14.0	52.0	14.0	14.0	13.8	32.0	31.0	SW	0	SW	0.2	0	4.6	4.6	4.6	4.6	4.6	4.6				10.9		30	
31	28.290		28.500		41.0	31.3	42.8	30.0	39.3	38.8	41.0	40.8	S	0	SW	0	0.03	4.6	4.6	4.6	4.6	4.6	4.6				10.9		31	
Means.	14.147		11.28		14.8	12.8	15.0	11.7	19.9	14.1	14.8	13.1	5		30.1		20	2.83										286.275		
Means.	28.332		28.322		41.4	31.8	62.3	30.1	35.2	34.1	36.1	34.9	11.6		0.97													9.289		
Total Corrections Instrumental Errors.	-0.09		-0.09																									9.10		
Corrected Means.	28.323		28.313						34.0		34.8																			
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), = *28.306*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = *28.294*
Mean at Station, corrected, and at 32°, = *28.300*
Correction for Height, feet, above Mean Sea-level, = *1.201*
Mean, reduced to 32°, and Sea-level, = *29.501*
Highest Reading, corrected for Index error, on the *24*th, = *29.200*
Lowest Do., Do., on the *9*th, = *27.456*
Difference, or Monthly Range, = *1.744*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *14*th, = *47.3*
Lowest in Month, corrected for Index errors, on the *12*th, = *11.8*
Difference, or Monthly Range, = *35.5*
"Corrected Mean" of all the Highest, (Col. 5), = *41.4*
"Corrected Mean" of all the Lowest, (Col. 6), = *31.8*
Difference, or Mean Daily Range, = *9.6*
** Calculated Mean Temperature of Month, = *36.6*

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the *23*th, = *72.3*
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = *54.3*
Lowest at Night, Black Bulb, (corrected for Index errors), on the *11*th, = *11.8*
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = *30.1*
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *35.6*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *34.4*
Computed Temperature of Dew-point, = *32.5*
Do. Elastic Force of Vapour, = *186*
Do. Weight of Vapour in a Cubic Foot of Air, = *89*
Relative Humidity, (Saturation = 100), = *89*
RAIN fell on *20* Days; Amount in Inches, = *2.85*

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	0	0	1	0	9	18	3	0	0	1.16	
P.M.	0	0	0	0	24	3	4	0	0	0.97	
Mean.	0	0	1	0	4	21	3	2	0	1.06	= 1.12

N.B.—The Means 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.

Observations made and Return verified by

James Aitken
R. Marshall

(Signed)

James Aitken

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Prannan, County of Perth, in Lat. 57° N., Long. 2° 24' W. Distance from Sea 60 miles.Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 feet.During the MONTH of February 1866.

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.		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.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.		0-10.												
		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.	Direction.	Force.	Direction.	Force.	Readings of the H-Cup Anemometer. No.	No. of hours in which it fell.	Amount in inches.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	No. 3 inches.		No. 12 inches.	No. 22 inches.			Temperature of WELL at Depth of feet. No.	Temperature at 1 fathom, and Density.	9 A.M. 9 P.M.			
		Inches.	"	Inches.	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		"	"			"	"	"	"	"	"
		"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"		"	"			"	"	"	"	"	"
	1	27.884	27.888	42.3	38.8	44.8	36.2	40.1	39.3	41.0	40.0	SW	0	SW	0.5			0.30		4	4									10.9		1				
	2	27.992	27.990	42.0	38.5	44.0	35.8	38.8	37.8	35.0	33.2	SW	0	SW	0.5			0.18		4	4									9.9		2				
27.916	3	28.066	28.066	40.8	38.1	44.5	35.0	36.0	35.0	34.0	33.0	SW	1.5	SW	1			0		4	4									9.9		3				
	4	28.114	28.096	42.8	38.2	46.5	30.4	37.8	35.6	35.0	34.7	SW	1	SW	1.5			0.15		4	4									9.10	Thunder at 5 P.M. light at 10 P.M.	4				
	5	28.164	28.000	41.0	38.8	48.0	31.0	34.5	32.2	40.8	40.2	SW	1	SW	1			0.45		4	4									9.10	Aurora B.	5				
	6	27.822	28.100	46.3	32.8	59.3	32.0	39.2	36.3	36.5	34.8	SW	5	SW	1			0.36		4	4									9.9		6				
	7	27.894	28.000	39.1	32.2	60.0	31.1	38.3	37.1	33.3	32.2	SW	1	SW	4			0.17		4	4									9.8		7				
	8	28.216	28.516	36.8	36.0	45.0	27.0	32.8	31.0	31.0	30.0	SW	1	SW	1			0.70		4	4									8.8		8				
	9	28.414	28.218	22.0	34.0	36.3	18.8	33.5	33.0	29.8	29.3	SE	0	SE	0			0.		4	4									8.9		9				
	10	28.126	27.972	47.2	27.2	53.5	26.0	27.7	27.3	35.0	34.5	SW	0	SW	0			0.07		4	4									9.8		10				
	11	27.978	27.954	37.0	32.8	49.6	30.2	34.2	33.8	32.3	32.0	NE	0	NE	1.5			0		4	4									9.9		11				
	12	28.128	28.250	34.0	28.2	54.0	22.0	29.2	28.0	28.4	27.0	NE	1	NE	1			0.05		4	4									10.9		12				
	13	28.110	28.238	33.0	25.0	47.3	21.3	28.3	24.4	24.0	23.5	NE	0	SW	0			0.		4	4									8.8		13				
	14	28.300	28.129	29.0	12.0	39.2	9.8	12.0	11.5	29.5	29.0	S	0	NE	0.5			0.02		4	4									8.9	Fog Am	14				
	15	28.242	28.172	33.0	28.3	68.0	25.2	30.0	29.8	28.2	28.5	NE	0	NE	0.2			0.25		4	4									6.9		15				
	16	28.240	28.520	33.8	28.0	48.0	23.0	29.8	29.0	29.0	28.2	S	0.5	E	1			0.14		4	4									9.10		16				
	17	28.634	28.700	33.0	24.8	45.0	24.8	28.2	25.2	33.0	32.0	NE	0	NE	4			0.70		4	4									10.10	Fog & drift all day Aurora B.	17				
	18	28.770	28.700	38.5	29.8	88.3	29.0	31.8	30.8	31.0	30.0	S	0.5	SW	0			0.03		4	4									10.9		18				
	19	28.822	28.834	39.3	31.0	74.0	28.0	36.2	34.8	34.2	32.0	SW	0.5	NE	1			0		4	4									6.9		19				
	20	28.762	28.851	36.7	23.6	50.2	17.8	27.2	26.8	34.3	34.0	NE	0	NE	0			0		4	4									9.8		20				
	21	28.068	28.750	37.0	19.2	81.0	15.2	19.5	18.0	33.3	32.3	S	0	SW	2			0		4	4									8.9		21				
	22	28.458	28.520	39.3	32.2	77.7	28.2	36.0	34.8	34.8	32.8	SW	1	SW	1			0.04		4	4									9.9	Meteor at 9 P.M.	22				
	23	27.900	28.330	40.0	28.0	54.8	26.0	37.2	36.0	27.0	26.2	SW	1.5	NE	2			0.16		4	4									10.9	Aurora B.	23				
	24	28.380	28.068	47.0	28.0	58.0	25.7	31.0	30.5	33.3	32.3	SW	1	SW	1.5			0.02		4	4									9.9		24				
	25	27.926	27.824	35.1	29.3	87.0	27.0	30.8	29.9	33.0	31.5	S	1	S	2			0		4	4									9.9		25				
	26	28.144	28.520	37.3	30.2	72.0	29.2	33.1	32.3	31.1	30.2	NE	0.5	NE	0.5			0.10		4	4									9.10		26				
	27	28.626	28.550	29.0	25.3	71.0	23.3	26.3	25.3	27.0	25.6	NE	2	NE	1.5			0.30		4	4									10.10		27				
	28	28.410	28.300	31.0	21.0	40.0	15.0	24.2	24.8	21.0	21.0	NE	0.5	NE	1.5			0.21		4	4									9.9		28				
	29																																29			
	30																																30			
	31																																31			
Sums.		1319	1387	3146	128	135	137	149	141	125	96	3	4					20	449		164	1	182							253	253					
Means.		28.286	28.301	37.7	28.2	59.6	25.7	30.8	29.8	31.9	30.9	0.73	1.24							5.9	6.5									9.090						
Total corrections for Instrumental Errors.		-0.09	-0.09																																	
Corrections for Diurnal Range.																																				
"Corrected Means."		28.277	28.292					29.7	30.8																											
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				

NOTATION USED IN GENERAL REMARKS.

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

TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction^{††} for Temp. (Col. 2), = 28.277

"Corrected Mean" of Barometer at 9 P.M., minus the Correction^{††} for Temp. (Col. 4), = 28.283

Mean at Station, corrected, and at 32°, = 28.277

Correction for Height, feet, above Mean Sea-level, = 1.201

Mean, reduced to 32°, and Sea-level, = 29.478

Highest Reading, corrected for Index error, on the 21 th, = 29.068

Lowest Do., Do., on the 1 th, = 27.808

Difference, or Monthly Range, = 1.260

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 10 th, = 47.2

Lowest in Month, corrected for Index errors, on the 14 th, = 12.0

Difference, or Monthly Range, = 35.2

"Corrected Mean" of all the Highest, (Col. 5), = 37.7

"Corrected Mean" of all the Lowest, (Col. 6), = 28.2

Difference, or Mean Daily Range, = 9.5

** Calculated Mean Temperature of Month, = 33.0

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 18 th, = 88.3

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 59.6

Lowest at Night, Black Bulb, (corrected for Index errors), on the 14 th, = 9.8

"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 25.7

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 30.2

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 30.2

†† Computed Temperature of Dew-point, = 27.2

†† Do. Elastic Force of Vapour, = 148

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

†† Relative Humidity, (Saturation = 100), = 83

RAIN fell on 20 Days; Amount in Inches, = 4.49

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		3	3	1	1	4	12	1	3	0	0.73
P.M.		2	4	2	1	1	12	1	3	0	1.24
Mean.		2	4	2	1	2	12	1	4	0	0.98 = 0.96

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

James Aitken

(Signed)

James Aitken

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Braemar, County of Aberdeen, in Lat. 57° N., Long. 3° 24' W., Distance from Sea 60 miles.

Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 feet.

During the MONTH of March 1866

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.				SUNSHINE. Hours.	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.		9 h. P.M.		No. of hours in which it fell.	Amount in inches. No.	9 A.M.		P.M.			9 h. A.M.									
		Barometer. * No.	Attach- ed Ther- mometer No.	Barometer. No.	Attach- ed Ther- mometer No.	Max. No.	Min. No.	Max. No.	Min. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direc- tion.	Force	Direc- tion.	Force			Readings of the H-Cup Anemometer. No.	9 h. A.M.	9 h. P.M.	Velocity, (0-10), and Species.		Amount, (0-10), and Species.	Velocity, (0-10), and Species.	Amount, (0-10), and Species.					No.	No.	No.
				inches.																														
	1	28.436		28.530		28.0	19.0	59.0	15.0	18.0	15.0	28.0	27.4	SE	0	NW	0.5	0.16		1									9.8	1				
	2	28.490		28.420		26.8	27.0	68.5	25.0	21.8	31.0	34.5	32.8	NW	0.2	SW	0.5	0		6									9.8	2				
	3	28.286		28.420		27.0	29.0	85.1	25.2	24.0	33.7	28.2	27.8	SW	0	SW	0.5	0		9										8.9	3			
	4	28.554		28.588		25.7	28.8	86.0	10.8	23.0	22.2	15.8	15.0	SW	0.5	SW	0	0.50		6										9.9	4			
	5	28.450		28.180		22.8	0.0	78.0	-3.0	0.3	0.3	29.2	29.0	SW	0	SW	2	0.2		6										9.10	5			
	6	27.990		28.000		22.3	29.2	34.4	28.0	29.3	29.0	31.5	31.5	SE	2	SE	0.5	0.14		10										9.8	6			
	7	28.002		28.214		22.2	20.2	22.2	20.0	31.0	31.0	32.0	32.0	SE	0.5	SE	0.5	0.51		10										9.9	7			
	8	28.514		28.800		23.2	29.0	29.0	27.0	27.2	27.0	30.2	30.0	SE	1	SW	1	0.53		7										10.9	8			
	9	28.974		29.150		28.3	30.0	26.0	29.0	36.2	34.8	30.0	28.2	N	0.2	SW	0	0		6										9.8	9			
	10	29.200		29.164		42.0	33.8	82.1	30.0	29.0	27.8	39.0	35.8	N	0	N	0	0		6											7.8	10		
	11	29.062		28.820		48.0	37.8	83.8	25.2	41.0	37.0	39.2	37.8	SW	0.5	SW	1	0.03		6											9.9	11		
	12	28.410		28.390		48.0	33.0	61.0	32.0	36.0	34.3	33.0	32.0	SW	1.5	N	1	0		9											9.9	12		
	13	28.560		28.450		43.0	25.5	69.0	23.0	29.0	27.8	26.0	25.5	N	2	SW	1	0.03		7											9.8	13		
	14	28.268		28.114		36.8	24.0	83.0	20.0	21.8	21.0	20.8	20.8	SW	0	SW	0	0.40		6											8.8	14		
	15	28.120		27.950		36.2	18.8	71.0	16.0	31.2	31.0	33.0	33.0	SW	0	SE	0.5	0		6											9.10	15		
	16	28.020		28.160		38.3	31.2	50.0	35.0	36.0	35.0	31.3	31.2	SE	0.5	SE	1	0.06		10											9.9	16		
	17	28.170		28.200		38.2	33.0	51.5	32.8	36.0	35.8	29.5	29.0	SE	1	NW	0.5	0.10		9											10.2	17		
	18	28.274		28.370		38.0	33.0	42.0	32.6	37.0	37.0	36.0	36.0	E	0	SE	0	0.12		10											9.5	18		
	19	28.390		28.376		37.8	31.8	42.7	31.2	32.3	31.4	32.0	31.0	SE	0.5	SE	1	0.06		9											10.7	19		
	20	28.490		28.460		35.1	29.0	76.8	26.2	32.0	31.6	29.3	29.0	SE	1	SE	1	0.05		8											9.9	20		
	21	28.500		28.530		32.0	25.0	61.2	23.2	30.8	30.0	25.8	25.0	N	0	E	0.5	0		6											10.8	21		
	22	28.824		28.740		35.0	14.0	75.0	13.0	18.0	17.5	26.8	26.0	SE	0	S	1	0		6											9.9	22		
	23	28.364		27.980		37.1	22.6	60.0	17.2	31.0	30.2	35.8	34.8	N	0	S	1.5	0		7											9.9	23		
	24	27.226		28.084		37.0	34.0	52.5	25.2	34.0	33.8	35.0	35.0	SE	1.5	E	1	0.50		10											9.9	24		
	25	28.550		28.000		42.0	33.2	63.1	28.2	35.0	34.0	32.0	31.3	SE	0.5	SE	0	0.20		10											8.9	25		
	26	28.826		28.714		44.8	29.3	52.2	26.3	37.3	36.8	41.0	40.3	SW	0	S	1	0.02		7											8.9	26		
	27	28.674		28.751		46.2	38.2	78.2	36.0	39.2	39.0	42.8	41.3	SE	0.2	SW	1	0		6											10.9	27		
	28	28.700		28.704		33.0	42.0	90.2	38.0	46.5	44.1	41.8	40.8	SW	1	SW	1	0.03		6											9.8	28		
	29	28.780		28.600		33.0	34.3	80.0	36.2	43.6	44.0	49.0	46.8	SW	2	SW	2	0		6											8.9	29		
	30	28.680		28.800		56.3	35.0	82.0	31.0	46.0	44.2	35.0	33.0	SW	1.5	SW	1	0		6											8.8	30		
	31	28.658		28.520		44.0	38.0	85.0	29.0	37.0	35.0	33.0	31.3	SW	0.5	SW	1	0.03		6											8.7	31		
Sums.		14147		14103		166	156	125	134	145	138	148	138	5		4		18 3.57		215		178								275 270				
Means.		28.462		28.474		39.4	28.5	66.5	25.8	31.9	31.1	32.5	31.6	0.54		0.79				6.9		5.7								8.987				
Total corrections for Instru- mental Errors.		-0.09		-0.09										0.06		0.06				6.3										8.8				
Correc- tions for Diurnal Range.																																		
"Cor- rected Means."		28.453		28.465																														
No. of Column.		1		3		5		7		9		11		13		15		17		19		21		23		25		27		29		31		

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 28.444
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 28.456
Mean at Station, corrected, and at 32°, = 28.450
Correction for Height, feet, above Mean Sea-level, = 1.207
Mean, reduced to 32°, and Sea-level, = 29.651
Highest Reading, corrected for Index error, on the 10th, = 29.200
Lowest Do., Do., on the 5th, = 27.526
Difference, or Monthly Range, = 1.674

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 30th, = 56.3
Lowest in Month, corrected for Index errors, on the 5th, = 0.0
Difference, or Monthly Range, = 56.3
"Corrected Mean" of all the Highest, (Col. 5), = 39.4
"Corrected Mean" of all the Lowest, (Col. 6), = 28.5
Difference, or Mean Daily Range, = 10.9
** Calculated Mean Temperature of Month, = 34.0
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 28th, = 90.2
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 66.5
Lowest at Night, Black Bulb, (corrected for Index errors), on the 5th, = -2.0
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 25.8
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 32.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 31.2
II Computed Temperature of Dew-point, = 29.0
II Do. Elastic Force of Vapour, = 1.60
II Do. Weight of Vapour in a Cubic Foot of Air, =
II Relative Humidity, (Saturation = 100), = 87
RAIN fell on 18 Days; Amount in Inches, = 3.57

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		4	7	1	5	0	11	1	2	0
P.M.		1	5	2	4	2	10	1	6	0
Mean.		2	6	2	4	1	10	1	4	0

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Observations made and Return verified by

(Signed)

James Aitken
D. Marshall

James Aitken

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

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

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

In *taking an Observation*, the attached Thermometer is first noted; the tube must then be gently tapped and the cistern-adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex 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 be "protected" by the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-pieces, 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 "*Macaroni*" Thermometers are recommended; printed Directions for their use may be obtained with each instrument. The "*Macaroni*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Macaroni*." 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-quickened 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.

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 "*Macaroni*" should be freely exposed to the Sun, and the "*Macaroni*" 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, under 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 "*Macaroni*," 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 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 wet 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 the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances. One form of "*Mason's*" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water-cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the 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, 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°; respectively. So also 40°-1, and 40°-2, must be registered 40°-2 or 40°-3, and 40°-3, and 40°-4, respectively. In reading Rutherford's "*Mac*," and "*Mac*," 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 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.

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

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

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

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

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

Ozone.—Mention whether Schönbain'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 face and direction of the wind at the time of observation, in the following manner:—thus 5 $\frac{3}{4}$, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as " $\frac{3}{4}$ " on the scale, that the wind is from the N.W., and that its force on the scale 0–6 is " $\frac{3}{4}$," *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 differences 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 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 *terminating* 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.

Edinburgh, 30th December 1866.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Divided of Leaves.	CROPS mentioning variety.	Planting or sowing above ground.	In Ear or Harvest.
Alder,		Barley,		
Beech,		Oats,		
Elm,		Wheat,		
Larch,		Peas,		
Lime,		Potatoes,		
Oak,		Rye Grass,		
Sycamore or Plane,				

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	First in Harvest.	MIGRATORY BIRDS.	First in Harvest.	First in Harvest.
Barberry,		Apple,			Cuckoo,		
Broom,		Black Currant,			House-Swallow,		
Hazel,		Cherry,			Lapwing,		
Hawthorn,		Gooseberry,			Plover,		
Holly,		Juniper,			Sand-Martin,		
Laburnum,		Peach,			Starling,		
Lilac,		Plum,			Swan,		
Measeon,		Strawberry,			Thall or Corn Crake,		
Mountain Ash or Rowan,					Other Birds, naming them—		
Red Flowering Currant,							
Rhododendron Ponticum,							
Whin,							

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

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

BOOK-POST.

T6

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Braemar*, County of *Abertoe*, in Lat. *57° N.*, Long. *5° 24' W.* Distance from Sea *60* miles.Height of Cistern of the Barometer above Mean Sea-level *1110* feet, above Ground *0* feet.During the MONTH of *April* 1866.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				SUNSHINE.	THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, 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.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		Barometer. No.	Attached Thermometer.	Barometer. No.	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.	Readings of the H-Cup Anemometer.		No. of hours in which it fell.	Amount in inches.	Velocity (0-4), and Direction.	Amount (0-10), and Species.		Velocity (0-6), and Direction.	Amount (0-10), and Species.	9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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BAROMETER, “corrected Mean” at 9 A.M., minus the Correction†† = *28.721*
 for Temp. (Col. 2), = *28.749*..... - *0.028* }
 “Corrected Mean” of Barometer at 9 P.M., minus the Correction†† = *28.720*
 for Temp. (Col. 4), = *28.747*..... - *0.027* }
 Mean at Station, corrected, and at 32°, = *28.720*
 Correction for Height, feet, above Mean Sea-level, = *1.201*
 Mean, reduced to 32°, and Sea-level, = *29.921*
 Highest Reading, corrected for Index error, on the 23 th, = *29.400*
 Lowest Do., Do., on the 16 th, = *28.100*
 Difference, or Monthly Range, = *1.300*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 27 th, = *65.5*
 Lowest in Month, corrected for Index errors, on the 4 th, = *24.0*<

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

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 prevent the bulbs from the wind. The "Maximum" should be freely exposed to the Sun, and the "Minimum" should rest on wooden supports, a few inches from the surface of the grass, in an open situation. Show 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 "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 *calibrated form* of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy and must be made with great care. The bulb must be isolated by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·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 40½°, respectively. So also 40½°, 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. 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 *hour*. In the Society's schedules, the indications registered on the *3rd* are those of a series of phenomena commencing at 9 p.m. on the *2nd*, and extending till 9 p.m. on the *3rd*.

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

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

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.

(*Hints.*—Convenient abbreviations for Luke Howard's

Oxide 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 comprehensiveness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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

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

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

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 *scrape* 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, 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 must be ascertained whether the space above the mercury in the tube, a *sharp tap* is produced. If this is prevented by air it must 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.

Noting an Observation.—The cistern of the 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 open 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 Zamboni's Patent "Maximum" Thermometers are recommended; pinned indications 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 globe, 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 obscuration of the sky *overhead* (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the *clouds' column*, though their appearances and changes ought to be noted among the *Remarks*. The amount of cloud is entered from a scale of 0 to 10; thus, when the sky *overhead* is *half covered* by clouds, 5 is entered as the *observation*, and so on. Observations of the 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; (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

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

Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil, its amount and constancy, the Council recommend that observations in this interesting department be made at 9 a.m., by Thermometers placed in the earth, their bulbs being sunk to 3, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. 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 Schönbien'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 3rd a, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as "3," on the scale, that the wind is from the N.W., and that its force on the scale 0–6 is "4," i.e., that it is *blowing fresh*.

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

Remarks.—The "Remarks" column is too narrow, but 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 hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

The Council recommend that *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.

(By Order) A. B.

Enslin, 9th December 1863.

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In	First Buds	In Leaf	First in Blossom.	First in Blossom.	First in Blossom.
Alder,.....					
Asp,.....					
Beech,.....					
Birch,.....					
Elm,.....					
Larch,.....					
Lime,.....					
Oak,.....					
Sycamore or Plane,.....					
CROPS.		CROPS.		CROPS.	
Planting or sowing	First in Harvest	Planting or sowing	First in Harvest	Planting or sowing	First in Harvest
Barley,.....					
Bare or Hilly,.....					
Oats,.....					
Wheat,.....					
Beans,.....					
Peas,.....					
Potatoes,.....					
Turnips,.....					
Rye Grass,.....					
MIGRATORY BIRDS.		MIGRATORY BIRDS.		MIGRATORY BIRDS.	
First in	First in	First in	First in	First in	First in
Barberry,.....					
Bourtree or Elder,.....					
Broom,.....					
Hazel,.....					
Hawthorn,.....					
Holly,.....					
Laburnum,.....					
Lilac,.....					
Mezereum,.....					
Mountain Ash or Rowan,.....					
Red Flowering Currant,.....					
Rhododendron Ponticum,.....					
Willow,.....					

Have the goodness also to state any information you may be able to collect relative to the Crops of Grass, Hay, Potatoes, Turnips, Fruit, 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.

Braemar
April 1866

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Braman, County of Shetland, in Lat. 57° 4', Long. E 24° 4', Distance from Sea 60 miles.

Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 feet.

During the MONTH of May 1866

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.	CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.					
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.			9 h. P.M.		9 A.M.		P.M.		9 h. A.M.									
		Barometer. No.	Attached Thermometer.	Barometer. No.	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.	Velocity (0-5), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. 3 inches.					No. 12 inches.	No. 22 inches.			
		inches.		inches.																												
	1	28.694		28.574		41.1	29.2	75.2	25.8	56.0	53.0	51.8	51.2	E	1.5	NE	0.5	0.02	Ca	Ca	Ca				88	Hail	1					
	2	28.500		28.412		41.1	32.1	80.8	29.8	55.2	53.0	54.0	52.0	E	0.5	NE	1	0.02	Ca	Ca	Ca						2					
	3	28.292		28.576		41.8	31.2	65.0	50.0	55.8	53.4	54.0	51.4	SW	0.5	SW	1	0.03	Ca	Ca	Ca						3					
	4	28.476		28.550		46.2	32.2	76.8	28.2	59.9	56.0	40.5	56.0	SW	0	SW	1	0.03	Ca	Ca	Ca						4					
	5	28.636		28.524		54.0	57.2	81.0	32.5	43.7	59.8	41.8	59.0	SW	1	SW	1	0.02	Ca	Ca	Ca						5					
	6	28.876		29.030		52.2	58.0	76.8	50.2	44.6	40.0	45.0	42.0	SW	0	SW	0.5	0.03	Ca	Ca	Ca						6					
	7	28.970		28.820		54.8	44.0	90.2	35.8	47.8	43.6	46.0	45.0	SW	0.5	SW	1.5	0	Ca	Ca	Ca						7					
	8	28.634		28.542		54.8	45.4	77.0	44.2	49.3	46.2	47.2	45.8	SW	1	SW	1.5	0.03	Ca	Ca	Ca						8					
	9	28.816		28.580		52.0	44.0	86.2	39.8	47.0	43.8	43.8	41.0	SW	2	SW	1	0.03	Ca	Ca	Ca						9					
	10	28.550		28.590		54.7	44.4	90.0	36.8	45.7	42.0	44.3	42.8	SW	0.5	SW	0.5	0.02	Ca	Ca	Ca						10					
	11	28.810		28.500		48.7	38.0	46.7	35.5	40.6	39.9	39.5	35.0	NE	1	NE	1	0.12	Ca	Ca	Ca						11					
	12	28.588		28.500		47.8	36.8	82.0	35.0	40.0	37.8	39.0	35.8	N	2	N	1	0.56	Ca	Ca	Ca						12					
	13	28.878		28.500		45.0	34.5	51.0	33.5	38.1	35.0	35.8	34.8	N	1	N	1	0.04	Ca	Ca	Ca						13					
	14	29.020		29.110		41.6	34.1	45.5	33.2	37.0	35.0	36.2	34.2	N	0	SW	2	0.06	Ca	Ca	Ca						14					
	15	29.184		29.220		51.0	34.0	92.4	34.0	39.9	36.6	38.0	36.3	NE	0.2	SE	1	0.02	Ca	Ca	Ca						15					
	16	29.184		29.120		55.4	33.2	91.2	29.8	45.0	41.1	47.2	44.0	S	0	SE	1.5	0	Ca	Ca	Ca						16					
	17	29.050		28.990		46.0	40.0	84.0	40.0	50.2	45.2	46.0	43.0	SW	0	S	1	0	Ca	Ca	Ca						17					
	18	28.930		28.966		55.2	35.2	78.8	31.4	48.3	45.5	49.0	46.4	SW	0	SE	0	0	Ca	Ca	Ca						18					
	19	28.988		29.074		65.8	34.2	96.2	31.0	56.0	47.2	50.8	46.4	E	0.2	S	0.5	0	Ca	Ca	Ca						19					
	20	29.176		29.288		67.0	35.0	104.3	29.8	61.7	52.0	50.0	43.8	NE	0	S	1	0	Ca	Ca	Ca						20					
	21	29.376		29.350		60.0	35.5	98.0	26.0	49.0	46.0	45.0	39.8	S	0.2	SW	1.5	0	Ca	Ca	Ca						21					
	22	29.340		29.200		62.0	31.6	99.9	28.0	52.8	45.0	47.3	40.0	SW	0.2	SW	0	0	Ca	Ca	Ca						22					
	23	29.066		28.876		69.0	37.0	106.5	34.0	60.1	54.0	50.7	45.2	SW	0	SE	0.5	0	0	0	0						23					
	24	28.940		28.950		62.2	32.2	104.0	29.2	55.8	47.0	41.4	40.5	SE	0	S	1	0	0	0	0						24					
	25	28.800		28.800		65.2	31.8	106.3	30.3	56.0	46.0	48.5	43.3	SE	0.5	NE	0.5	0	0	0	0						25					
	26	28.680		28.602		64.0	35.0	85.0	31.0	57.1	50.2	49.0	48.0	SW	0	NE	0.2	0	0	0	0						26					
	27	28.488		28.480		55.0	40.4	81.1	36.2	49.0	45.3	46.5	45.7	SW	0	SW	1	0.16	Ca	Ca	Ca						27					
	28	28.522		28.508		55.7	31.5	85.5	39.5	39.0	37.2	37.2	37.2	SW	0.5	SW	1	0.03	Ca	Ca	Ca						28					
	29	28.503		28.706		46.0	35.2	78.0	32.0	42.0	37.2	42.0	39.2	N	0.5	S	0.5	0.03	Ca	Ca	Ca				88	Shower of Snow	29					
	30	28.659		28.780		51.2	31.2	89.0	30.2	44.5	38.9	41.2	39.8	SW	0.2	SW	1	0.01	Ca	Ca	Ca				88	Snow on hills	30					
	31	28.839		28.862		51.8	39.4	61.4	39.2	46.0	43.0	43.0	40.0	NE	0.2	NE	0.5	0	Ca	Ca	Ca				89		31					
Sums.		1616		1513		44.8	34.8	159	149	169	15	149	149	5		6		15	171	159												
Means.		28.557		28.598		1616	1513	159	149	169	15	149	149	142	272			18	1.25	159												
+ Total corrections for Instrumental Errors.		-009		-009		53.6	35.6	32.9	46.4	41.8	42.8	40.0	0.46	0.88				5.5	5.6													
+ Corrections for Diurnal Range.						82.1																										
+ "Corrected Means."		28.783		28.794																												
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

The month has been remarkably dry, and with the exception of the days between the 19th & 26th, very cold. During that week the heat during the day was ~~more~~ oppressive and the nights generally frosty. Vegetation is in a very backward state, and the hay crop, in particular, threatens to be a failure.

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

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++ for Temp. (Col. 2), = 28.737
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = 28.757
Mean at Station, corrected, and at 32°, = 28.737
Correction for Height, feet, above Mean Sea-level, = 1.201
Mean, reduced to 32°, and Sea-level, = 29.938
Highest Reading, corrected for Index error, on the 21st, = 29.376
Lowest Do., Do., on the 11th, = 28.292
Difference, or Monthly Range, = 1.084

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 23rd, = 69.0
Lowest in Month, corrected for Index errors, on the 1st, = 29.2
Difference, or Monthly Range, = 39.8
"Corrected Mean" of all the Highest, (Col. 5), = 53.6
"Corrected Mean" of all the Lowest, (Col. 6), = 35.6
Difference, or Mean Daily Range, = 18.0
** Calculated Mean Temperature of Month, = 44.6

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 3rd, = 106.5
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 82.1
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1st, = 25.8
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 32.9
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 44.6
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 40.8
Computed Temperature of Dew-point, = 36.4
Do. Elastic Force of Vapour, = 2.15
Do. Weight of Vapour in a Cubic Foot of Air, = 3
Relative Humidity, (Saturation = 100), = 74
RAIN fell on 18 Days; Amount in Inches, = 1.28

WIND.												SUMMARY.			
Direction.	N	NE	E	SE	S	SW	W	NW	Caln or Variable.	Mean Force.	Mean Velocity in miles per day.				
A.M.	6	5	1	0	3	14	1	1	0	0.46					
P.M.	3	5	0	3	5	9	2	4	0	0.88					
Mean.	4	5	0	2	4	12	2	2	0	0.67					

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 James A. H. R. (Signed) James A. H. R.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Braman, County of Aburdon

Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 feet.

During the MONTH of Aug 1866

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.		SUNSHINE.	THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		Barometer. No.	Attached Ther- mometer	Max.	Min.	Max. in Sun's rays	Min. on Grass.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	Direction.	Force.	Direction.	Force.	No. of hours in which it fell.	Amount in inches.	Velocity, (0-10), and Species.	Amount, (0-10), and Species.		9 h. A.M.						Temperature of Well at Depth of feet. No.	Temperature at Surface, and Density.	9 A.M.	9 P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† = 28.737
for Temp. (Col. 2), = 2.8... 7.83... - 0.46...
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = 28.757 57
for Temp. (Col. 4), = 2.8... 7.82... - 0.37...
Mean at Station, corrected, and at 32°, = 28.731 747
Correction for Height, feet, above Mean Sea-level, = 1.201
Mean, reduced to 32°, and Sea-level, = 29.932 948
Highest Reading, corrected for Index error, on the 21 th, = 29.376
Lowest Do., Do., on the 12 th, = 28.300 292
Difference, or Monthly Range, = 1.076 084

S.-R. THERMOMETER, (in shade, etc.) Highest in Month (corrected for Index errors), on the 23 th, = 69.0
Lowest in Month, corrected for Index errors, on the 1 th, = 29.2
Difference, or Monthly Range, = 39.8
"Corrected Mean" of all the Highest, (Col. 5), = 53.6
"Corrected Mean" of all the Lowest, (Col. 6), = 35.6
Difference, or Mean Daily Range, = 18.0
** Calculated Mean Temperature of Month, = 44.6

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 23 th, = 106.5
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 82.1
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1 th, = 25.8
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 32.9
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 44.6
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 40.8
** Computed Temperature of Dew-point, = 36.4
** Do. Elastic Force of Vapour, = 215
** Do. Weight of Vapour in a Cubic Foot of Air, = 3
** Relative Humidity, (Saturation = 100), = 78
RAIN fell on 18 Days; Amount in Inches, = 1.28

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		6	5	1	0	3	14	1	1	0	0.46
P.M.		3	5	0	3	5	9	2	4	0	0.88
Mean.		4	5	0	2	4	12	2	2	0	0.67 = 0.46

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 James Aitken
Dr. Huxhall

(Signed) James Aitken

The influenza, noticed last
month, has continued with
but increased severity
during the latter month,
only few having escaped
it.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its *scale-inches* are not true inches, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame, the surface of the mercury is then at the exact height from which the 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 *serve 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 upmost. 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 every local influence. The lids 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-sticks, 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 Zamboni'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 disadvantages, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks the plane of the liquid; when the instrument is subjected against the plane of the liquid; when part of the spirit itself is by high temperature, it will be found in the upper tube, and must be discoloured 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 be made, or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Maximum*" should be freely exposed to the Sun, and the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat to affect the 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 "*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 five 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 mistin 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 mistin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances. One form of "*Mason's*" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the 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 under, 40.4 , 40.5 , or 40.6 , according as it indicates a little under, an exact coincidence with, or a little over 40° , or $40\frac{1}{2}$, respectively. So also $40\frac{1}{4}$, and $40\frac{3}{4}$, 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.

How 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 instruments 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, the "*Wind-gauge*" is also recommended: the method of *indicating* 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 indexed 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 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*" 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 $2\frac{1}{2}$ c.s. will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

Sunshine.—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. **Underground Thermometers.**—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and constancy; the Council recommend that observations in this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to 3, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. 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 Schönbien'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 $5\frac{3}{4}$ s. as an ozone entry in the schedule, will indicate that the ozone paper is tinted as " $5\frac{3}{4}$ " on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is " $5\frac{3}{4}$," *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. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm. The Council recommend that *term-day* observations be taken;—*viz.*, on the 21st days of March, June, September, and December. 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.

Instrument, 9th December 1866.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Last Buds.	In Leaf.	Divided of Leaves.	CROPS.	Sowing or Planting.	Harvesting or Above Ground.	In Ear or Ripe.	First or Ripe.
Alder.					Barley.				
Aspen.					Bare or Bigg.				
Beech.					Oats.				
Birch.					Wheat.				
Elm.					Beans.				
Larch.					Pease.				
Lin.					Peatoes.				
Oak.					Rye Grass.				

SHRUBS, ETC.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.
Barberry.									
Boureaux or Elder.									
Black Currant.									
Broom.									
Hazel.									
Hawthorn.									
Holly.									
Laburnum.									
Lilac.									
Mazone.									
Mountain Ash or Rowan.									
Red Flowering Currant.									
Rhododendron Ponticum.									
Whin.									

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



EDINBURGH.

10, St Andrew Square.

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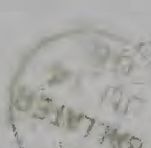
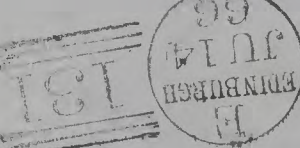
Secretary of the Meteorological Society of Scotland,

Mr ALEXANDER BUCHAN,

BOOK-POST.

Edinburgh May 1866

To



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Perth, County of Perth, in Lat. 57° 4', Long. 3° 24', Distance from Sea 60 miles.Height of Cistern of the Barometer above Mean Sea-level 110 feet, above Ground 5 feet.During the MONTH of June 1866.

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.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA. Temperature at 1 fathom, and Density.	OZONE. 0-10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. 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.		9 h. P.M.		Readings of the H-Cup Anemometer. No.		No. of hours in which it fell.	Amount in inches.	9 A.M.			P.M.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		Barometer. * No.	Attached Thermometer	Barometer. No.	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	9 h. A.M.	9 h. P.M.			Velocity (0-6), and Direction.	Amount (0-10), and Species.		Velocity (0-6), and Direction.	Amount (0-10), and Species.	No. 9 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), = 28.681
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++
for Temp. (Col. 4), = 28.684
Mean at Station, corrected, and at 32°, = 28.682
Correction for Height, feet, above Mean Sea-level, = 1.201
Mean, reduced to 32°, and Sea-level, = 29.883
Highest Reading, corrected for Index error, on the 24th, = 29.124
Lowest Do., Do., on the 16th, = 28.210
Difference, or Monthly Range, = 0.914

* 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 capillary and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ "Frequently, 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 byJames G. Allen
J. Marshall

(Signed)

James G. Allen

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 26th, = 78.9
Lowest in Month, corrected for Index errors, on the 20th, = 32.7
Difference, or Monthly Range, = 46.2
"Corrected Mean" of all the Highest, (Col. 5), = 62.7
"Corrected Mean" of all the Lowest, (Col. 6), = 46.4
Difference, or Mean Daily Range, = 16.3
** Calculated Mean Temperature of Month, = 54.6

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 24th, = 117.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 90.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 20th, = 30.0
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 44.4
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 54.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 50.7
†† Computed Temperature of Dew-point, = 47.3
†† Do. Elastic Force of Vapour, = 32.5
†† Do. Weight of Vapour in a Cubic Foot of Air, = 77
†† Relative Humidity, (Saturation = 100), = 77
RAIN fell on 14 Days; Amount in Inches, = 1.49

WIND.	SUMMARY.										Mean Force.	Mean Velocity in miles per day.
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.		
A.M.		6	5	2	2	4	10	4	3		0.27	
P.M.		1	8	2	2	4	9	3	1		0.92	
Mean.		0	6	2	2	4	10	4	2	0	0.60	0.36

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Præmar, County of Aburdeen, in Lat. 57° N., Long. 7° 20' W., Distance from Sea 60 miles.Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 0 feet.During the MONTH of July 1866.

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.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA. Temperature at 1 fathom, and Depth.	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.		9 h. P.M.		9 A.M.		P.M.			9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max.	Min.	Max. in Sun's rays.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	Amount in inches.	Velocity (0-10), and Direction.	Amount (0-10), and Species.		Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. 3 inches.					No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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BAROMETER, "corrected Mean" at 9 A.M. (minus the Correction) = 28.758
 for Temp. (Col. 2), = 29.777 - 0.009 = 29.768
 "Corrected Mean" of Barometer at 9 A.M. (minus the Correction) = 28.758
 for Temp. (Col. 4), = 29.777 - 0.009 = 29.768
 Mean at Station, corrected, and at 32°, = 28.28 - 0.66 = 27.62
 Correction for Height, feet, above Mean Sea-level, = 1.201
 Mean, reduced to 32°, and Sea-level, = 29.901 - 0.009 = 29.892
 Highest Reading, corrected for Index error, on the 16 th, = 29.140
 Lowest Do., Do., on the 3 th, = 27.973
 Difference, or Monthly Range, = 1.168

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 12 th, = 83.8
 Lowest in Month, corrected for Index errors, on the 4 th, = 36.3
 Difference, or Monthly Range, = 47.5
 "Corrected Mean" of all the Highest, (Col. 5), = 63.6
 "Corrected Mean" of all the Lowest, (Col. 6), = 47.3
 Difference, or Mean Daily Range, = 16.3
 ** Calculated Mean Temperature of Month, = 55.4

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the 12 th, = 121.0
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 91.6
 Lowest at Night, Black Bulb, (corrected for Index errors), on the 4 th, = 35.0
 "Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 45.7
 Difference of above Means or Range ("exposed"), = 45.7

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 54.8
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 50.8
 II Computed Temperature of Dew-point, = 47.84
 II Do. Elastic Force of Vapour, = 32.86
 II Do. Weight of Vapour in a Cubic Foot of Air, = 78
 II Relative Humidity, (Saturation = 100), = 78
 RAIN fell on 19 Days; Amount in Inches, = 2.75

WIND.	SUMMARY.										Mean Force.	Mean Velocity in miles per day.
	Direction.	N	NE	E	SE	S	SW	W	NW	Variable.		
A.M.		3	8	2	2	0	15	1	0	0	0.33	
P.M.		4	7	1	1	6	5	0	0	0	0.53	
Mean.		4	8	4	2	0	10	3	0	0	0.43	

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

James A. Smith
J. A. Smith

(Signed)

James A. Smith

THE above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays, and the least from radiation during night. Their bulbs have a black coating, which may easily be made, or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "Maximum" should be freely exposed to the Sun, and the "Minimum" 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 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 Meteorological Secretary.

The *Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and *well-tested form* of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the frame and frame to which they are attached;—the frame must be such as will bring the tubes suspended by an inch, from any board on which it may be supported; 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 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 pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·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°·1, respectively. So also 40°·3, and 40°·7, 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 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, 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 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 *Deflecting* Wind Force by such tables as that given in the schedule is, to say the least, unsatisfactory.

Reinforces.—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

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

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

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

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

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

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

Ozone.—Mention whether Schönbain'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 *+*, as an *ozone* only in the schedule, will indicate that the ozone paper is tinted as "3," on the scale, that the wind is from the N.W., and that its force on the scale 0–6 is "4"; *i.e.*, that it is *blowing fresh*.

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

Remarks.—The "Remarks" column is too narrow, but 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 gales, 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, auroral boreas, 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 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 *even-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.

EDINBURGH, 9th December 1863.

Braemar, July, 1865

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

10, St Andrew Square

FOREST TREES.		FRUITS.		NEGATORY BIRDS.		First Arrival.	
In	First appearance.	In	First appearance.	First in	First in	First in	First in
Alder		Apple		Chickadee			
Ash		Black Currant		Cuckoo			
Beech		Cherry		Curlew			
Birch		Gooseberry		House Swallow			
Elm		Hawthorn		Lapwing			
Larch		Holly		Plover			
Linne		Laburnum		Sand Martin			
Plane		Peach		Starling			
Sycamore or Plane		Pear		Swallow			
		Plum		Thrush			
		Strawberry		Other Birds, naming them			

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS

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

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Braemar, County of Aberdeen, in Lat. 57° 41', Long. 2° 24' W, Distance from Sea 60 miles.Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 feet.During the MONTH of August 1866.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				SUNSHINE.	THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.			9 h. A.M.						
		Barometer. No.	Attached Ther- mometer	Barometer. No.	Attached Ther- mometer	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force			Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.		No. 3 inches.	No. 12 inches.	No. 22 inches.				
		inches.	"	inches.	"	No.	No.	No.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force	9 h. A.M.	9 h. P.M.	No.	inches.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.		Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	No. 3 inches.				
1	28.729		28.572	58.8	54.8	99.0	52.4	51.8	47.4	51.2	48.2	NE	0	SE	1			0		2	4	4	4						8 6	1	
2	28.482		28.560	58.2	49.0	62.7	48.0	49.4	48.0	51.2	50.0	NE	0	NE	0			0.57		2	4	4	4						9 8	2	
3	28.552		28.200	60.0	46.8	96.2	46.0	51.2	51.2	50.2	48.0	SW	0	SW	1.5			0.06		2	4	4	4						8 8	3	
4	28.576		28.300	58.8	47.0	92.2	44.0	52.2	47.0	48.4	48.0	SW	1	SW	1.5			0.06		2	4	4	4						10 9	4	
5	28.580		28.484	53.6	48.2	91.2	41.0	48.0	44.0	47.8	42.2	SW	1	SW	1			0.22		2	4	4	4						10 9	5	
6	28.555		28.391	54.0	46.0	65.0	40.0	48.5	46.8	49.2	48.6	S	0	SW	0.5			0.03		2	4	4	4						4 9	6	
7	28.570		28.980	55.0	46.8	91.2	41.0	49.0	47.4	48.6	47.2	S	0	W	0			0.25		2	4	4	4						2 8	7	
8	28.256		28.150	55.8	45.2	91.0	41.8	50.2	46.0	48.2	47.2	SW	1	SW	0.2			0.25		2	4	4	4						1 8	8	
9	28.450		28.470	56.5	46.1	92.0	46.0	50.0	48.0	47.8	46.0	SW	0	W	0.5			0.28		2	4	4	4						8 8	9	
10	28.450		28.724	57.0	42.0	76.8	40.0	50.0	47.2	48.0	46.0	SW	0	NE	0.2			0.04		2	4	4	4						9 8	10	
11	28.570		28.786	56.8	42.0	87.0	39.0	48.2	46.0	48.2	45.2	SW	0.2	SE	0.2			0.64		2	4	4	4						9 9	11	
12	28.616		28.640	52.0	43.0	60.0	40.0	47.0	47.8	49.8	48.8	S	0	SE	0.2			0.02		2	4	4	4						9 8	12	
13	28.772		28.650	55.0	47.8	92.0	44.0	52.8	50.4	52.8	52.0	SE	0	SE	0.2			0.12		2	4	4	4						8 8	13	
14	28.580		28.820	54.7	49.8	92.0	46.0	56.8	50.8	58.8	52.4	SW	0	W	0.5			0.28		2	4	4	4						9 8	14	
15	28.642		28.576	57.2	47.0	101.0	41.5	50.8	46.8	48.0	45.8	SW	0	SW	0.5			0		2	4	4	4						9 8	15	
16	28.532		28.850	56.0	45.0	88.0	40.0	46.8	48.8	48.8	46.6	SW	0.5	SE	0.2			0.10		2	4	4	4						9 7	16	
17	28.500		28.660	56.2	45.4	82.0	40.0	47.0	46.8	48.2	46.0	SW	0.5	W	0			0.15		2	4	4	4						9 9	17	
18	28.672		28.540	57.2	47.8	96.8	46.8	49.0	46.2	47.1	46.0	SW	0	W	0.5			0.07		2	4	4	4						9 9	18	
19	28.582		28.602	57.2	46.0	95.0	39.0	48.8	49.9	58.0	55.8	SW	0.5	SW	0			0.06		2	4	4	4						9 8	19	
20	28.714		28.780	58.2	52.0	94.2	48.2	47.8	56.0	54.0	51.8	NE	0	SW	0.5			0.08		2	4	4	4						8 8	20	
21	28.850		28.900	60.0	50.0	100.0	49.0	48.9	52.2	52.0	51.6	NE	0	SW	0			0		2	4	4	4						8 8	21	
22	28.890		28.900	66.8	48.8	120.2	46.0	47.2	48.2	49.0	47.7	W	0	S	0			0		2	4	4	4						9 8	22	
23	28.900		28.920	68.9	46.2	86.0	46.2	50.8	54.0	54.2	50.2	SW	0	SW	0			0		2	4	4	4						8 8	23	
24	28.870		28.974	62.0	47.0	94.0	46.0	50.5	52.7	54.0	53.2	NE	0	SW	0			0.02		2	4	4	4						9 8	24	
25	28.828		28.736	65.0	44.0	76.8	48.0	58.5	58.0	58.8	56.2	SW	0	S	0.5			0		2	4	4	4						9 9	25	
26	28.714		28.620	66.8	47.0	90.0	55.0	58.2	56.8	58.0	55.0	SW	0.5	SW	1			0.15		2	4	4	4						8 8	26	
27	28.432		28.672	59.8	51.0	77.0	40.0	54.8	56.1	50.7	47.9	SW	0.5	SW	0.6			0.14		2	4	4	4						8 9	27	
28	28.520		28.520	57.0	48.2	65.0	41.0	52.8	49.2	56.6	50.8	SW	0	SW	0			0		2	4	4	4						8 8	28	
29	28.572		28.490	56.8	48.8	65.2	42.2	52.5	50.2	60.0	47.8	NE	0	NE	0.2			0		2	4	4	4						9 8	29	
30	28.486		28.574	66.0	47.0	120.0	40.2	50.0	48.8	47.2	45.2	SW	0	SW	0			0		2	4	4	4						9 8	30	
31	28.600		28.542	61.2	45.0	102.8	38.2	52.2	48.8	50.0	48.2	SW	0	SW	0.5			0		2	4	4	4						8 8	31	
Sums.	18.145 17.009		17.054 17.023	515.04 274.5	176.2025 197.9747	114.5 127.533	151.24 1335.3	169.44 65.4	141.0 28.47	169.44 17.0255		5.7	14.4					21 3.48		217		232						269.256			
Means.	28.549		28.549	58.9	46.4	88.6	43.1	52.1	49.2	50.6	48.5	0.18	0.46							7.0		7.5						8.783			
† Total corrections for Instrumental Errors.	-0.09		-0.09					-0.1	-0.1			0.6																	8.5		
‡ Corrections for Diurnal Range.																															
“Corrected Means.”	28.540		28.540					49.1	48.4																						
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†† = 28.479
 for Temp. (Col. 2), = 28.541 - 0.061 }
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = 28.482
 for Temp. (Col. 4), = 28.540 - 0.058 }
 Mean at Station, corrected, and at 32°, = 28.486
 Correction for Height, feet, above Mean Sea-level, = 1.201
 Mean, reduced to 32°, and Sea-level, = 29.687
 Highest Reading, corrected for Index error, on the 23rd, = 28.930
 Lowest Do., Do., on the 7th, = 27.870
 Difference, or Monthly Range, = 1.060

* 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.
 †† 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.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 19th, = 67.3
 Lowest in Month, corrected for Index errors, on the 1st, = 34.8
 Difference, or Monthly Range, = 32.5
 "Corrected Mean" of all the Highest, (Col. 5), = 58.9
 "Corrected Mean" of all the Lowest, (Col. 6), = 46.4
 Difference, or Mean Daily Range, = 12.5
 ** Calculated Mean Temperature of Month, = 52.6

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 22nd, = 120.2
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 88.6
 Lowest at Night, Black Bulb, (corrected for Index errors), on the 1st, = 32.4
 "Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 43.1
 Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 57.4
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 48.8
 †† Computed Temperature of Dew-point, = 46.1
 †† Do. Elastic Force of Vapour, = 3.14
 †† Do. Weight of Vapour in a Cubic Foot of Air, =
 †† Relative Humidity, (Saturation = 100), = 82
 RAIN fell on 21 Days; Amount in Inches, = 3.48

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		0	6	0	1	3	14	1	6		0.18
P.M.		0	3	0	3	3	15	4	3		0.46
Mean.		0	4	0	2	3	14.5	2.5	0		0.32 = 0.10

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

James S. Porter
D. Macfarlane

(Signed)

James S. Porter

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 different kinds of 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 completeness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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

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

Two moderate-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. de la Roche, 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 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; whose coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When *severe*, 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 *verrier*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *seize* up the 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 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 Zambert'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 lobes, 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 mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Maximum*" should be freely exposed to the Sun, and the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat to affect the 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 warped to 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 wet 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 the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "*Mason's*" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the 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 readings 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 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 40½°, respectively. So also 40½°, and 40¾°, 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 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd. Wind.—A wind-vane ought to be elevated 12 feet at least, above surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always when the wind is feeble, reference must be made to the direction of the lower strata of clouds overhead, and to the direction of smoke, etc.

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at important 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 *Testing* 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-gauges 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

(By Order.) A. B.

Edinburgh, 30th December 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 "*Remarks*." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is half-covered by clouds, 5 is entered as the *observation*, and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "*Velocity* and Direction," 2, W.; (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 the (*extreme*) speed of the former. Again, in the second "*Cloud*" column, an entry of 2, cu-st.; (cu.) 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.

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

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

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At or near the line 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. This 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 3³⁰ w., as an ozone entry in the schedule, will indicate that the ozone paper is timed as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0-6 is "4," i.e., that it is *blowing fresh*.

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

Remarks.—The "*Remarks*" column is too narrow, but 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 hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

The Council recommend that *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.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Leaf Buds first appear.	In Leaf.	Diseased or moulting variety.	CROPS.	Sowing or above ground.	In Ear.	First Cut or Harvest.
Alley.					Barley or Bigg.			
Ash.					Oats.			
Beech.					Wheat.			
Birch.					Beans.			
Elm.					Peas.			
Larch.					Potatoes.			
Oak.					Turnips.			
Sycamore or Plane.					Rye Grass.			

SHRUBS, ETC.	First in Blossom.	FRUITS.	First in Blossom.	First in Fruit.	First Arrival.	Departure.
Barberry.		Apple.		Cuckoo.		
Bourtree or Bladd.		Black Currant.		Curlew.		
Broom.		Cherry.		House-Swallow.		
Hazel.		Gean.		Lapwing.		
Hawthorn.		Gooseberry.		Plover.		
Holly.		Peach.		Sand-Martin.		
Laburnum.		Pear.		Starling.		
Lilac.		Plum.		Swan.		
Mezeron.		Strawberry.		Rail or Corn Crane.		
Mountain Ash or Rowan.				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, Fruit, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc. Whether

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

BOOK-POST.

Success
August 1866



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Braemar, County of Scordeen, in Lat. 57° N, Long. 3° 24' W, Distance from Sea 60 miles.

Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 3 feet.

During the MONTH of September 1866.

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.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA. Temperature at 1 fathom, and Density.	OZONE. 0-10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. 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.		9 h. P.M.		9 A.M.		P.M.			9 h. A.M.																
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	No.	Max.	Min.	Max.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No.	Amount in inches.	Velocity (0-10), and Direction.		No.	Amount (0-10), and Species.	Velocity (0-10), and Direction.					No.	Amount (0-10), and Species.	No.	Amount (0-10), and Species.	No.	Amount (0-10), and Species.				
		* No.		No.		No.				No.										No.				No.							No.			No.			No.		
		inches.		inches.																9 h. A.M.	9 h. P.M.																		
	1	28.458		28.410		37.0	45.0	103.8	40.0	30.5	47.5	44.8	43.0	SW	0.5	SW	0		0.21	SW	0.2											1							
	2	28.208		28.280		34.0	42.0	76.8	38.2	48.8	48.0	46.0	43.4	SW	0	SW	0.2		0.05	SW	0.2											2							
	3	28.658		28.520		32.3	42.5	76.0	37.0	54.8	48.2	42.0	39.8	SW	0.2	SW	0.2		0.03	SW	0.2											3							
	4	28.464		28.278		35.1	37.2	92.0	29.0	47.0	42.8	47.8	46.3	SW	0.2	SW	0		0.02	SW	0											4							
	5	28.090		28.050		33.0	45.0	74.3	38.0	46.8	46.0	48.8	48.0	SW	0	SW	0		0.43	SW	0											5							
	6	28.252		28.310		35.5	41.0	86.2	36.0	49.3	46.2	42.4	41.3	SW	0.2	SW	0.2		0.26	SW	0.2											6							
	7	28.360		28.336		38.0	32.4	98.0	30.0	47.8	48.2	48.2	47.8	SE	0	SE	0		0	SE	0										Falling Stars	7							
	8	28.648		28.710		37.2	43.4	73.9	36.0	50.2	48.0	49.0	48.8	SW	0	SW	0		0.34	SW	0											8							
	9	28.650		28.658		32.7	44.9	57.8	38.0	49.2	46.8	50.3	49.3	SE	0	SE	0.5		0.04	SE	0.5											9							
	10	28.350		28.240		38.8	38.0	66.0	45.0	55.0	53.2	54.7	52.7	SE	1	SE	0.8		0.10	SE	0.8											10							
	11	28.036		28.000		34.7	47.3	101.0	46.2	49.0	47.8	51.2	48.0	SE	0.2	SE	0.2		0.02	SE	0.2											11							
	12	28.670		28.561		36.0	38.0	76.3	37.1	46.0	42.4	46.0	43.3	SE	0.5	SE	0.2		0	SE	0.5											12							
	13	28.072		28.351		33.0	43.2	62.3	41.0	46.8	46.0	48.0	47.8	W	0	W	0		0.02	W	0											13							
	14	28.924		28.060		34.0	46.8	72.0	45.0	44.7	48.8	47.0	46.3	SE	0.2	SE	0.5		0.12	SE	0.5											14							
	15	28.240		28.220		34.3	42.0	99.0	40.2	48.1	45.0	44.4	40.0	SW	0.3	SW	1		0.06	SW	1											15							
	16	28.132		28.282		31.8	39.6	91.2	35.2	46.8	44.3	41.0	40.0	SE	0	SE	1		0	SE	0											Aurora Borealis	16						
	17	28.376		28.380		34.0	41.8	101.0	36.0	46.3	42.9	46.3	43.8	SW	0.5	SW	0.5		0	SW	0.5										Falling Stars	17							
	18	28.664		28.350		31.9	45.0	61.2	41.0	48.5	45.3	51.0	50.0	SE	0	SE	1.5		0	SE	1.5											18							
	19	28.280		28.392		32.7	41.8	84.2	36.0	48.4	46.5	46.0	44.8	SW	0.5	SW	0.5		0.15	SW	0.5											Lunar Rainbow	19						
	20	28.442		28.060		37.0	48.8	66.7	42.0	49.3	46.0	46.8	45.8	SW	1.5	SW	0.5		0.05	SW	1.5											20							
	21	27.494		27.900		31.0	40.2	78.0	36.2	46.0	41.0	43.3	40.8	SW	0.5	SW	1.5		0.19	SW	1.5											21							
	22	27.406		28.002		31.0	42.2	92.2	34.5	45.3	42.2	45.2	41.0	SW	1	SW	1		0.05	SW	1											22							
	23	28.178		28.330		30.2	32.3	94.8	28.0	44.8	42.2	46.8	41.2	SW	0.3	SW	1		0.02	SW	0.3											23							
	24	28.434		28.326		32.8	32.5	74.0	30.4	42.5	41.8	43.0	42.7	SE	0	SE	1		0	SE	0											24							
	25	28.544		28.456		32.0	38.3	62.2	36.8	50.2	47.2	51.1	49.9	SE	1	SE	3		0.12	SE	3											25							
	26	28.540		28.660		35.4	47.3	85.0	38.0	48.8	46.5	50.4	47.2	SW	0	SW	1.5		0.27	SW	1.5											26							
	27	28.716		28.724		32.0	45.2	62.0	40.2	47.3	46.2	48.8	46.1	SE	0.5	SE	1		0.02	SE	0.5											27							
	28	28.870		28.840		32.8	35.2	56.0	31.8	38.8	35.2	46.2	44.8	SE	0	SE	0		0.02	SE	0											28							
	29	28.772		28.850		32.0	41.0	54.2	38.1	46.6	46.0	52.0	51.8	SE	0.2	SE	0.2		0.78	SE	0.2											29							
	30	28.808		29.100		31.0	44.7	105.8	35.0	50.3	48.5	40.0	39.3	SE	0	SE	0		0.13	SE	0											30							
	31																																31						
	Sums.	151510		12124		51184	216	137	133	1812	159	139	143		5	5			24	35	214	208																	
	Means.	28.405		28.418		54.2	41.8	79.6	36.9	47.8	45.3	46.7	45.1		0.31	0.59			7.1	6.9																			
	+ Total Corrections for Instrumental Errors.	-0.09		-0.09																																			
	+ Corrections for Diurnal Range.																																						
	+ "Corrected Means."	28.396		28.409																																			
	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), = 28.349
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 28.363
 Mean at Station, corrected, and at 32°, = 28.356
 Correction for Height, feet, above Mean Sea-level, = 1.207
 Mean, reduced to 32°, and Sea-level, = 29.557
 Highest Reading, corrected for Index error, on the 30 th, = 29.100
 Lowest Do., Do., on the 22 th, = 27.906
 Difference, or Monthly Range, = 1.194

* 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.
 † Enclosing 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 form.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 11 th, = 59.7
 Lowest in Month, corrected for Index errors, on the 23 th, = 32.3
 Difference, or Monthly Range, = 27.4
 "Corrected Mean" of all the Highest, (Col. 5), = 54.2
 "Corrected Mean" of all the Lowest, (Col. 6), = 41.8
 Difference, or Mean Daily Range, = 12.4
 ** Calculated Mean Temperature of Month, = 48.0

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the 30 th, = 105.8
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 79.6
 Lowest at Night, Black Bulb, (corrected for Index errors), on the 23 th, = 38.0
 "Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 36.9
 Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 47.2
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 45.1
 †† Computed Temperature of Dew-point, = 42.8
 †† Do. Elastic Force of Vapour, = 2.75
 †† Do. Weight of Vapour in a Cubic Foot of Air, = 86
 †† Relative Humidity, (Saturation = 100), = 86
 RAIN fell on 24 Days; Amount in Inches, = 3.43

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		0	6	0	2	5	13	2	2	0
P.M.		0	2	0	3	1	19	3	2	0
Mean.		0	4	0	2	3	16	3	2	0

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

James A. H. H.
R. H. H.

(Signed)

James A. H. H.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

The above remarks apply equally to the Thermometers for registering the greatest heat from the Sun's rays, and the least from radiation during night. Their bulbs have a black coating, which may easily be made, or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "Maximum" should be freely exposed to the Sun, and the "Minimum" 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, unalloyed 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 are specially liable to vitiate the "Hygrometrical Deductions," Observers are 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 point 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 the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "Mason's" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the 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—39.3, 40.1, or 40.7; 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 40.3, respectively. 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 36th of those of a series of phenomena commencing at 9 p.m. on the 24th, and extending till 9 p.m. on the 30th.

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 wind is feasible, reference must be made to the direction of the lower strain 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 important 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 unavoidable 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.

Thanks.—Convenient abbreviations for Luke Howard's

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

Observations of the clouds are made at 9 a.m. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 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 $\frac{1}{2}$ (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 constancy; the Council recommend that observations in this interesting department be made at 9 a.m., by thermometers placed in the earth, their bulbs being sunk to 3, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. Mention must be made of the geological formation and agricultural condition of the soil in which these thermometers are placed.

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

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

Quakes.—Mention whether Schönböck'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 $\frac{1}{2}$; as an *entry* in the schedule, will indicate that the *quake* paper is *tinted* as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4." *i.e.*, that it is *blowing fresh*.

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

Remarks.—The "Remarks" column is too narrow, but unavoidable so. Some of the most valuable observations that can be taken are those for which no rules can be given nor lions 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 hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

Edinburgh, 4th December 1866.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Flowering.	In Leaf.	Leaf buds.	In first appearance.	Decayed.
Alder.					
Aspen.					
Beech.					
Birch.					
Elm.					
Larch.					
Maple.					
Pine.					
Spruce.					
Yew.					

SHRUBS, ETC.	First in blossom.	First in fruit.	First in blossom.	First in fruit.
Apple.				
Black Currant.				
Cherry.				
Gooseberry.				
Hawthorn.				
Laburnum.				
Malva.				
Mezereum.				
Mountain Ash or Rowan.				
Red Flowering Currant.				
Rhododendron Ponticum.				
Whin.				

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

BOOK-POST.

EDINBURGH.

10, St. Andrew Square.

Secretary of the Meteorological Society of Scotland.

Mr ALEXANDER BUCHAN,

Braemar Sept 1866.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Præmar, County of Aberdeen, in Lat. 57° N., Long. 5° 24' W. Distance from Sea 60 miles.

Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 feet. During the MONTH of October 1866.

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.			Temperature of WELL at Depth of feet. No.	SEA. Temperature at 1 fathom, and Density.	OZONE. 0—10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. 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.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.													
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H-Cup Anemometer. No.	No. of hours in which it fell.	Amount to inches. No.	Velocity, (0—6), and Direction.	Amount, (0—10), and Species.						Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.	Temperature of WELL at Depth of feet. No.	Temperature at 1 fathom, and Density.	0—10.
		inches.		inches.																															
	1	29.112		29.050		57.8	29.0	102.0	26.2	55.0	36.5	50.0	49.3	SW	0	S	0			0												1			
	2	29.000		29.050		55.0	58.2	125.0	37.2	44.9	44.8	46.4	46.0	S	1	S	0			0												2			
	3	29.050		29.078		55.0	46.8	63.8	41.8	49.1	48.8	53.2	53.0	NE	0	S	0.5			0.02												3			
	4	29.050		29.074		61.4	48.3	121.0	46.3	54.0	50.8	53.4	52.7	E	0	S	0			0												4			
	5	29.220		29.310		61.0	44.2	98.0	45.3	54.8	51.1	52.0	51.0	N	0	S	0			0												5			
	6	29.344		29.388		62.8	43.2	108.2	37.0	44.8	48.0	48.9	47.0	SW	0	S	0			0												6			
	7	29.260		29.284		60.2	45.0	101.0	38.2	50.1	47.8	46.1	44.8	SW	0.5	SW	1			0												7			
	8	29.276		29.284		58.5	36.2	115.2	36.0	41.0	40.2	53.9	51.2	SW	0	S	0.5			0												8			
	9	29.202		29.160		56.3	39.7	104.0	30.8	47.3	44.8	58.0	57.2	S	1	S	0.5			0												9			
	10	29.078		29.008		54.0	33.2	100.0	26.0	35.8	35.5	41.2	40.3	S	0	S	0			0												10			
	11	29.050		28.976		56.1	41.0	71.8	31.2	44.8	43.8	46.3	44.8	S	0	S	0.2			0												11			
	12	28.850		28.754		51.3	41.8	69.0	39.0	45.2	44.0	47.3	46.3	SW	0.2	S	0.5			0.23												12			
	13	28.654		28.752		48.0	39.2	53.2	35.8	41.8	40.8	38.3	36.2	N	0	S	0			0.13												13			
	14	28.840		28.804		44.8	29.0	79.0	25.2	37.3	34.6	37.2	35.8	SW	0	SW	0.5			0												14			
	15	28.828		28.950		47.8	37.0	80.0	29.2	42.0	39.8	38.2	37.8	SW	0	N	0.5			0												15			
	16	29.000		29.004		48.3	36.8	56.2	30.3	35.0	34.2	45.3	40.3	N	0	N	1			0.03												16			
	17	28.900		28.850		47.9	37.0	73.0	35.0	43.3	40.2	46.0	43.2	SE	1	SE	0.5			0												17			
	18	28.800		28.750		51.0	43.0	64.2	37.0	48.0	45.0	48.0	47.2	SE	1	S	2			0												18			
	19	28.750		28.756		50.3	48.0	59.6	44.8	50.8	49.8	54.0	52.0	SE	1	SW	1			0.520												19			
	20	28.952		28.988		56.0	48.1	83.0	41.2	52.0	50.0	47.0	46.2	S	1.5	SW	1			0.07												20			
	21	28.880		28.744		52.0	47.0	57.2	45.8	53.2	51.8	52.8	51.5	S	0.2	S	1			0												21			
	22	28.740		28.837		54.8	45.0	63.0	43.0	52.7	51.1	45.6	44.8	SW	0.5	S	0			0.77												22			
	23	28.820		28.720		49.8	50.8	64.7	29.8	35.0	34.8	49.8	48.0	SW	0	SW	0.5			0.07												23			
	24	28.400		28.400		51.8	39.0	58.0	37.0	46.8	45.3	39.3	38.5	SW	0.2	SW	1			0.27												24			
	25	28.550		28.700		47.0	50.0	87.0	23.4	33.1	32.8	30.0	29.3	SW	0	SW	0			1.03												25			
	26	28.740		28.688		44.8	25.3	70.3	16.2	24.8	24.3	39.0	37.9	SW	0	SW	0.5			0												26			
	27	28.664		28.540		49.9	38.8	65.0	24.0	45.8	45.0	48.0	47.3	SW	0.2	SW	0.5			0												27			
	28	28.724		28.914		51.4	38.4	79.3	30.3	40.8	38.3	38.7	37.8	SW	1	SW	1			0.19												28			
	29	28.692		28.538		49.0	35.3	79.9	34.8	44.8	41.8	45.0	44.2	SW	1	SW	1			0.03												29			
	30	28.330		28.604		48.5	38.8	87.3	33.9	42.3	42.0	49.3	36.5	SE	0	SW	1			0												30			
	31	28.752		28.504		46.0	34.2	67.4	30.0	39.8	37.7	38.8	38.4	SW	0.2	SW	0			0												31			
Sums.		1511.4		1612.10		1511	115	166	149	1212	1214	188	1611	2	5					26															
		27.488		27.325		1620.0	1212.3	2523.3	1059.7	1347.0	1306.7	1393.7	1355.3	8.5	17.2					13	3.52														
Means.		28.887		28.881		52.3	39.1	81.4	34.2	43.5	42.2	45.0	43.7	0.27	0.63																				
Total Corrections for Instru- mental Errors.		-0.04		-0.04																															
Corrections for Diurnal Range.																																			
"Cor- rected Means."		28.878		28.872						42.1		43.6																							
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++ = 28.839
for Temp. (Col. 2), = 28.878..... - 0.039
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ = 28.828
for Temp. (Col. 4), = 28.872..... - 0.044
Mean at Station, corrected, and at 32°..... = 28.834
Correction for Height, feet, above Mean Sea-level, = 1.207
Mean, reduced to 32°, and Sea-level, = 30.035
Highest Reading, corrected for Index error, on the 6 th, = 29.344
Lowest Do., Do., on the 30 th, = 28.330
Difference, or Monthly Range, = 1.014

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 6 th, = 62.8
Lowest in Month, corrected for Index errors, on the 26 th, = 25.3
Difference, or Monthly Range, = 37.5
"Corrected Mean" of all the Highest, (Col. 5), = 52.3
"Corrected Mean" of all the Lowest, (Col. 6), = 39.1
Difference, or Mean Daily Range, = 13.2
** Calculated Mean Temperature of Month, = 45.7

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 2 th, = 125.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun = 81.4
Lowest at Night, Black Bulb, (corrected for Index errors), on the 26 th, = 16.2
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 34.2
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 44.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 42.8
II Computed Temperature of Dew-point, = 41.1
II Do. Elastic Force of Vapour, = 2.59
II Do. Weight of Vapour in a Cubic Foot of Air, = 89
II Relative Humidity, (Saturation = 100), = 89
RAIN fell on 13 Days; Amount in Inches, = 3.52

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		1	2	1	3	6	14	2	2	7.7	0.27
P.M.		0	0	0	1	13	12	4	1	0.55	0.55
Mean.		0	1	0	2	10	13	3	2	4.1	0.41 = 9.17

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 James McRae (Signed) James McRae

OBSERVATIONS,

H REMARKS ON THE USE OF INSTRUMENTS.

The importance of the objects of immediate importance, that the Scottish
 Geographical Society has proposed to itself, is to secure a
perfect uniformity in the system of observation pursued at all its
 stations. A certain degree of uniformity is absolutely necessary
 to justify the publication of Monthly Results from different
 Observations; and it is found that differences between the
 Observations 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
 voluntarily 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 pub-
 lished by the Society, an entire comparableness among the
 several Returns, without which the Society's Reports must
 inevitably fail in achieving one of the main objects of Meteo-
 rological Observation.

Hour of Observation.—The Council recommends 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, giving at the top of the schedule. It is hoped that the utmost uniformity in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; such instances, they are specially requested to mark opposite

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

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

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

the system. 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 scales of the *cistern* are of leather, and thus, by the expansion and contraction of the leather, the scales are aided 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 plate, whose stem passes freely through the lid and case of the cistern. When the *water-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

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 *ascend* 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 cured by the cistern, and got rid of by inverting the Barometer (care being taken to prevent the loss of mercury by this plan failing 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 *position*, and 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 instrument carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the tube—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 the 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 the least 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.

Negretti and Zambra's Patent "Macchioni" instrument is recommended; printed directions for their use may be obtained with each instrument. The "*Macchioni*" Thermometer of Radford is recommended when graduated on the glass stem and allied to a frame separate from the "*Macchioni*". 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 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 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 therefore ought to be estimated from the amount of cloud in the sky *overlaid* (i.e., within the greater or less extension of the sky *overlaid* (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon ought to be observed obliquely; and thus, being unable to judge the horizontal extent, we 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 from a scale of 0 to 10; thus, when the sky *overlaid* 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," u , v , w , (for example), will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of $\frac{1}{2}$, $\frac{3}{4}$, $\frac{4}{5}$, 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 1-fifth by lower clouds of the *cumulo-stratus* kind.

Since the number of hours in which objects in the sun's

Soil Moisture Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil—amount and constancy; the Council recommend that observations in this interesting department be made at 9 A.M., by sections of the following thermometers, which have sunk to 3, 12, and 22 inches, and the stems above ground protected from frost by straw, and the bulbs by the stems or wooden frames, 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 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 Schröbin'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,  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 an *ozone* entry in the schedule, will indicate that the ozone paper is tinted as 4° on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is 4.4; i.e., that it is *blowing fresh*.

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

Remarks—The "Remarks" column is too narrow, but can be made 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 to this column to prevent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunderstorms, and remarkable falls of snow, hail, or rain, the hour of storms as they have been attained their maximum, as well as of hills or storms as they have been hinted at above.

By the use of abbreviations, the state of the weather at 9 a.m. on 15 March 1967 was registered, either in two columns either side of a vertical line, or in two ruled off for the purpose, from the following examples. It is intended that observations by the type of weather be entered in this manner, or on the side of the ruled-off margin. Additional remarks may be made on the margin.

The Council recommend that *rem-day* observations be taken on a selected piece of ground or farm. The Council recommend that *rem-day* observations be taken on the 21st days of March, June, September, and December. For these hourly observations separate sheets 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 they should have full power to reject any instrument which, on being

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS

FOREST TREES.	In Flower.	Leaf Buds first appear.	In Leaf.	Deepest of Leaves.	GIOPS mentioning variety.	Sowing or Planting.	Appearance above Ground.	In Flower.	First Cut or Raised.
Alder,					Bark,				
Aspen,					Bark or Buds,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Peas,				
Linum,					Potatoes,				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass,				

SHRUBS, ETC.		FRUITS.			
First in Blossom.		First in Blossom.		First ripe Fruit	MIGRATORY BIRDS.
Barberry,	Apple,		Cuckoo,		
Bourtree or Elder,	Black Currant,		Curlew,		
Broom,	Cherry,		House-Swallow,		
Hazel,	Gean,		Lapwing,		
Hawthorn,	Gooseberry,		Plover,		
Holly,	Peach,		Sand-Martin,		
Laburnum,	Pear,		Starling,		
Lilac,	Plum,		Swan,		
Mezereum,	Strawberry,		Rail or Corn Crane,		
Mountain Ash or Rowan,			Other birds, naming them—		
Red Flowering Currant,					
Rhododendron Ponticum,					
Whin,					

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

(By Order,) A. B.

slightly downwards, rather than the other

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Brumar, County of Aberdeen, in Lat. 57° 14', Long. 8° 24', Distance from Sea 60 miles.

Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 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.				SUNSHINE.	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.		9 h. P.M.			9 A.M.		P.M.			9 h. A.M.						
		Barometer.	Attached Ther- mometer	Barometer.	Attached Ther- mometer	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.		Velocity.	Amount.	Velocity.	Amount.		No.	No.	No.				
		No.	Inches.	No.	Inches.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	No.	No.		No.	No.	No.				
1	28.416	28.500	57.8	58.0	71.0	36.0	44.8	47.1	46.2	42.0	SW 1	SW 1					0.50	8	8	8								1		
2	28.500	28.500	44.0	59.0	67.0	34.0	46.8	45.3	38.8	38.0	S	0.2	SW 0				0	8	8	8								2		
3	28.574	28.500	46.2	53.1	54.8	30.0	35.8	35.6	35.0	34.0	SW 0	SW 0.2					0	8	8	8								3		
4	28.412	28.500	45.2	54.8	52.0	31.2	43.0	40.3	40.2	38.2	SW 0.5	SW 1					0	8	8	8								4		
5	28.200	28.500	50.8	58.8	82.8	32.0	47.8	45.4	42.0	39.8	S	0.5	SW 1.5				0.03	8	8	8								5		
6	28.322	28.500	47.2	56.9	72.0	32.3	38.2	37.1	38.1	37.8	SW 1.5	SW 1					0.15	8	8	8								6		
7	28.180	28.500	50.0	58.0	56.2	33.8	49.3	47.0	38.8	36.8	S	1	SW 4				0.10	8	8	8								7		
8	28.056	28.500	49.2	51.8	71.0	31.0	49.0	47.8	34.0	31.6	SW 1	SW 1.5					0.46	8	8	8								8		
9	28.484	28.700	48.0	52.8	62.3	30.0	37.0	35.3	32.0	31.0	SW 2	SW 0.5					0.19	8	8	8								9		
10	28.804	28.500	44.0	22.0	62.0	17.0	23.0	22.7	38.8	37.2	SW 0	SW 0					0	8	8	8									10	
11	28.824	28.500	44.2	37.8	67.0	32.8	43.3	42.2	39.0	37.3	SW 0.5	SW 0.5					0.25	8	8	8									11	
12	28.436	28.200	44.9	38.1	74.0	33.1	39.6	37.0	40.8	38.5	SW 1	SW 0.5					0.12	8	8	8									12	
13	28.100	28.200	42.0	36.8	77.0	32.0	37.0	35.0	35.3	34.0	SW 1	SW 1.5					0.02	8	8	8									13	
14	28.410	28.700	41.0	33.8	62.5	26.3	36.0	35.0	33.8	31.0	SW 0.5	SW 0.5					0.15	8	8	8									14	
15	28.612	28.200	38.8	32.0	51.3	25.2	36.2	35.1	33.3	33.0	SW 0	SW 0					0.13	8	8	8									15	
16	28.222	28.662	35.3	26.2	46.2	24.1	32.2	32.0	34.0	31.4	SW 0	SW 1.5					0.40	8	8	8									16	
17	28.850	28.700	35.8	24.8	70.8	23.0	25.8	25.0	35.0	33.0	SW 0.2	SW 0.2					0.20	8	8	8									17	
18	28.472	28.550	36.8	24.0	67.0	22.8	32.5	29.5	26.0	25.5	SW 0.3	SW 0.3					0.04	8	8	8									18	
19	28.640	28.550	32.8	24.8	54.0	22.0	28.0	27.8	24.0	23.2	SW 0.2	SW 0.3					0.03	8	8	8									19	
20	28.946	28.524	35.3	27.0	42.8	22.3	29.0	28.5	33.3	33.3	SW 1	SW 1					0.18	8	8	8									20	
21	28.844	28.500	42.8	34.2	50.0	31.0	37.4	36.2	34.0	34.0	SW 0.2	SW 0					0	8	8	8									21	
22	28.878	28.700	43.2	36.8	77.0	30.0	38.0	37.0	36.0	36.0	SW 0	SW 0.5					0	8	8	8									22	
23	28.550	28.440	42.8	34.0	61.0	30.8	37.0	35.7	33.8	33.2	SW 0.5	SW 1					0.08	8	8	8									23	
24	28.556	28.182	41.3	32.0	56.0	30.0	32.0	31.0	39.0	37.3	SW 1	SW 0.2					0.06	8	8	8									24	
25	28.084	28.400	42.8	34.2	64.4	28.2	35.8	34.2	39.1	37.4	S	0	SW 0.5				0.02	8	8	8									25	
26	28.724	28.528	40.9	35.8	61.0	32.0	36.2	35.2	40.2	39.0	SW 0.5	SW 0.5					0.10	8	8	8									26	
27	28.600	28.880	43.0	38.0	49.9	33.0	42.4	39.4	40.0	39.0	SW 0.5	SW 0.5					0.18	8	8	8									27	
28	28.964	28.920	42.8	38.8	81.0	23.0	32.8	32.0	31.2	29.8	SW 0	SW 0.2					0	8	8	8									28	
29	28.900	28.858	44.0	38.7	60.3	31.8	34.8	36.0	43.0	41.0	SW 1	SW 0.5					0.07	8	8	8									29	
30	28.772	28.750	43.7	33.0	50.8	28.0	37.2	37.8	34.8	32.8	SW 0	SW 0.5					0	8	8	8									30	
31																													31	
1	15.108	17.104	12.12	16.12	11.7	8.5	18.10	15.8	13.5	15.8	4	7					3.8	185												
2	15.588	17.304	12.986	16.986	11.253	8.53	18.53	15.83	13.53	15.83	17.8	26.8					3.35	179												
3	28.520	28.577	43.333	26.41	29.037	36.1	36.735	35.1	0.59	0.89							6.2	6.4												
4	-0.09	-0.09																												
5	28.511	28.568					36.0	35.0																						

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 28.511 - 0.23 = 28.488
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 28.568 - 0.20 = 28.548
 Mean at Station, corrected, and at 32°, = 28.578
 Correction for Height, feet, above Mean Sea-level, = 1.201
 Mean, reduced to 32°, and Sea-level, = 29.719
 Highest Reading, corrected for Index error, on the 28th, = 28.920 9.46
 Lowest Do., Do., on the 15th, = 28.100 0.56
 Difference, or Monthly Range, = 0.820 8.90

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 1th, = 51.8
 Lowest in Month, corrected for Index errors, on the 10th, = 22.0
 Difference, or Monthly Range, = 29.8
 "Corrected Mean" of all the Highest, (Col. 5), = 43.3
 "Corrected Mean" of all the Lowest, (Col. 6), = 32.2
 Difference, or Mean Daily Range, = 10.81
 ** Calculated Mean Temperature of Month, = 38.3

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the 4th, = 92.0
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 64.1
 Lowest at Night, Black Bulb, (corrected for Index errors), on the 10th, = 17.0
 "Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 29.0
 Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 37.1
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 35.5
 ** Computed Temperature of Dew-point, = 33.3
 ** Do. Elastic Force of Vapour, = 190
 ** Do. Weight of Vapour in a Cubic Foot of Air, = 86
 ** Relative Humidity, (Saturation = 100), = 86
 RAIN fell on 22 Days; Amount in Inches, = 3.27 3.35

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	1	0	4	14	17	0	0.59		
P.M.		0	0	0	0	20	5	8	0	0.89		
Mean.		1	1	0	0	21	3	6	0	0.74		0.55

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 James Hutton
D. Marshall

(Signed) James Hutton

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Braemar, County of Aberdeen, in Lat. 57° 44', Long. 2° 24' W, Distance from Sea 60 miles.

Height of Cistern of the Barometer above Mean Sea-level 1110 feet, above Ground 5 feet. During the MONTH of December 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.		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.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.			9 A.M.			9 P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	Barometer. No.	Attached Thermometer.	Barometer. No.	Attached Thermometer.	Max. No.	Min. No.	Max. No.	Min. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H-Cup Anemometer. No.	No. of hours in which it fell.	Amount in inches. No.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	No.	Inches.		No.	Inches.				No.	Inches.	Temperature of WELL at depth of feet. No.	Temperature at atmosphere, at depth. No.	No.	No.	No.	No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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NOTATION USED IN GENERAL REMARKS.									
a.	denotes aurora.	m.	denotes meteor.						
ci.	cirrus.	ms.	meteors.						
ci-cu.	cirro-cumulus.	n.	nimbus.						
cu.	cumulus.	r.	rain.						
cu-s.	cumulo-stratus.	h.r.	heavy rain.						
cu-s.	cumulo-stratus.	c.h.r.	continued heavy rain.						
d.	dew.	s.	stratus.						
f.	fog.	sc.	scud.						
fr.	frost.	slet.	sleet.						
h-fr.	hoar-frost.	sn.	snow.						
h.	haze.	so. ha.	solar halo.						
h. d.	heavy dew.	sq.	squall.						
h. d.	hail.	sq.	squalls.						
l.	lightning.	t.	thunder.						
li. cl.	light clouds.	t-s.	thunder-storm.						
li. sh.	light showers.	w.	wind.						
lu. co.	lunar corona.	g.	gale of wind.						
lu. ha.	lunar halo.								

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ = 28.427
for Temp. (Col. 2), = 28.428 - 0.001 = 28.427
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ = 28.406
for Temp. (Col. 4), = 28.407 - 0.001 = 28.406
Mean at Station, corrected, and at 32°, = 28.406 - 416 = 28.406
Correction for Height, feet, above Mean Sea-level, = 1.201
Mean, reduced to 32°, and Sea-level, = 29.607
Highest Reading, corrected for Index error, on the 22th, = 29.136
Lowest Do., on the 7th, = 27.650
Difference, or Monthly Range, = 1.486

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 18th, = 53.7
Lowest in Month, corrected for Index errors, on the 31st, = 21.2
Difference, or Monthly Range, = 32.5
"Corrected Mean" of all the Highest, (Col. 5), = 43.6
"Corrected Mean" of all the Lowest, (Col. 6), = 31.9
Difference, or Mean Daily Range, = 11.7
** Calculated Mean Temperature of Month, = 37.8
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 16th, = 73.3
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 54.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1st, = 20.4
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 27.7
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 37.0
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 35.5
Computed Temperature of Dew-point, = 33.4
Do. Elastic Force of Vapour, = 1.91
Do. Weight of Vapour in a Cubic Foot of Air, =
Relative Humidity, (Saturation = 100), = 87
RAIN fell on 20 Days; Amount in Inches, = 3.71

WIND.									
SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.	1	1	0	2	1	23	1	2	0
P.M.	1	1	0	2	2	21	0	4	0
Mean.	1	1	0	2	2	22	0	3	0

* 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.
§ Presumably, 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 James A. Allen
W. Marshall

(Signed) James A. Allen

