

3

Observations taken at Inveresk Napburgh, County of Edinburgh, in Lat 55° 56' 0" N, Long 3° 2' 40" W, Distance from Sea one miles.

Height of Cistern of the Barometer above Mean Sea-level *Twelve* feet, above Ground *four* feet.

During the MONTH of January 1867

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.	SUNSHINE. Hours.	TEMPERATURE OF WELL at Depth of feet. No.	SEA. Temperature at surface 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.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.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—6), and Direction.	Amount, (0—10), and Species.	Velocity, (0—6), and Direction.	Amount, (0—10), and Species.											
																															9 h. A.M.		9 h. P.M.	
																															No.	No.	No.	No.
																															Inches.	Inches.	Inches.	Inches.
1	29.84	43	30.00	44	40	29			26		33		SSE	1	S	1		20																
2	30.09	44	30.20	45	32	18			30		26		SSE	2	SSE	1														1				
3	30.24	44	30.20	40	17	13			19		16		S	-	S	1														2				
4	30.16	41	30.10	40	15	8			14		10		S	2	S	1														3				
5	30.08	36	30.14	37	29	18			11		29		S	-	SW	½														4				
6	30.18	37	30.14	37	23	18			22		21		SW	1	WSW	1														5				
7	30.10	36	30.16	35	27	15			24		26		WSW	1	WSW	½		.10												6				
8	30.20	34	30.04	38	33	26			19		26		WSW	-	W	-		.06												7				
9	30.00	40	30.10	40	37	31			37		36		WSW	4	W	2														8				
10	30.20	46	30.04	46	38	30			34		30		SW	-	SW	1		.20												9				
11	30.00	47	29.90	50	38	37			37		27		SW	3	SSW	1		.02												10				
12	29.70	47	29.70	48	34	28			39		30		WSW	3	W	1		.02												11				
13	29.70	48	29.70	47	34	22			29		24		W	-	W	-														12				
14	29.90	44	30.14	44	36	33			33		34		E	1½	E	2														13				
15	30.34	43	30.36	44	36	34			34		35		ENE	2	ENE	1														14				
16	30.38	42	30.32	44	36	33			35		35		NNE	1	NE	-														15				
17	30.31	44	30.26	45	36	34			36		34		N	-	N	1														16				
18	30.20	46	30.18	47	38	33			35		35		W	-	W	-														17				
19	30.04	48	29.96	50	41	38			37		38		W	-	W	1														18				
20	30.16	49	30.24	51	46	40			40		42		W	3	WSW	2														19				
21	30.29	50	30.27	54	46	42			45		44		WSW	2	WSW	1														20				
22	30.24	56	30.16	53	46	44			45		46		WSW	2	W	1														21				
23	30.00	54	29.90	53	46	43			45		45		W	1	SW	1														22				
24	29.70	51	29.60	54	47	40			44		44		SW	5	SW	2														23				
25	29.40	53	29.30	56	53	46			44		48		SW	4	SW	1		.26												24				
26	29.90	53	30.00	54	50	44			46		46		SW	1	SW	1														25				
27	30.08	53	29.94	54	47	43			45		44		S	2	S	1														26				
28	29.98	54	30.00	56	50	44			45		46		S	1	S	1														27				
29	30.00	55	29.80	55	48	43			47		46		S	1	S	2														28				
30	29.80	54	29.80	58	52	46			45		47		S	2	S	1														29				
31	29.70	55	29.80	57	55	44			51		49		S	4	S	5														30				
Sums.		13 208		13 208	14 233	13 267	13 87											086												31				
Means.		3000.167		3001.475	3060.329																													
* Total Corrections for Instrumental Errors.																																		
† Corrections for Diurnal Range.																																		
“Corrected Means.”																																		
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30				
BAROMETER, “corrected Mean” at 9 A.M. minus the General +3																																		
14. 3. THERMOMETER																																		

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.	drizzle.	s.	sleet.		
f.	fog.	sc.	scud.		
fr.	frost.	sl.	snow.		
h-fr.	hoar-frost.	sn.	snow.		
h.	haze.	so. ha.	solar halo.		
h. d.	heavy dew.	sq.	squall.		
hl.	hail.	sgs.	squalls.		
li.	lightning.	t.	thunder.		
li. cl.	light clouds.	t-s.	thunder-storm.		
li. sh.	light showers.	w.	wind.		
lu. co.	lunar corona.	g.	gale of wind.		
lu. ha.	lunar halo.				

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

BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction + for Temp. (Col. 2), = <u>30.000</u> - <u>1.7</u> = <u>28.962</u>	
"Corrected Mean" of Barometer at 3 P.M., <i>minus</i> the Correction + for Temp. (Col. 4), = <u>30.000</u> - <u>1.5</u> = <u>28.950</u>	
Mean at Station, corrected, and at 32°, =	
Correction for Height,	feet, above Mean Sea-level, =
Mean, reduced to 32°, and Sea-level, =	
Highest Reading, corrected for Index error, on the th, =	
Lowest	Do., Do., on the th, =
Difference, or Monthly Range, =	

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

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

Difference, or **Monthly Range**, =

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

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

Difference, or **Mean Daily Range**, =

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

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

“Corrected **Mean,**” (Col. 7), of **Black Bulb, Max. in Sun,**..... =

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

“Corrected **Mean,**” (Col. 8), of **Black Bulb Min.** on the th,..... =

Difference of above Means or Range (“exposed”),

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

Mean (corrected) A.M. and P.M. Reading of Wet Bulb ,	=
†† Computed Temperature of Dew-point ,	=
†† Do. Elastic Force of Vapour ,	=
†† Do. Weight of Vapour in a Cubic Foot of Air ,...	=
†† Relative Humidity , (Saturation = 100),	=

RAIN	fell on	Days ;	Amount in Inches
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[illegible]

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

William M. Auslane

(Signed

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Leith, Musselburgh*, County of *Edinburgh*, in Lat. $55^{\circ}56'0''N$, Long. $3^{\circ}2'40''W$, Distance from Sea *one* mile.Height of Cistern of the Barometer above Mean Sea-level *thirty* feet, above Ground *four* feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of *February*

186/

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			Temperature of Water, Soil, and Air.	SEA. Temperature at Bottom, and Drift.	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.	Attach- ed Ther- mometer	Barometer.	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 Anemo- meter, at 9 P.M. 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.	No.						No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† for Temp. (Col. 2), = *29.637*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction† for Temp. (Col. 4), = *29.637*
Mean at Station, corrected, and at 32°, =
Correction for Height, feet, above Mean Sea-level, =
Mean, reduced to 32°, and Sea-level, =
Highest Reading, corrected for Index error, on the th, =
Lowest Do., Do., on the th, =
Difference, or Monthly Range, =

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

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

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

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

†† Computed Temperature of Dew-point, =

†† Do. Elastic Force of Vapour, =

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

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

RAIN fell on Days; Amount in Inches, =

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.										
P.M.										
Mean.										

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

William M. Mustane

(Signed)

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 moved from their position on the Scale, and ought never afterwards to be used, without being re-tested. The self-registering, and especially the "Minimum" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

The *Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the 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 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 insulated 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 cage, 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 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 at 9 P.M. are those of a series of phenomena commencing at 9 P.M. and extending till 9 P.M. on the 3d.

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.

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, *Link's* Anemometer is also recommended: the method of *Link's* 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 indeed in every column, the observer cannot be too careful to register *observations only*; and nothing that partakes of the nature of deduction or inference.

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

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

Starline.—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 force and direction of the wind at the time of observation in the following manner:—thus 93°·5, as an *ozone* entry in the schedule, will indicate that the *ozone* paper is trusted 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*. Boxes of Papers may be had at the Society's Office.

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 Magnetometer is necessary to every complete meteorological observatory.

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

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

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

The Council recommend that *term-day* observations be taken;—*viz.*, on the 21st days of March, June, September, and December. 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 that, on being presented for comparison, does not afford him satisfaction.

(By Order,) A. H. B.

EDINBURGH, 24th Feb^y 1861.

FOREST TREES.		FRUIT.		MIGRATORY BIRDS.		First Departure.	
In Flower.	In Leaf.	First in Blossom.	First in Fruite in General.	First Arrival.	First Departure.	First Arrival.	First Departure.
Alder.				Apple.	Black Currant.	Cuckoo.	
Asch.				Cherry.	House-Swallow.	Curlew.	
Beech.				Gooseberry.	Lapwing.	Flower.	
Birch.				Holly.	Peach.	Sand-Martin.	
Elm.				Plum.	Swallow.	Rail or Corn Crane.	
Larch.				Strawberry.	Swallow.	Other Birds, naming them.	
Oak.							
Sycamore or Plane.							

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

SHRUBS, ETC.		FRUIT.		MIGRATORY BIRDS.		First Departure.	
First in Blossom.	First in Fruite in General.	First in Blossom.	First in Fruite in General.	First Arrival.	First Departure.	First Arrival.	First Departure.
Barberry.				Apple.	Black Currant.	Cuckoo.	
Broom.				Cherry.	House-Swallow.	Curlew.	
Hazel.				Gooseberry.	Lapwing.	Flower.	
Hawthorn.				Holly.	Peach.	Sand-Martin.	
Laurum.				Plum.	Swallow.	Rail or Corn Crane.	
Lilac.				Strawberry.	Swallow.	Other Birds, naming them.	
Mountain Ash or Rowan.							
Rhododendron.							
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; and the Agricultural condition of the district generally. Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

Mr A. H. BURGESS,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

BOOK-POST.

To

Inveresk,
February 1861

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, County of *Midlothian*, in Lat. $55^{\circ}56'0''$, Long. $3^{\circ}2'40''W$, Distance from Sea *2* miles.Height of Cistern of the Barometer above Mean Sea-level *90* feet, above Ground *4* feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of *March* 186*1*.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			Temperature of WELL, at Depth of feet. No.	SEA. Temperature at 1 fathom, and Drizzle.	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.	Attach- ed Ther- mometer.	Barometer.	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 Anemo- meter, at 9 P.M. No.	No. of hours in which it fell.	Amount in inches. No.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.		Amount, (0-10), and Species.	No. 1 inches.	No. 2 inches.						No. 3 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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BAROMETER, “corrected Mean” at 9 A.M., minus the Correction† = *29.45*
for Temp. (Col. 2), = *29.45*
“Corrected Mean” of Barometer at 9 P.M., minus the Correction† = *29.45*
for Temp. (Col. 4), = *29.45*
Mean at Station, corrected, and at 32°, = *29.45*
Correction for Height, feet, above Mean Sea-level, = *90*
Mean, reduced to 32°, and Sea-level, = *29.45*
Highest Reading, corrected for Index error, on the th, = *30.20*
Lowest Do., Do., on the th, = *28.94*
Difference, or Monthly Range, = *1.26*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the th, = *51*

Lowest in Month, corrected for Index errors, on the th, = *32*

Difference, or Monthly Range, = *19*

“Corrected Mean” of all the Highest, (Col. 5), = *49*

“Corrected Mean” of all the Lowest, (Col. 6), = *34*

Difference, or Mean Daily Range, = *15*

** Calculated Mean Temperature of Month, = *44*

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the th, = *51*

“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun, = *51*

Lowest at Night, Black Bulb, (corrected for Index errors), on the th, = *32*

“Corrected Mean,” (Col. 8), of Black Bulb Min. on the th, = *34*

Difference of above Means or Range (“exposed”), = *19*

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *39*

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *35*

†† Computed Temperature of Dew-point, = *32*

†† Do. Elastic Force of Vapour, = *1.26*

†† Do. Weight of Vapour in a Cubic Foot of Air, = *7.45*

†† Relative Humidity, (Saturation = 100), = *85*

RAIN fell on Days; Amount in Inches, = *1.26*

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.											
P.M.											
Mean.											

† Each instrument tested at the Office in Edinburgh bears the stamp “S.M.S.,” and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
†† The Diurnal Range for both capillary and Index Errors.
†† These “Hygrometric Deductions” are calculated from Glaisher’s Hygrometric Tables, Second Edition only.
* While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 5 and 6 will be entered as the “Calculated Mean Temperature.”
Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column must be marked as such by the Observer, in each Schedule. See Over.

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 *William Macdonald, gardiner*
to Sir John Lubbock, B. C. B. Inveresk
Sent by Request of David Milne Home Esq.

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

9

Observations taken at *Inverclyde*County of *Edinburgh*in Lat. $55^{\circ} 56' 11''$ Long. $3^{\circ} 2' 40''$ Distance from Sea *one* mileHeight of Cistern of the Barometer above Mean Sea-level *Twenty* feet, above Ground *four* feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of *April* 1861

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER.				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 h. P.M.												
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H. Cup Anemometer, at 9 P.M.	No. of hours in which it fell.	Amount in inches.	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. 29 inches.					Temperature of WELL at Depth of feet.	No.	Temperature at 1 fathom, and Dustiness.	9 A.M. 9 P.M.	
		† No.		† No.		No.	No.	No.	No.									No.																		
		inches.		inches.																																
	1	29.85	51	29.87	51	46	40																													
	2	29.80	51	29.80	50	45	40																													
	3	29.82	50	29.82	51	47	40																													
	4	29.80	50	29.86	51	45	40																													
	5	29.90	50	30.00	53	50	33																													
	6	30.13	51	30.24	54	52	37																													
	7	30.30	52	30.33	53	50	37																													
	8	30.40	52	30.50	52	52	36																													
	9	30.50	52	30.42	52	54	38																													
	10	30.36	54	30.35	56	56	44																													
	11	30.40	56	30.42	56	54	36																													
	12	30.50	54	30.40	55	52	36																													
	13	30.40	53	30.36	54	54	37																													
	14	30.34	52	30.30	58	51	36																													
	15	30.40	52	30.42	54	51	37																													
	16	30.44	53	30.40	55	57	35																													
	17	30.38	52	30.28	53	50	35																													
	18	30.26	51	30.20	55	50	35																													
	19	30.28	52	30.29	53	51	39																													
	20	30.28	53	30.02	58	57	43																													
	21	29.90	55	29.97	57	52	37																													
	22	29.90	55	29.80	56	54	40																													
	23	29.92	56	29.92	58	60	38																													
	24	29.95	60	29.94	59	63	47																													
	25	29.94	61	29.88	60	62	39																													
	26	30.12	55	30.20	50	51	29																													
	27	30.20	52	30.03	54	55	37																													
	28	30.04	56	30.10	56	56	31																													
	29	30.12	57	30.12	55	55	42																													
	30	30.14	57	30.18	58	60	43																													
	31																																			
	Sums.	3477	99	3442	137	92	237																													
	Means.	30.159	53.1	30.137	54.6	53.1	37.9																													
	* Total Corrections for Instru- mental Errors.																																			
	Correc- tions for Diurnal Range.																																			
	"Cor- rected Means."																																			
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					
BAROMETER. "corrected Mean" = 30.159																																				

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction for Temp. (Col. 2), = 30.093
"Corrected Mean" of Barometer at 9 P.M., minus the Correction for Temp. (Col. 4), = 30.067
Mean at Station, corrected, and at 32°, = 30.080
Correction for Height, 90 feet, above Mean Sea-level, = 1.00
Mean, reduced to 32°, and Sea-level, = 30.180
Highest Reading, corrected for Index error, on the 8th, = 30.500
Lowest Do., on the 23rd, = 29.800
Difference, or Monthly Range, = 0.700

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 24th, = 63.0
Lowest in Month, corrected for Index errors, on the 26th, = 29.0
Difference, or Monthly Range, = 34.0
"Corrected Mean" of all the Highest, (Col. 5), = 53.1
"Corrected Mean" of all the Lowest, (Col. 6), = 37.9
Difference, or Mean Daily Range, = 15.2
** Calculated Mean Temperature of Month, = 45.5

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 44.4
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 40.2
†† Computed Temperature of Dew-point, = 35.6
†† Do. Elastic Force of Vapour, = 2.06
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = 76
RAIN fell on 9 Days; Amount in Inches, = 2.11

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	2	6	10	1	2	1	6	2		7.5	
P.M.	2	7	7	2	1	3	7	1		1.35	
Mean.	2	6	8	2	2	2	6	2		1.05	

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

William Munro

(Signed)

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a 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-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, the Barometer, the sides of the cistern are of leather; and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the zero-point of the fixed scale; the 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 verniers has to be removed from its fittings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then screw up 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 any local influences. The laths forming the sides and doors of the Boxes are arranged so as to once to "protect" the Thermometers; and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

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

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 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 the 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 the Thermometer will be read—39.4°, 40.0°, or 40.1°; 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 40.7°, 40.8°, or 40.9°, respectively. So also 40.4°, and 40.7°, 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 3 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 importance 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 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.

Clavis.—Convenient abbreviations for Luke Howard's nomenclature of deduction or inference.

clature 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 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 the 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.

Grass.—Mention whether Schönbach's or Mohr's papers are used. Mohr'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 1/4; as an exact 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. Boxes of Papers may be had at the Society's Office.

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 room 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. Observations ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

The Council recommend that *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 the Meteorologist have full power to reject any instrument that, on being presented for comparison, does not afford him satisfaction.

(By Order,) A. H. B.

EDINBURGH, 24th Feb. 1861.

BOOK-POST.

EDINBURGH.

10, St Andrew Square,

Secretary of the Meteorological Society of Scotland,

Mr A. H. BURGESS,



Table with 4 main sections: FOREST TREES, CROPS, FRUITS, and MIGRATORY BIRDS. Each section has columns for First or Second, In Flower, and First or Second. The table lists various types of trees, crops, fruits, and birds, with some cells containing handwritten numbers or marks.

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, 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.

Inveresk April 1861



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inverclyde*County of *Edinburgh*in Lat. *55° 56' 0"*Long. *3° 2' 14" W*Distance from Sea *One* miles.Height of Cistern of the Barometer above Mean Sea-level *Twenty* feet, above Ground *four* feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of *May*

1861

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. 9 A.M. 9 P.M.	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.	Atmospheric Thermometer.	Barometer. No.	Atmospheric 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, at 9 P.M. No.	No. of hours in which it fell.	Amount in inches. No.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.		Amount, (0-10), and Species.	No. 1. inches.	No. 2. inches.					No. 3. inches.	Temperature of WELL, at Depth of feet. No.	Temperature at 1 station, and Dew-Point.
		inches.	inches.	inches.	inches.																													
	1	30.20	60	30.22	58	60	42			49	46	47	43½	W	1	W	1															May has been very dry and a		
	2	30.28	60	30.18	58	55	41			51	45	45	41	N	½	NW	1														great want of rain felt towards			
	3	30.00	60	30.18	56	57	39			52	47	44	39½	NW	2	NW	1														the end of the month.			
	4	30.30	57	30.34	56	60	36			45	39	40	36	NE	2	NE	2														Fluid showers on the 7 & 8 with			
	5	30.30	57	30.20	58	58	35			47	41	46	40	NE	½	NE	1														a smart touch of frost on			
	6	30.17	56	30.07	58	63	42			49	42	49	45	N	1	NE	2														the morning of the 8 which			
	7	30.06	55	30.05	54	51	32			47	39	39	34	NE	1	NW	1½														destroyed the potatoes that			
	8	29.95	52	29.78	54	48	29			42	35	39	33½	N	1	N	1														were above ground very			
	9	29.70	52	29.76	54	50	31			41	34	40	35½	N	1	N	1														much, and injured the fruit			
	10	29.80	55	29.84	53	58	31			45	38	40	35	NE	1	NE	3															blooms (which was but very weak)		
	11	29.84	53	29.91	54	60	38			46	40	42	36½	NE	1	NE	1															at best. The winds for the		
	12	29.98	53	30.10	56	55	38			46	42	41	37½	E	1	E	1½															first 18 days has generally		
	13	30.18	55	30.26	56	63	44			46	39	48	43	NE	½	NE	1															been from N.E. & E. and from		
	14	30.30	57	30.35	60	70	40			50	46	52	46	W	½	W	1															that to the end N.E. & W. and		
	15	30.30	60	30.24	62	62	53			60	53	57	52½	W	1	W	1½															has been very light for the whole		
	16	30.20	61	30.16	58	64	46			56	51	50	46	NW	2	NW	2															month.		
	17	30.20	60	30.30	57	68	42			52	47	46	39½	NE	1	NE	1																Rainbow on the 25 th	
	18	30.30	58	30.31	60	66	40			49	42½	47	41	NE	1	NE	1																Plus Swarming on the 30 th	
	19	30.32	61	30.32	64	75	50			57	50	59	53	NW	1	NW	1																	
	20	30.32	64	30.32	64	70	52			61	54½	59	51	NW	2	NW	1																	
	21	30.28	62	30.28	64	60	48			58	52	54	51	W	2	W	1																	
	22	30.10	63	30.09	64	68	55			56	53	57	52½	W	1	W	2																	
	23	30.00	63	29.90	60	65	43			58	53½	48	43	W	2	W	2																	
	24	29.92	63	29.80	61	63	49			54	46	51	46	W	2	NW	2																	
	25	29.49	61	29.49	63	64	48			56	50½	51	48	NW	2	NW	2																	
	26	29.60	62	29.79	62	65	44			58	51	51	45	NW	2	NW	2																	
	27	29.90	61	30.11	61	69	43			54	48	48	42½	NW	2	NW	2																	
	28	30.15	60	30.05	63	70	50			55	47	54	48	NW	1	NW	1																	
	29	30.00	64	29.94	65	65	44			60	52	56	52½	W	1	W	1																	
	30	29.95	64	29.95	64	70	50			60	54	54	49½	NW	1	NW	1																	
	31	29.98	64	29.80	64	74	52			60	53	55	52	NW	2	NW	2																	
	Sums.	107	283	209	201	97	93			70	191	269	119.5	34		42.5																		
	Means.	30.067	54.1	30.067	54.4	63.1	43.0			52.5	46.2	43.7	43.9	1.1		1.4																		
	* Total Corrections for Instrumental Errors.																																	
	Corrections for Diurnal Range.																																	
	"Corrected Means."																																	
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		

BAROMETER. "corrected Mean" at 9 A.M. minus the Correction #1.

10. D. THERMOMETER.

NOTATION USED IN GENERAL REMARKS.

a. denotes aurora.

ci. cirrus.

ci-cu. cirro-cumulus.

ci-s. cirro-stratus.

cu. cumulus.

cu-s. cumulo-stratus.

d. dew.

f. fog.

fr. frost.

h-fr. hoar-frost.

h. haze.

h.d. heavy dew.

hl. hail.

l. lightning.

li.cl. light clouds.

li.sh. light showers.

lu.co. lunar corona.

lu.ha. lunar halo.

m. denotes meteor.

ms. meteors.

n. nimbus.

r. rain.

h.r. heavy rain.

c.h.r. continued heavy rain.

s. stratus.

sc. scud.

sl. sleet.

sn. snow.

so.ha. solar halo.

sq. squall.

sgs. squalls.

t. thunder.

t-s. thunder-storm.

w. wind.

g. gale of wind.

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.

Common Designation.

Estimated Force, 0-6.

Common Designation.

Estimated Force, 0-6.

Common Designation.

0.5

Calm

1.5

Light breeze

4

Blowing hard

1.

Very light air

3.

Fresh breeze

6

Blowing a gale

Light air

Very fresh

5

Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction + for Temp. (Col. 2), = *30.067*..... - *0.082*..... = *30.085*

"Corrected Mean" of Barometer at 9 P.M., minus the Correction + for Temp. (Col. 4), = *30.067*..... - *0.083*..... = *30.084*

Mean at Station, corrected, and at 32°, = *30.084*

Correction for Height, *90* feet, above Mean Sea-level, = *1.01*

Mean, reduced to 32°, and Sea-level, = *30.185*

Highest Reading, corrected for Index error, on the *14* th, = *30.350*

Lowest Do., Do., on the *25* th, = *29.490*

Difference, or Monthly Range, = *0.860*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *19* th, = *75.0*

Lowest in Month, corrected for Index errors, on the *8* th, = *29.0*

Difference, or Monthly Range, = *46.0*

"Corrected Mean" of all the Highest, (Col. 5), = *63.1*

"Corrected Mean" of all the Lowest, (Col. 6), = *43.0*

Difference, or Mean Daily Range, = *20.1*

** Calculated Mean Temperature of Month, = *53.0*

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

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

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

"Corrected Mean," (Col. 8), of Black Bulb Min. on the th, =

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *50.6*

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *45.0*

†† Computed Temperature of Dew-point, = *39.2*

†† Do. Elastic Force of Vapour, = *2.40*

†† Do. Weight of Vapour in a Cubic Foot of Air, = *65*

†† Relative Humidity, (Saturation = 100), = *65*

RAIN fell on *10* Days; Amount in Inches, = *0.62*

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	4	8	1	0	0	3	4	1		1.1	
P.M.	2	8	1	0	0	3	2	5		1.4	
Mean.	3	8	1	0	0	3	3	3		1.2	

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

Observations made and Return verified by

William McQuarrie

(Signed)

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a 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-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. Ait 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; when 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 screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a sharp tap is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

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

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

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Tarent "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-unioned 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 "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 attached scales, 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, might frequently 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 from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always clean, and moist, and the water pure. In frosty weather observation is a matter of much difficulty; and must be made with great care. The bulb must be immersed by immersion from 15 to 30 minutes before the hour will proceed. From the moist cloth is thus formed evaporation is observed. 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 must be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be reading 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 40.5 or 40.7, 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 note 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 Examining 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 observations, 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 a level 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 deduction or inference.

clature 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 column, they ought not to take them into account in the clouds' amount, 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," 5 S.W., (for example) will indicate that the upper strata of clouds travel with extreme velocity from S.W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of 2 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 15th, 25th, and 28th 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 5½, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 4½ on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4½," i.e., that it is blowing fresh. Boxes of Papers may be had at the Society's Office.

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, &c. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been 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 *ten-day* observations be taken; viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the 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 that, on being presented for comparison, does not afford him satisfaction.

(By Order,) A. H. B.

Edinburgh, 24th Feb. 1860.

To

Mr A. H. BURGESS,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

BOOK-POST.

FOREST TREES.		CROPS.		MIGRATORY BIRDS.		FRUITS.		SHRUBS, &C.	
In flower.	First buds.	In leaf.	Divested of leaves.	Sowing or planting.	Reaping or above ground.	First in ear.	First in blossom.	First in blossom.	First in blossom.
Alder,	Barley,	Oats,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Broom,	Barberry,
Beech,	Bare or Bigg,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Black Currant,	Broom,	Barberry,
Birch,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Black Currant,	Cherry,	Broom,	Barberry,
Elm,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Black Currant,	Gooseberry,	Broom,	Barberry,
Larch,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Black Currant,	Holly,	Broom,	Barberry,
Lincoln,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Black Currant,	Lavender,	Broom,	Barberry,
Oak,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Black Currant,	Plum,	Broom,	Barberry,
Sycamore or Plane,	Wheat,	Peas,	Turnips,	Hyssop,	Apple,	Black Currant,	Strawberry,	Broom,	Barberry,

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

SCOTTISH METEOROLOGICAL SOCIETY.

13

Observations taken at *Inverness*County of *Edinburgh*in Lat. $55^{\circ}56'00''$, Long. $2^{\circ}2'40''$, Distance from Sea *0* miles.Height of Cistern of the Barometer above Mean Sea-level *Ninty* feet, above Ground *100* feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of *June*186*1*

ELECTRICITY	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. Under Ground.			TEMPERATURE OF WELL at Depth of feet. No.	SEA. Temperature at 1 fathoms and Density.	OZONE. 0-10.	GENERAL REMARKS. As to occurrences 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. Max. in Sun's rays No.	Min. on Grass. No.	9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H-Cup Anemo- meter, at 9 P.M. No.	No. of hours in which it fell. No.	Amount in inches. No.	9 A.M.		P.M.											
		Barometer. † No.	Attach- ed Ther- mometer No.	Barometer. No.	Attach- ed Ther- mometer No.				Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direc- tion.	Force	Direc- tion.	Force				Velocity, (0-6), and Species.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.										
																									No. 3 inches.	No. 12 inches.	No. 22 inches.						
		inches.		inches.																													
	1	29.74	62	29.80	61	55	50			54	51	50	48	NW	-	NW	-		2.0														
	2	29.94	63	30.00	61	54	49			53	41	52	48	N	-	N	-		1.6														
	3	30.10	60	30.15	60	52	48			50	47	50	48	NW	1	NW	1		2.0														
	4	30.20	60	30.10	61	64	48			51	48	53	49	NW	1	NW	1		-														
	5	30.05	60	30.05	60	66	46			54	49	52	48	NW	1	NW	1		-														
	6	30.15	60	30.14	60	66	50			56	52	53	49	NW	1	NW	1		-														
	7	30.14	62	30.10	60	65	50			58	52	51	47	NW	1	NW	1		-														
	8	30.03	60	29.86	61	64	47			57	52	51	50	NW	1	NW	1		-														
	9	29.86	60	29.80	62	66	50			56	52	55	52	NW	1	NW	1		3.8														
	10	29.80	60	29.80	60	60	58			52	49	55	51	NW	1	NW	1		-														
	11	29.90	60	29.80	61	60	57			58	54	59	54	NW	1	NW	1		3.5														
	12	29.80	63	29.95	65	73	61			64	58	63	59	NW	2	NW	3		0.4														
	13	30.20	66	30.20	65	76	56			64	61	63	59	NW	1	NW	1		-														
	14	30.25	66	30.25	66	76	54			64	60	58	55	NW	1	NW	1		-														
	15	30.25	67	30.20	66	75	53			63	57	55	53	NW	1	NW	1		-														
	16	30.18	65	30.20	65	70	51			57	53	54	49	NW	1	NW	1		-														
	17	30.20	61	30.16	60	69	48			55	49	50	46	NW	1	NW	1		-														
	18	30.18	64	30.06	63	72	51			57	49	56	52	NW	1	NW	1		-														
	19	30.00	65	29.97	65	67	51			61	56	63	61	NW	1	NW	1		-														
	20	29.97	68	29.98	69	75	58			67	63	62	60	NW	1	NW	1		0.7														
	21	29.98	69	29.98	65	69	56			67	64	58	56	NW	1	NW	1		2.6														
	22	29.90	68	29.80	66	60	53			58	57	55	53	NW	1	NW	1		-														
	23	29.74	65	29.67	65	66	56			58	54	60	56	NW	1	NW	1		7.6														
	24	29.70	65	29.71	63	69	53			58	56	56	52	NW	1	NW	1		-														
	25	29.70	65	29.54	64	65	49			62	56	58	56	NW	1	NW	1		1.6														
	26	29.60	64	29.71	66	70	55			59	53	59	56	NW	1	NW	1		0.8														
	27	29.83	64	29.85	66	72	55			58	56	59	55	NW	1	NW	1		-														
	28	29.85	66	29.65	67	74	56			64	57	57	55	NW	1	NW	1		2.4														
	29	29.80	64	29.94	67	71	49			61	56	59	52	NW	1	NW	1		1.0														
	30	30.04	66	30.06	66	74	51			62	57	59	53	NW	1	NW	1		-														
	31																																
	Sums.	29.18	108	28.42	106	113	69			252	122	185	86	105	27	298	109																
	Means.	29.973	63.6	29.947	63.5	67.1	52.3			58.4	54.1	56.1	52.9	06	09																		
	* Total Corrections for Instrumental Errors.																																
	Corrections for Diurnal Range.																																
	* Corrected Means.																																
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†)

IS-R. THERMOMETER

NOTATION USED IN GENERAL REMARKS.

a. denotes aurora.

ci. cirrus.

ci-cu. cirro-cumulus.

ci-s. cirro-stratus.

cu. cumulus.

cu-s. cumulo-stratus.

d. dew.

f. fog.

fr. frost.

h-fr. hoar-frost.

h. haze.

h-d. heavy dew.

hl. hail.

l. lightning.

li-cl. light clouds.

li-sh. light showers.

lu-co. lunar corona.

lu-ha. lunar halo.

m. denotes meteor.

ms. meteors.

n. nimbus.

r. rain.

h-r. heavy rain.

c-h-r. continued heavy rain.

s. stratus.

sc. sand.

sl. sleet.

sn. snow.

so-ha. solar halo.

sq. squall.

sq-s. squalls.

t. thunder.

t-s. thunder-storm.

w. wind.

g. gale of wind.

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

0.5

1

Calm

Very light air

Light air

1.5

2

3

Light breeze

Fresh breeze

Very fresh

4

5

6

Blowing hard

Blowing a gale

Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction† for Temp. (Col. 2), = $29.973 - 0.094$ = 29.879
"Corrected Mean" of Barometer at 9 P.M., minus the Correction† for Temp. (Col. 4), = $29.947 - 0.094$ = 29.853
Mean at Station, corrected, and at 32°, = 29.866
Correction for Height, 90 feet, above Mean Sea-level, = 1.100
Mean, reduced to 32°, and Sea-level, = 29.966
Highest Reading, corrected for Index error, on the 14th, = 30.250
Lowest Do., Do., on the 25th, = 29.540
Difference, or Monthly Range, = 0.710

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 13th, = 76.0
Lowest in Month, corrected for Index errors, on the 5th, = 46.0
Difference, or Monthly Range, = 30.0
"Corrected Mean" of all the Highest, (Col. 5), = 67.1
"Corrected Mean" of all the Lowest, (Col. 6), = 52.3
Difference, or Mean Daily Range, = 14.8
** Calculated Mean Temperature of Month, = 59.7

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the 13th, = 76.0
"Corrected Mean," (Col. 7), of Black Bulb. Max. in Sun, = 76.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 5th, = 46.0
"Corrected Mean," (Col. 8), of Black Bulb Min. on the 5th, = 46.0
Difference of above Means or Range ("exposed"), = 30.0

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 57.3
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 53.5
†† Computed Temperature of Dew-point, = 50.0
†† Do. Elastic Force of Vapour, = 36.2
†† Do. Weight of Vapour in a Cubic Foot of Air, = 76.76
†† Relative Humidity, (Saturation = 100), = 76.76
RAIN fell on 13 Days; Amount in Inches, = 2.98

WIND.		SUMMARY.							
Direction.		N	NE	E	SE	S	SW	W	NW
A.M.		4	5	5	1	6	0	2	
P.M.		3	3	1	6	4	1	3	
Mean.		4	4	3	4	5	0	2	

N.B.—The Sums to be correctly added, and the Means deduced.

Returns from the "Principal Towns" should be in Edinburgh not later than the 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

(Signed)

William Mawson

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS,

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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

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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scale-inches are not true inches, but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the *cistern* are of leather; and thus, by aid of a screw acting on the bottom, the zero-point of the fixed scale; mercury can be adjusted to the zero-point of the fixed scale; the stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought, by the adjusting screw, to form one straight line with those on its ivory frame, the 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 verniers has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the case. Then screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a sharp tap is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

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

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box; painted white outside, and black within, and fixed 4 feet above 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 open to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-tails, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maximum*." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the columns of spirit breaks, it may be repaired 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 "*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, midwigo repairs, they are very liable to be moved from their position on the scale, and ought never afterwards to be used, without being re-tested. The self-registering, and especially the "*Minimum*" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube), ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested *Thermometer* may be had, on loan, by any observer, from the Meteorological Secretary.

The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the mudin 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 mudin 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 nailing the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

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

Hour of Observing Temperature.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 A.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered 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, the Lifting Wind Force is also recommended; the method of *Lifting* 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 unquestionable 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.

capture 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 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, V., (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 (*extreme*) speed of the former. Again, in the second "*Cloud*" column, an entry of 4, *str.*, (*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 indications registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3°, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 3° on the scale, that the wind is from the N.W., and that its force on the scale 0–6 is 4; *i.e.*, that it is blowing fresh. Boxes of Papers may be had at the Society's Office.

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 *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 that, on being presented for comparison, does not afford him satisfaction.

(By Order,) A. H. B.

EDINBURGH, 24th Feb. 1861.

BOOK-POST.

EDINBURGH.

10, St Andrew Square,

Secretary of the Meteorological Society of Scotland,

Mr A. H. BURGESS,

To

SHRUBS, ETC.		FRUIT TREES.		MIGRATORY BIRDS.		Other Birds, naming them.	
First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.
Barberry,.....		Apple,.....		Chickadee,.....		Curlew,.....	
Boutree or Elder,.....		Black Currant,.....		House-Swallow,.....		Lapwing,.....	
Broom,.....		Cherry,.....		House-Swallow,.....		Plover,.....	
Hazel,.....		Gooseberry,.....		Sand-Martin,.....		Starling,.....	
Holly,.....		Peach,.....		Swallow,.....		Other Birds, naming them.	
Laburnum,.....		Pear,.....		Swallow,.....			
Lilac,.....		Plum,.....					
Mezereum,.....		Strawberry,.....					
Mountain Ash or Rowan,.....							
Red Flowering Currant,.....							
Rhododendron Ponticum,.....							
Whin,.....							

FOREST TREES.		CROPS.		CROPS.		CROPS.	
In Blossom.	In Fruit.	In Blossom.	In Fruit.	In Blossom.	In Fruit.	In Blossom.	In Fruit.
Alder,.....		Barley,.....		Barley,.....		Barley,.....	
Ash,.....		Bare or Bigg,.....		Bare or Bigg,.....		Bare or Bigg,.....	
Beech,.....		Oats,.....		Oats,.....		Oats,.....	
Birch,.....		Wheat,.....		Wheat,.....		Wheat,.....	
Elm,.....		Beans,.....		Beans,.....		Beans,.....	
Larch,.....		Potatoes,.....		Potatoes,.....		Potatoes,.....	
Oak,.....		Rye Grass,.....		Rye Grass,.....		Rye Grass,.....	
Sycamore or Plane,.....							

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, Fruits, etc., in perfection; whether any have suffered from blights, diseases, etc. Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.



Mr A. H. BURGESS,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

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SCOTTISH METEOROLOGICAL SOCIETY.

15

Observations taken at *Marischalburgh*, County of *Edinburgh*in Lat *55° 56' 0" N* Long *3° 2' 40" W*, Distance from Sea *one* mile.Height of Cistern of the Barometer above Mean Sea-level *Ninety* feet, above Ground *four* feet.During the MONTH of *July*

1861

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, at 9 P.M.	No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.													
		Barometer.	Attached Thermometer.	Barometer.	Attached Thermometer.	No.	No.	No.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.				Velocity (0-6), and Species.	Amount, (0-10), and Direction.	Velocity (0-6), and Direction.		Amount, (0-10), and Species.	No. 1.	No. 12.					No. 22.						
		† No.	inches.	inches.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.	No.					No.	No.	No.	No.	No.	No.	No.
		inches.																																				
	1	30.00	65	29.84	65	66	54			62	56	57	55	S	1	S	1		.02													1						
	2	29.83	64	29.81	64	69	51			61	56	54	51½	SW	2	S	2		-													2						
	3	29.81	65	29.68	63	70	45			61	56	52	50	SW	1	SW	1		-														3					
	4	29.50	64	29.22	64	68	51			63	58	57	54½	SW	2	SW	1		.02														4					
	5	29.20	65	29.30	64	70	55			63	59	56	54	NE	1	NE	-		.04														5					
	6	29.40	65	29.50	64	71	53			62	58	55	53	NE	-	NE	-		.00														6					
	7	29.63	64	29.71	64	64	55			59	57	57	55½	W	-	W	1		.20														7					
	8	29.74	64	29.78	64	74	49			58	56	55	52½	NE	-	NE	1		.02														8					
	9	29.83	64	29.80	65	68	49			60	58	58	56	N	1	W	1		-														9					
	10	29.79	65	29.73	58	67	46			57	53	48	46	WSW	2	SW	2		.05															10				
	11	29.58	64	29.59	61	68	50			56	52½	51	47	SW	2	NE	1		-															11				
	12	29.64	62	29.70	61	69	48			58	54½	55	53	NE	-	NE	1		.06															12				
	13	29.76	62	29.70	62	56	45			56	54	54	52½	NE	2	NE	2		.44															13				
	14	29.73	62	29.73	62	58	52			50	48	57	54	NE	2	NE	-		.25															14				
	15	29.68	62	29.55	65	70	54			64	58½	58	53	SW	1	SW	1		-															15				
	16	29.58	61	29.58	62	68	50			60	54	53	48	SW	1	SW	1		-															16				
	17	29.60	63	29.50	63	66	50			60	53	52	50	SW	3	SW	2		.10															17				
	18	29.40	62	29.46	61	68	47			55	49	52	48	WSW	2	SW	2		.21															18				
	19	29.54	63	29.57	64	69	52			57	50	54	51	WSW	1	SW	1		.06															19				
	20	29.57	64	29.70	65	72	53			63	55	56	52	WSW	1	SW	1		-															20				
	21	29.71	65	29.63	65	71	53			63	54	59	56	SW	-	S	-		.01															21				
	22	29.56	64	29.50	65	69	53			64	57	59	54½	S	1	SW	1		.02															22				
	23	29.24	64	29.54	64	68	53			59	58	59	54½	S	-	S	1		.58															23				
	24	29.63	64	29.56	64	63	52			61	57	57	54	S	1	S	-		.10															24				
	25	29.20	64	29.46	64	67	53			54	53	58	53½	S	1	SW	2		.51															25				
	26	29.50	63	29.57	60	63	48			57	55	53	49	ENE	1	SW	-		.04															26				
	27	29.63	62	29.62	62	65	47			58	54	53	50	SW	-	S	-		.21															27				
	28	29.70	62	29.85	62	68	48			58	54	52	49	SW	-	SW	-		.02															28				
	29	29.90	61	29.67	64	72	48			62	54½	60	54	SW	1	SW	1		-															29				
	30	29.40	64	29.58	64	65	53			60	55	58	53½	SW	3	SW	2		.13															30				
	31	29.74	63	29.86	64	66	54			62	54	56	53	SW	2	S	2		.14															31				
	Sums.	1902	106	1929	98	228	19			293	151	15	67½		3		3		323																			
	Means.	29.614	634	29.622	632	67.3	50.6			59.5	54.9	55.3	52.2		1.1		1.0																					
	* Total Corrections for Instrumental Errors.																																					
	Corrections for Diurnal Range.																																					
	"Corrected Means."																																					
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30							

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†)

IS-B THERMOMETER

NOTATION USED IN GENERAL REMARKS.

a. denotes aurora.

ci. " cirrus.

ci-cu. " cirro-cumulus.

ci-s. " cirro-stratus.

cu. " cumulus.

cu-s. " cumulo-stratus.

d. " dew.

f. " fog.

fr. " frost.

h-fr. " hoar-frost.

h. " haze.

h.d. " heavy dew.

hl. " hail.

l. " lightning.

li-cl. " light clouds.

li.sh. " light showers.

lu.co. " lunar corona.

lu.ha. " lunar halo.

m. denotes meteor.

ms. " meteors.

n. " nimbus.

r. " rain.

h.r. " heavy rain.

c.h.r. " continued heavy rain.

s. " stratus.

sc. " scud.

sl. " sleet.

sn. " snow.

so.ha. " solar halo.

sq. " squall.

sq.s. " squalls.

t. " thunder.

t-s. " thunder-storm.

w. " wind.

g. " gale of wind.

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.

Common Designation.

Estimated Force, 0-6.

Common Designation.

Estimated Force, 0-6.

Common Designation.

0-5

Very light air

1-5

Light breeze

4

Blowing hard

1-

Light air

3-

Fresh breeze

5

Blowing a gale

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.	sc.	" sleet.
f.	" fog.	sl.	" snow.
fr.	" frost.	so. ha.	" solar halo.
h-fr.	" hoar-frost.	sq.	" squall.
h.	" haze.	sgs.	" squalls.
h. d.	" heavy dew.	t.	" thunder.
hl.	" hail.	t-s.	" thunder-storm.
li. cl.	" lightning.	w.	" wind.
li. sh.	" light showers.	g.	" gale of wind.
lu. co.	" lunar corona.		
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† = *29.523*
for Temp. (Col. 2), = *29.614* - *.091* = *29.523*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction† = *29.531*
for Temp. (Col. 4), = *29.622* - *.091* = *29.531*
Mean at Station, corrected, and at 32°, = *29.527*
Correction for Height, *90* feet, above Mean Sea-level, = *.001*
Mean, reduced to 32°, and Sea-level, = *29.528*
Highest Reading, corrected for Index error, on the *1st* th., = *30.000*
Lowest Do., Do., on the *5th* th., = *29.200*
Difference, or Monthly Range, = *0.800*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *7th* th., = *74.2*
Lowest in Month, corrected for Index errors, on the *3th* th., = *45.0*
Difference, or Monthly Range, = *29.0*
"Corrected Mean" of all the Highest, (Col. 5), = *67.3*
"Corrected Mean" of all the Lowest, (Col. 6), = *50.6*
Difference, or Mean Daily Range, = *16.9*
* Calculated Mean Temperature of Month, = *59.0*

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

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, = *53.6*
†† Computed Temperature of Dew-point, = *50.1*
†† Do. Elastic Force of Vapour, = *.362*
†† Do. Weight of Vapour in a Cubic Foot of Air, = *th*
†† Relative Humidity, (Saturation = 100), = *77.*
RAIN fell on *23* Days; Amount in Inches, = *3.23*

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		1	5	3			8	6		1.2
P.M.						10	12	2	1	1
Mean.		1	6	1	0	9	10	4	0	1.1

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

(Signed)

M. Mansel

WITH REMARKS ON THE USE OF INSTRUMENTS.

Hour of Observation.—The quæll recommend that Observations be made precisely at 9 o'clock, (Greenwich or Railway time only), twice a-day for some, and once, (morning or evening) for other instruments, as specified, in the following remarks, at or after the time of the schedule. It is hoped that the utmost uniformity in the time of reading the instruments will be maintained. 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*.

the *inter-tube* on this little piston, by the adjusting screw, *turn 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 now 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 up as to form a tight plug to the ostern. Then *screw up* the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the ostern 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 done when, on inclining the instrument so that the mercury touches the top of the tube, a *sherry top* is produced. If this is not the case, the air must be removed to the ostern, and *any* ridges 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.

Self-Registering Thermometers.—Professor Phillips, and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained with the instrument. The "*Maximum*" Thermometer of Bullerford is recommended when graduated on the glass stem and affixed in a frame separate from the "*Maximum*". This Thermometer is made in two arrangements, both of which must be guaranteed, and may be easily remedied by an observer. When the instrument of spirit breaks, it may be re-annealed by striking the instrument repeatedly against the palm of the hand; when part of the spirit disengages from the bulb, it will be found in the lower 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 kept perfectly horizontal; the bulb end should incline slightly upwards, rather than the other.

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, indeed requires, 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 only registering, and especially the "*Maximum*" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing point of each Thermometer, (marked by a scratch on the tube) ought to be tested, once a year, in snow or melting ice. For comparison of Thermometers, a properly-tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

bottom, 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 is always pure. In frosty weather observation is a matter of much greater care, 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 thermometers shall be communicated with as far as possible.

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 importance when the self-registering Thermometers are read, since, when 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 card are those of a series of phenomena commencing at 9 p.m. of the 2nd, and extending till 9 p.m. on the 3rd.

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.

Snow-falls only, for convenience, be registered in the rain gauge, and the snowfall be measured by the snow gauge. When a snow shower occurs, the rain gauge must be noted in the "Remarks," and the letter S must be written in the column of the rain gauge. The depth of the snow must be measured in some open place where no drift has formed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as before, the observer must enter in each column, the number of inches in each column, and nothing can be too careful to enter "observations only," and observing that partakes of the nature of deduction or inference.

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

Clouds. --- Convenient abbreviations for Luke Howard's nomenclature of deduction or inference.

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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

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

Quesada.—Mention whether Schönheim's or Moffat's papers are used. Moffat's are preferred. The paper is affixed by a pin to the board in the harmonicon box, and the indication registered at 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, and 9.9°. 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 3.0 w, as *azone* entry in the schedule, will indicate that the *azone* paper is entered as "3.0" on the scale; that the wind is from the N.W., and that its force on the scale 0—6 is "4.3." i.e., that it is *blowing* 4.3. Boxes of Papers may be had at the Society's Office.

Remarks.—The “*Remarks*” column is too narrow, but unavoidably so. Some of the most valuable observations that can be given are those for which no rules can be given nor hours assigned.

By the use of abbreviations, the state of the weather at 9 A.M., 9 P.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 thermometer should be entered in this manner, or the side-column. Additional remarks may be made on the margin.

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 issued to observers.

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 be empowered to give a full power to reject any instrument that, on being presented for comparison, does not afford him satisfaction.

(By Order,) A. H. B.

EDINBURGH, 24th Feb^r 1860.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

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

BOOK-POST.

EDINBURGH.

10, *St Andrew Square.*

Secretary of the Meteorological Society of Scotland.

Mr. A. H. BURGESS.

 T_G

July 1861

James

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55°56', Long W3°2'40", Distance from Sea 1 mile.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of August 1861.

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.		Readings of the H-Cup Anemometer.		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.	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.	No.	9 h. A.M.			9 h. P.M.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Amount, (0-10), and Species.	No.					No.	No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† = 29.699
for Temp. (Col. 2), = 29.744... 0.045
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = 29.695
for Temp. (Col. 4), = 29.795... 0.100
Mean at Station, corrected, and at 32°, = 29.697
Correction for Height, 90 feet, above Mean Sea-level, = 1.07
Mean, reduced to 32°, and Sea-level, = 29.798
Highest Reading, corrected for Index error, on the 21st = 30.160
Lowest Do., Do., on the 3rd = 29.320
Difference, or Monthly Range, = 0.840

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 28th, = 72.0
Lowest in Month, corrected for Index errors, on the 29th, = 42.0
Difference, or Monthly Range, = 30.0
"Corrected Mean" of all the Highest, (Col. 5), = 66.3
"Corrected Mean" of all the Lowest, (Col. 6), = 53.2
Difference, or Mean Daily Range, = 13.1
** Calculated Mean Temperature of Month, = 59.7

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 58.8
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 54.6
†† Computed Temperature of Dew-point, = 50.8
†† Do. Elastic Force of Vapour, = 373
†† Do. Weight of Vapour in a Cubic Foot of Air, = 75
†† Relative Humidity, (Saturation = 100), = 75
RAIN fell on 22 Days; Amount in Inches, = 2.98

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.										
P.M.										
Mean.										

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

(Signed) per William McAnslan

A.B.

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 black coatings, which may easily be made, or rendered 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.

kindly furnish Reports to the Society will, by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fall in achieving one of the main objects of Meteorological Observation.

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock, (Greenwich or Railway Time only) twice a-day for some, and once, (morning or evening), for other instruments, as specified, in the following remarks, or at the top of the schedule. It is hoped that the utmost exactness in the time of reading the instrument will be

observed. Observers, in some few cases, may find this impossible; in such instances they are specially requested to mark opposite to the meniscus the position of the surface of the mercury, and to give their reading at what time it was taken, if not at 9 o'clock.

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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-inches* are not true inches, but so much shorter as to *compensate* the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the barometer, the sides of the *cistern* are of leather, and thus, by the action of a screw acting on the bottom of the surface of the

the mercury can be adjusted to the *zero-point* of the fixed scale; their co-incidence being indicated by a little ivory float, whose position passes freely through the lid and cask of the cistern. When a *mercurial-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 fusible surfaces has to be removed from its fastenings, the ivory peg must be screwed as to form a tight plug to the cistern. Then *serua* 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 hurried with the cistern uppermost. Before suspending therometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is to be done when, on inclining the instrument so that the mercury is evoked to the top of the tube, a *slown tap* is produced. If this is evoked by air, it may be *slown tap* 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 and if this plan fails, the instrument must be repaired. If 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 Sun's direct rays nor the heat of a fire.

in taking an *Observation*, the attached Thermometer is first withdrawn from the tube must then be gently tapped and the instrument carefully made. By raising and lowering the eye, it can be brought into the plane of the back and front of the vernier, 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 from the sun 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 enclosed in a Box, painted white outside, and black within, fixed 4 feet above grass in an exposed position, free from any local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the box, and face the door opening to the north. To accommodate the complicated set of instruments, which is most desirable, doors are made to open to the south. These Boxes may be had at the Surveyor's Office.

of the *Self-Registering Thermometers*,—Professor Phillips's, and Zambra's Patent "*Maximum*," Thermometers are recommended; printed directions for their use may be obtained with the instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed in a frame separate from the "*Maximum*," This Thermometer is subject to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the thermometer 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 tube, and must be dislodged from thence by heating the thermometer over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be kept perfectly horizontal; the bulb end should incline slightly upwards, 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 black coatings, which may easily be made, or rendered 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 justly requested to attend to the following conditions:—

The bulbs must *hang down* by at least an inch free from the supports and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any support on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by a cotton, which also supplies it with water. It must be soot 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 suspended by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed 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 oppo-

the tip of the index or *column* of mercury. The reading is thought 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 less than, an exact coincidence with, or a little over 40°, or 40½°, or 40¾°, respectively. So also 40½, and 40¾, more or less, must be indicated 40.5 and 40.75, and 40.6 and 40.8 respectively. In reading Rutherford's "*Man*," and "*Win*," 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 simply taken, being so readily affected by heat from the person who observes.

Hour of Observation.—The Hygrometer is read at 9 A.M., 9 P.M. The self-registering Thermometers are read at 9 A.M. and 9 P.M., as indicating the greatest and least forces of

temperature in the 24 hours preceding. It is not a matter of inference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to verify their accuracy by their proper methodological use. In the Society's schedules, the indications registered 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 the surrounding objects. When it oscillates incessantly, the mean direction must be taken; and when it is stationary, and always in the same position, the wind is feeble; reference must be made to the direction of the lower strata of clouds overhead, and to the direction of the smoke.

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 series of simultaneous observations, pursued at different stations

could be likely to give slightly interesting and important results. The Council would strongly recommend that every Observer be furnished with a Hemispherical Cup Anemometer and self-registering instrument which shows the amount of Wind it passes in a day; from which also the Velocity of the Wind and the time of its blowing may be ascertained. For indicating the Force of the Wind, as any particular hour of observation, the Anemometer is also recommended; the method of *Estimating Wind Force* by such tables as that given in the schedule to say the least, unsatisfactory.

Want of Range.—Many causes conspire to produce anomalies in a retrains. They arise, partly, from unfavourable situation in observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the range-gage; but in all cases the

gauges must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge must be read daily, and the readings entered in the returns for the day on which the rain fell.

ster *observations* only; and nothing that partakes of the nature of deduction or inference.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

(By Order,) A. B.

(By Order,) A. B.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Leith*, County of *Edinburgh*, in Lat *55° 56' 0"* Long *3° 2' 40" W*, Distance from Sea *one* miles.Height of Cistern of the Barometer above Mean Sea-level *twenty* feet, above Ground *four* feet.During the MONTH of *September* 1861.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE. 0-10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		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	Readings of the H-Cup Anemometer. No.	No. of hours in which it fell.	Amount in inches. No.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	No. 3 inches.	No. 12 inches.					No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = *29.622* - .086... = *29.622*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = *29.743* - .088... = *29.655*
Mean at Station, corrected, and at 32°, = *29.638*
Correction for Height, *90* feet, above Mean Sea-level, = *1.01*
Mean, reduced to 32°, and Sea-level, = *29.739*
Highest Reading, corrected for Index error, on the *18* th, = *30.150*
Lowest Do., Do., on the th, = *28.800*
Difference, or Monthly Range, = *1.350*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *2nd*, = *69.0*
Lowest in Month, corrected for Index errors, on the *26* th, = *38.0*
Difference, or Monthly Range, = *31.0*
"Corrected Mean" of all the Highest, (Col. 5), = *61.6*
"Corrected Mean" of all the Lowest, (Col. 6), = *49.0*
Difference, or Mean Daily Range, = *12.6*
** Calculated Mean Temperature of Month, = *55.3*

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *53.8*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *50.3*
Computed Temperature of Dew-point, = *46.9*
Do. Elastic Force of Vapour, = *32.0*
Do. Weight of Vapour in a Cubic Foot of Air, =
Relative Humidity, (Saturation = 100), = *77*
RAIN fell on *14* Days; Amount in Inches, = *4.59*

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		-4	1	3	5	0	7	-			1.64
P.M.		2	1	-	2	7	8	9	1		1.17
Mean.		1	3	0	2	6	9	8	1		1.40

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

William McAndrew

(Signed)

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 removed from their position on the Scales, and ought never afterwards to be used, without being *re-tested*. The self-registering, and especially the "*Minimum*" Thermometers, ought regularly

The *Hygrometer* consists of *in vivo* Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and *well-taxed* form of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulls 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 bulls;—the muslin must be of medium fineness, and fastened at the neck of the tub 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 40 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 Thermometer is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the 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 should be taken to tenths of a degree, and noted in decimals.

This the Thermometer will be read— $39^{\circ}\cdot 9$, $40^{\circ}\cdot 0$, or $40^{\circ}\cdot 1$; or, again, $40^{\circ}\cdot 4$, or $40^{\circ}\cdot 5$, according as it indicates a little under, an exact coincidence with, or a little over 40° ; or $40^{\circ}\cdot 3$, respectively. So also $40^{\circ}\cdot 3$, and $40^{\circ}\cdot 7$, more or less, must be respectively $40^{\circ}\cdot 2$ or $40^{\circ}\cdot 3$, and $40^{\circ}\cdot 6$ or $40^{\circ}\cdot 7$ or $40^{\circ}\cdot 8$ respectively. In

Reading Rutherford's *g. Max.*³ and *g. Min.*³ Thermometers, the indication of that end of the *index* which is next to the surface of the liquid is the *reading*. The *readings* of the *g. Max.* and *g. Min.* 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 importance 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 *g. Max.* and *g. Min.* are those of a series of phenomena commencing at 9 a.m. on the *2nd* of, 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 so, 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 that time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, the Anemometer is also recommended : the method of *Estimating* Wind Force by such tables as that given in the schedule to, say the least, unsatisfactory.

Rain-gauges.—They cause conspire to produce anomalies in rain returns. Many aise, partly, from unfavourable situation for observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unex-

the convenient 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 should be brought 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-bluns, 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 recorded 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 nomen-

The altitude 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 as usual, *as in 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," 6, S.W. (for example), will indicate that the "upper strata of clouds travel with *extreme* velocity from S.W.," and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of $2 \frac{1}{2}$ ^{sk.} _{1000 ft.} 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.

Sinushke.—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, it is of the greatest importance to ascertain the temperature of the soil, and the amount and constancy; the Council recommend that observations in this interesting department be made at 9 A.M.; and that thermometers placed in the earth, their bulbs being sunk to 3, 6, 12, 18, 24, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping iron collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. Attention must be made of the geological formation, and agricultural condition of the soil in which these thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our atmosphere, one of the most important branches of Meteorology. The Council, therefore, recommended that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of the river water. At or near the time of high water, on the 5th, 13th, 17th, 25th and 29th 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.

Notes.—Mention whether Schüben'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 1 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 38°^W, as in zone entry in the schedule, will indicate that the ozone paper is turned as 4°^W on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is 4.2, i.e., that it is *blowing* 4.2 *h*.

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 unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned, and 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 of 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 height of storms of wind attaining their maximum, as well as such notes as storms 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., 12 noon, 3 P.M., 6 P.M., and 9 P.M. can be registered, either in two columns often printed on the same page, or in two ruled off for purposes from that of the "Remarks," or in two ruled off for observations by the observer. It is intended that observations by the observer, and the use of the electrometer should be extended in this manner on the side-panels of the notebook. Additional remarks may be made on the margin.

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

The Council recommend that *term-day* observations (see table) be made, 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 consult with the Meteorological Secretary; and they consider it desirable that he should use every possible effort to secure that the instruments of the full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

(By Order,) A. B.

EDINBURGH, 17th July 1861.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.					
Alder,					
Asch,					
Beech,					
Birch,					
Elm,					
Larch,					
Lime,					
Sycamore or Plane,					
In flower,					
Leaf buds					
In leaf.					
Dressed or leaves.					
CROPS.					
Barley,					
Bere or Bigg,					
Oats,					
Wheat,					
Beans,					
Peach,					
Potatoes,					
Turnips,					
Rye Grass,					
Sowing or Planting.					
Growing above ground.					
Appearing in bar.					
First Cut or Raised.					

SHRUBS, ETC.		FRUITS.		MIGRATORY BIRDS.	
Barberry,	Apple,	Strawberry,	First in Blossom.	Cuckoo,	Other Birds, naming them—
Bentwree or Elder,	Black Currant,	Plum,	First in Blossom.	Swan,	
Broom,	Cherry,	Pear,	First in Blossom.	Starling,	
Hazel,	Gean,	Peach,	First in Blossom.	Sand-Martin,	
Hawthorn,	Gooseberry,	Plover,	First in Blossom.	Lapwing,	
Mountain Ash or Rowan,		House-Swallow,	First in Blossom.	Catwey,	
Red Flowering Currant,			First in Blossom.		
Rhododendron Ponticum,			First in Blossom.		
Whin,			First in Blossom.		

Trumps, Prunus, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc. Whether Epizootic disease prevails among Cattle; and the Agri-cultural condition of the district generally.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square

EDINBURGH.

BOOK-POST.

Indeseth
September 1861

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Leith, County of Edinburgh, in Lat. 55°56'0" N. Long. 3°2'40" W. Distance from Sea 1 mile.

Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.

During the MONTH of October 1861.

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.		9 h. A.M.		9 h. P.M.		9 h. A.M.													
		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	No. of hours in which it fell.	Amount in inches. No.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.		No. 3 inches.	No. 12 inches.	No. 22 inches.								
		Inches.		Inches.																															
	1	29.68	61	29.70	61	62	43			55	51	46	42	W	2	W	1																		
	2	29.73	61	30.00	60	60	42			55	52	46	43	SW	2	S	1																		
	3	30.14	60	30.20	56	58	36			49	45	44	40	SW	1	SW	1																		
	4	30.15	57	29.92	61	57	43			43	39	47	43	SW	1	S	-			.12															
	5	29.97	57	30.08	58	58	43			53	51	45	42	SW	1	SW	1 1/2			.18															
	6	30.12	58	30.08	57	56	45			51	47	49	44	SW	1	S	1			-															
	7	30.00	57	29.83	60	60	55			49	46	57	53	S	1	S	-			-															
	8	29.67	61	29.62	62	65	51			60	55	55	51	S	3	S	2			.24															
	9	29.74	61	29.90	60	60	44			54	49	50	46	S	1	S	1			-															
	10	29.98	58	29.80	61	61	52			47	43	51	50	S	1	SW	1			-															
	11	29.36	62	29.20	64	64	50			57	55	54	48	S	2	SW	1			-															
	12	29.40	62	29.60	63	64	56			56	52	60	56	S	3	S	2			.26															
	13	29.66	64	29.68	64	63	54			63	58	57	52	SE	3	SE	4			-															
	14	29.83	63	30.08	62	60	52			59	54	52	48	S	-	SW	-			-															
	15	30.10	62	30.18	62	62	38			58	54	50	46	SW	-	SW	-			.25															
	16	30.26	61	30.36	59	52	36			40	38	42	38	S	-	SW	-			-															
	17	30.31	57	30.26	56	55	35			39	35	43	40	S	-	SW	-			-															
	18	30.21	54	30.10	58	55	42			38	36	50	46	SW	-	SW	1			-															
	19	30.10	56	29.80	58	58	48			47	43	48	45	S	1	SW	-			-															
	20	29.87	58	29.87	58	56	47			50	47	51	48	SW	1 1/2	SW	-			.09															
	21	29.80	54	29.80	57	58	49			51	48	51	48	S	-	S	-			-															
	22	29.74	60	29.80	60	60	49			50	47	51	49	S	-	S	-			-															
	23	29.83	61	29.83	60	56	50			53	50	53	49	S	1	SW	1			-															
	24	29.80	60	29.99	60	53	45			50	49	47	46	S	-	S	-			.31															
	25	30.06	58	30.27	58	55	38			47	46	42	40	SW	1	W	-			.16															
	26	30.38	58	30.30	58	53	46			46	44	47	45	S	-	S	-			-															
	27	30.30	57	30.36	58	52	36			48	46	39	36	SE	1	SE	1			-															
	28	30.30	56	30.29	52	48	32			44	39	37	35	SE	1	S	1			-															
	29	30.20	50	30.04	53	49	31			34	32	39	37	SE	1	W	1			-															
	30	29.94	52	29.83	57	48	35			44	41	46	43	W	-	S	-			-															
	31	29.70	51	29.87	57	48	31			39	37	39	36	S	1	S	1			.10															
	Sums.	29.32	25.4	29.14	27.4	216	117			289	196.5	251	160.5		30.5		52.5			1.44															
	Means.	29.946	58.2	29.940	58.8	57.0	43.8			49.3	46.2	48.1	44.9		1.0		7.3			1.54															
	+ Total Corrections for Instrumental Errors.																																		
	+ Corrections for Diurnal Range.																																		
	+ "Corrected Means."																																		
	No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	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.
hl.	" hail.	sq.s.	" squalls.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t-s.	" thunder-storm.
li. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	g.	" gale of wind.
lu. ha.	" lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER. "corrected Mean" at 9 a.m. minus the Correction.

867

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++ for Temp. (Col. 2), = 29.946 - 0.27 = 29.852
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = 29.940 - 0.81 = 29.859
 Mean at Station, corrected, and at 32°, = 29.863
 Correction for Height, 90 feet, above Mean Sea-level, = 1.01
 Mean, reduced to 32°, and Sea-level, = 29.964
 Highest Reading, corrected for Index error, on the 26th, = 30.380
 Lowest Do., Do., on the th, = 29.200
 Difference, or Monthly Range, = 1.180

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 7th, = 65.0
 Lowest in Month, corrected for Index errors, on the th, = 31.0
 Difference, or Monthly Range, = 34.0
 "Corrected Mean" of all the Highest, (Col. 5), = 57.0
 "Corrected Mean" of all the Lowest, (Col. 6), = 43.8
 Difference, or Mean Daily Range, = 13.2
 ** Calculated Mean Temperature of Month, = 50.4
 S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the th, =
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =
 Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =
 "Corrected Mean," (Col. 8), of Black Bulb Min. on grass, =
 Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 48.7
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 45.6
 II Computed Temperature of Dew-point, = 42.4
 II Do. Elastic Force of Vapour, = 270
 II Do. Weight of Vapour in a Cubic Foot of Air, =
 II Relative Humidity, (Saturation = 100), = 79
 RAIN fell on 9 Days; Amount in Inches, = 1.44

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		1	1		3	17	6	3			1.00
P.M.		2			2	15	8	4			.53
Mean.		1	1		2	16	7	4			.76

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 William M. Wilson

(Signed)

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 moulded, 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, under repairs, they are very liable to be moved from their position on the *Scale*, and 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 *Hierometer* 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 vitiates the "Hygrometrical Deductions," Observers are especially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the 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 uncovered, and placed to the side, and a little below the level of the bulb;—in no case under the bulbs;—the muslin must be the wet bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by

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, 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-heights* are not true heights, 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 this Barometer, the sides of the *cistern* are of leather, and thus, by the elasticity of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; and their co-incidence being indicated by a little ivory float, whose position is ascertained by the eye, the *scale-heights* are then taken from a scale freshly brought into the lid and case of the cistern. When the *scale-heights* are taken in this manner, the *scale-heights* are the *under-tone* 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 inflexible surfaces has to be removed from its fastenings, the ivory peg must be screwed up as far as to form a tight plug to the chain. Then *erase* 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 aneroid 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 it. It must be perfectly perpendicular, and exposed to neither Sun's direct rays nor the heat of a fire.

In *taking an Observation*, the attached Thermometer is first inserted into the tube must then be gently tapped and the instrument carefully made. By raising or lowering the eye, it must be brought into the plane of the back and front of the Box—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 in the dark, so as to prevent heat from the observer's hands and face 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 enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from any 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 the large number of instruments, which is most desirable, doors are made to open to the south. These Boxes may be had at the Survey's Office.

Self-Regulating Thermometers.—Professor Phillips, and Neill and Lamb's Patent "*Maximum*" Thermometers are recommended printed directions for their use may be obtained with this instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed in 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 "*Minimum*" 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 lower globe, and must be dislodged from thence by heating that over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be kept perfectly horizontal; the bulb should incline slightly upwards, rather than the other.

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner.—In the column "Velocity and Direction," $6, S.W.$, (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 $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, 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 *cumulus*-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 twenty thermometers in this interesting department be made at 9 A.M., 12, 2, 4, 6, 8, 10, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fired with sloping lin collars, to prevent rain water being conveyed to the bulbs by the stems or wooden frames. Mention must be made of the geological formation, and agricultural condition of the soil in which these thermometers are placed.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our atmosphere, 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 mouth of the river, on the 30th, 15th, 10th, and 25th of each month, the thermometer ought to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, to draw up and read. When convenient, extra sea observations might be taken for other and greater depths, nothing always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

Ozone-Moffat yelcher, Schönbüch's parents are preferred. The paper is affixed by a pin to the board in the thermometer box, and the indication registered at 8 A.M. and 9 P.M. It is desired that these indications be registered in observation, with the force and direction of the wind at the time of observation, in the following manner:—thus *950*, as in *ozone* entry in the schedule, will indicate that the ozone paper, tinted as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4.5"; that it is *blowing* east.

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

By the use of abbreviations, the state of the weather at 9 A.M. ought to be registered, either in two columns either side of the page, or in two ruled off for the purpose, from that which is unoccupied. It is intended that observations by the aneroid barometer should be entered in this manner, or the side-ventilator remarks may be made on the margin.

Observations. In connection with the periodic return of the Observers, 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 in a selected piece of ground or farm.

A selected piece of ground or terrain. The Council recommend that *tern-day* observations be taken; i.e., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

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.

DUNBURGH, 17th July 1861.

Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

[illegible] T_0

Mr ALEXANDER BUCHAN.

Secretary of the Meteorological Society of Scotland.

10, *St Andrew Square,*

EDINBURGH.

Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat 55° 56' 0" N, Long. 3° 2' 40" W, Distance from Sea one miles.

Height of Cistern of the Barometer above Mean Sea-level Twenty feet, above Ground four feet. During the MONTH of November 1861

The Hours of Observation are of Greenwich Time.

The Hours of Observation are of Greenwich Time.

[illegible]

BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction ++}		
for Temp. (Col. 2),	= 29.498..... - .057.....	29.441
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction ++}		
for Temp. (Col. 4),	= 29.499..... - .056.....	29.443
Mean at Station, corrected, and at 32°,	=	29.444
Correction for Height, 90 feet, above Mean Sea-level,	=	1.01
Mean, reduced to 32°, and Sea-level,	=	29.545
Highest Reading, corrected for Index error, on the 18th,	=	30.260
Lowest Do., Do., on the 15th,	=	28.960
Difference, or Monthly Range,	=	1.300

S.-R. THERMOMETER, (in shade, etc.).	Highest in Month (corrected for Index errors), on the <u>21st of Jan. 29.67</u>	=	<u>54.0</u>
Lowest in Month, corrected for Index errors, on the <u>23rd</u>		=	<u>22.0</u>
Difference, or Monthly Range,		=	<u>32.0</u>
" Corrected Mean " of all the Highest, (Col. 5),		=	<u>44.1</u>
" Corrected Mean " of all the Lowest, (Col. 6),		=	<u>34.5</u>
Difference, or Mean Daily Range,		=	<u>9.6</u>
** Calculated Mean Temperature of Month,		=	<u>39.3</u>

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb ,.....	=	38.1
Mean (corrected) A.M. and P.M. Reading of Wet Bulb ,.....	=	35.4
⌘ Computed Temperature of Dew-point ,	=	31.8
⌘ Do. Elastic Force of Vapour ,	=	178
⌘ Do. Weight of Vapour in a Cubic Foot of Air ,...	=	
⌘ Relative Humidity , (Saturation = 100),.....	=	77
RAIN fell on 15 Days; Amount in Inches,	=	4.75

* 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 *aplurality* and *Index Errors*.

* The *Diurnal Range* for Scotland is as yet unknown.

+ *Practically*, though not *absolutely*, a *minus* correction.

+ These "Hyometrical 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 *Order*.

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

“ Corrected **Mean,**” (Col. 7), **of Black Bulb, Max. in Sun,**..... =

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

“ Corrected **Mean,**” (Col. 8), **of Black Bulb Min. on grass,** =

Difference of above Means or Range (“ exposed ”), =

WIND.	SUMMARY.											
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	2	3	2		5	11	4	3			3.2	
P.M.	4	3	1	1	4	9	7	1			3.2	
Mean.	3	3	1	1	4	10	6	2			3.2	

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Towns" should be in Edinburgh not later than the 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

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 considerations 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 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-priced Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted for 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 co-incidence 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 screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a sharp tap is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

In taking an observation, the attached Thermometer is first noted: the tube must then be gently tapped and the cistern-adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and face of the mercury in the tube. 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 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 Zambra's Patent "Maximum" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "Minimum" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "Maximum." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-quired 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 "Maximum" should be freely exposed to the Sun, and the "Minimum" should rest on open 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 free from 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 framed requirements shall be completed 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 40.4, under, an exact coincidence with, or a little over 40°, or 40.4, respectively. So also 40.3, and 40.7 or 40.8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of 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 on the 3rd 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, the Linds 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." The depth of snow must be measured in some open place where no drift is observed, and registered in addition to and as a check upon the indications of the rain-gauges. For wind, rain, and snow, as indeed in every column, the observer cannot be too careful to register *observations only*; and nothing that partakes of the nature of deduction or inference.

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

clature 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 30° 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 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, ² _{at-sea}, (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. Of crops and plants greatly depend on the temperature and health of soil;—its amount and constancy; the Council recommend that observations in this interesting department be made at 9 a.m., 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.

Osone.—Mention whether Schönbem'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 2, as an *osone* entry in the schedule, will indicate that the ozone paper is tinted as 2° on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4," i.e., that it is *blowing fresh*.

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

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

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

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

Edinburgh, 17th July 1861.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	In leaf.	Dressed of leaves.	CROPS.	Sowing or planting.	In flower or above ground.	In fruit or raised.	MIGRATORY BIRDS.										First in season.	First in fruit.	Departure.
Alder.				Barley.				Cuckoo.										Barberry.		
Aspen.				Bare or bigg.				Cutew.										Broom.		
Beech.				Wheat.				House-Swallow.										Hazel.		
Birch.				Oats.				Lapwing.										Hawthorn.		
Blind.				Peas.				Plover.										Lilac.		
Larch.				Beans.				Sand-Martin.										Laburnum.		
Lin.				Potatoes.				Starling.										Mountain Ash or Rowan.		
Oak.				Rye Grass.				Swan.										Mazoeon.		
Sycamore or Plane.								Other Birds, naming them.										Red Currant.		
																		Rhododendron Ponticum.		
																		Whip.		

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 any have suffered from blight, disease, etc. Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

EDINBURGH.

10, St Andrew Square,

Secretary of the Meteorological Society of Scotland,

Mr ALEXANDER BUCHAN.

BOOK-POST.

To

November 1861

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55° 56' 0" N Long. 3° 2' 40" W, Distance from Sea one mile.

Height of Cistern of the Barometer above Mean Sea-level Ninety feet, above Ground four feet.

During the MONTH of December 1861.

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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		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.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	No. 3 inches.	No. 15 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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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.
cl-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	h. r.	" heavy rain.
cu-s.	" cumulo-stratus.	c. h. r.	" continued heavy rain.
d.	" dew.	s.	" stratus.
f.	" fog.	sc.	" squall.
fr.	" frost.	sl.	" sleet.
h.-fr.	" hoar-frost.	sn.	" snow.
h.	" haze.	so. ha.	" solar halo.
h. d.	" heavy dew.	sq.	" squall.
hl.	" hail.	sqs.	" squalls.
l.	" lightning.	t.	" thunder.
ll. cl.	" light clouds.	t.-s.	" thunder-storm.
ll. 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), = 29.994 - 0.52 = 29.941
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 29.975 - 0.57 = 29.918
 Mean at Station, corrected, and at 32°, = 29.930
 Correction for Height, feet, above Mean Sea-level, = 1.01
 Mean, reduced to 32°, and Sea-level, = 30.031
 Highest Reading, corrected for Index error, on the 27th, = 30.500
 Lowest Do., Do., on the 7th, = 29.030
 Difference, or Monthly Range, = 1.470

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 12th, = 57.0
 Lowest in Month, corrected for Index errors, on the 27th, = 20.0
 Difference, or Monthly Range, = 37.0
 "Corrected Mean" of all the Highest, (Col. 5), = 42.3
 "Corrected Mean" of all the Lowest, (Col. 6), = 32.5
 Difference, or Mean Daily Range, = 9.8
 ** Calculated Mean Temperature of Month, = 37.4

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index errors), on the 12th, = 57.0
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 42.3
 Lowest at Night, Black Bulb, (corrected for Index errors), on the 12th, = 20.0
 "Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 32.5
 Difference of above Means or Range ("exposed"), = 9.8

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 37.3
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 35.0
 Computed Temperature of Dew-point, = 31.8
 Do. Elastic Force of Vapour, = 1.79
 Do. Weight of Vapour in a Cubic Foot of Air, = 81
 Relative Humidity, (Saturation = 100), = 81
 RAIN fell on 5 Days; Amount in Inches, = 1.95

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		3	2			9	12	3	2	1.00
P.M.		3	2			8	14	2	2	.91
Mean.		3	2			8	13	3	2	.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

William M. Macdonald

(Signed)

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS,

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a 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-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 screw up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum: this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer, (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

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

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, undergo repairs, they are very liable to be warped 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.

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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.

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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, 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 different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every Observatory be furnished with a *Thermopneumatic 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 *Leffing's* 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 and 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.

Invested

December 1861

capture 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* 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, S.W., (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of 2, *sc.*, (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 observed 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 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 2½, 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 recognized and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of 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, filed 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 *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.

Edinburgh, 17th July 1861.

Clouds.—Convenient abbreviations for Luke Howard's nomenclature of deduction or inference.

BOOK-POST

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EDINBURGH.

FOREST TREES.		In Flower.	Leaf first appear.	In Leaf.	Dressed of Leaves.	CROPS.	Sowing or Planting.	Appearing above Ground.	In Ear or Flower.	First Cut or Raised.
Alder.						Barley.				
Asp.						Bere or Bigg.				
Beech.						Oats.				
Birch.						Wheat.				
Elm.						Beans.				
Larch.						Pease.				
Oak.						Potatoes.				
Sycamore or Plane.						Rye Grass.				

SHRUBS, ETC.		First in Blossom.	Apple.	Black Currant.	Cherry.	Gemm.	Gooseberry.	Peach.	Laburnum.	Holly.	Hawthorn.	Hazel.	Broom.	Bouretree or Elder.	Barberry.
Whin.															
Rhododendron Ponticum.															
Mountain Ash or Rowan.															
Measeum.															
Lilac.															
Laburnum.															
Holly.															
Hawthorn.															
Hazel.															
Broom.															
Bouretree or Elder.															
Barberry.															

MIGRATORY BIRDS.		First Arrival.	Departure.	Cuckoo.	Carlew.	House-Swallow.	Lapwing.	Plover.	Sand-Martin.	Starling.	Swan.	Rail or Corn Crake.	Other Birds, naming them.