

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Imveresk, County of Edinburgh, in Lat. 55° 58' 0" N., Long. 3° 2' 40" W., Distance from Sea 100 miles.

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

During the MONTH of January 1865.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H-Cup Anemometer.		No. of hours in which it fell.	Amount in inches.	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.	Direc- tion.	Force	Direc- tion.	Force	No.				Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	No. 3 inches.					No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
																	9 h. A.M.															9 h. P.M.		No. 3 inches.	No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
																	No.															No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1	30. -	40	29.82	52	32	30			31	30	32	30	NE	2	S	1				.60																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													

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.	squalls.
l.	lightning.	t.	thunder.
li. cl.	light clouds.	t-s.	thunder-storm.
li. sh.	light showers.	w.	wind.
lu. co.	lunar corona.	g.	gale of wind.
lu. ha.	lunar halo.		

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-5.	Common Designation.	Estimated Force, 6-5.	Common Designation.	Estimated Force, 6-6.	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), = 29.346
“Corrected Mean” of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = 29.300
Mean at Station, corrected, and at 32°, = 29.323
Correction for Height, feet, above Mean Sea-level, = 1.01
Mean, reduced to 32°, and Sea-level, = 29.424
Highest Reading, corrected for Index error, on the 6th, = 30.050
Lowest Do., Do., on the 14th, = 28.300
Difference, or Monthly Range, = 1.750

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 9th, = 50.0
Lowest in Month, corrected for Index errors, on the 28th, = 16.0
Difference, or Monthly Range, = 34.0
“Corrected Mean” of all the Highest, (Col. 5), = 40.6
“Corrected Mean” of all the Lowest, (Col. 6), = 31.2
Difference, or Mean Daily Range, = 9.4
** Calculated Mean Temperature of Month, = 35.8

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 1st, = 50.0
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun, = 40.6
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1st, = 16.0
“Corrected Mean,” (Col. 8), of Black-Bulb Min. on grass, = 31.2
Difference of above Means or Range (“exposed”), = 9.4

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 34.8
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 32.3
†† Computed Temperature of Dew-point, = 30.6
†† Do. Elastic Force of Vapour, = 1.72
†† Do. Weight of Vapour in a Cubic Foot of Air, = 88
†† Relative Humidity, (Saturation = 100), = 88
RAIN fell on 15 Days; Amount in Inches, = 3.10

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	5	1	2		12	3	1	7		2.27	
P.M.	7	1	1	1	10	2	6	3		4.00	
Mean.	6	1	1	1	11	2	4	5		3.13	

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 McManis

(

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

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

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

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *sever* 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 *lign*, which may be improved by putting a piece of white paper behind the tube. It must be perfectly perpendicular, and exposed to neither the Sun's direct rays nor the heat of a fire.

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

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

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

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or *column* of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·9, 40°·0, or 40°·1; or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 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.

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

Snow-falls may, for convenience, be registered in the rain column, 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 place. 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

OBSERVATIONS.

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

Observations of the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 2 W., (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of 2, or 2½, (*etc.*) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

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

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

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

Electricity.—Too much importance cannot be attached to electric condition of the atmosphere in connection with terrestrial magnetism, and as a meteorological phenomenon. A proper Electrometer is necessary to every complete meteorological observatory. **Remarks.**—The "Remarks" column is too narrow, but unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

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

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

(By Order,) A. B.

Edinburgh, 9th December 1865.

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit.	First in generally.	First in generally.
Alder.			Apple.	Cuckoo.	
Beech.			Black Currant.	Curlew.	
Birch.			Cherry.	House-Swallow.	
Elm.			Corn.	Lapwing.	
Larch.			Gooseberry.	Plover.	
Oak.			Holly.	Sand-Martin.	
Sycamore or Plane.			Laburnum.	Swallow.	
			Mountain Ash or Rowan.	Other Birds, naming them.	
			Mezereum.	Rail or Corn Crake.	
			Strawberry.		

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.	
In Flower.	In Leaf.	First in Blossom.	First in Fruit generally.	First in generally.	First in 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 *90* feet, above Ground *4* feet.

During the MONTH of *February* 186*5*.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				SUNSHINE.	THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.			
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		Readings of the H-Cup Anemometer.		9 A.M.		P.M.		9 h. A.M.												
		Barometer.	Attached Ther- mometer	Barometer.	Attached Ther- mometer	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity, (0-5)	Amount, (0-10), and Species.	Velocity, (0-5), and Direction.	Amount, (0-10), and Species.		No.	3 inches.	No.					12 inches.	No.	22 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.
	1	28.76	44	28.90	48	38	33			37	36	35	34	SE	1	SE	1					1							on the night of the 15 th	1		
	2	28.97	44	29.05	49	38	35			35	35	35	35	SE	1	N	-					-						Beautiful and singular	2			
	3	29.10	47	29.37	48	40	35			37	37	36	35	S	-	S	-					1.43						Broad or Aurora seen	3			
	4	29.55	46	29.66	48	37	29			35	34	33	32	SE	1	E	1					.02						from 9 to 10 o'clock it	4			
	5	29.74	43	29.82	48	36	25			34	33	28	27	S	1	SW	1					-						streaked from East to	5			
	6	29.90	43	29.75	47	37	35			32	30	35	34	SE	1	SE	1					-						West right over head	6			
	7	29.78	44	29.80	45	39	34			37	36	37	36	N	1	SE	1					.02						with a little incline	7			
	8	30.00	42	30.19	49	39	29			26	35	32	31	SE	1	SE	1					-						in centre of Bow to	8			
	9	30.40	43	30.50	45	39	22			34	33	26	25	SE	1	SE	1					-						the South of a snowy	9			
	10	30.56	40	30.50	43	38	26			24	24	28	27	SW	1	SW	2					.02						or light showers -	10			
	11	30.47	39	30.40	44	34	30			30	30	30	29	SW	1	SE	1					.04						another was seen on	11			
	12	30.30	40	30.40	44	34	27			32	32	29	29	SW	1	SW	1					.03						The night of the 17 th	12			
	13	30.41	41	30.37	43	33	29			31	31	31	30	SE	1	SE	1					-						at 8 o'clock which lasted	13			
	14	30.34	41	30.30	41	33	19			30	30	29	29	SE	1	SE	1					-						only for a few moments	14			
	15	29.90	41	29.50	42	32	26			26	25	26	26	SW	2	SW	2					-						but so distinct as the	15			
	16	29.30	42	29.18	42	31	16			31	31	25	25	SW	1	SW	1					.06						previous nights before	16			
	17	29.18	40	29.15	40	35	22			20	20	26	25	SW	1	SW	1					-								17		
	18	29.30	40	29.32	42	32	29			24	24	32	31	SW	1	SW	1					.26								18		
	19	29.42	42	29.63	48	40	27			33	33	30	30	N	3	N	3					.03						a slight aurora seen	19			
	20	30.10	42	30.30	43	38	25			30	30	27	27	SW	3	SW	3					-						on the 23 rd	20			
	21	30.13	43	30.09	46	38	32			32	32	32	32	SW	1	SW	2					.03								21		
	22	30.06	46	30. -	48	43	38			37	36	44	43	SW	1	SW	1					-								22		
	23	30.00	47	29.60	50	48	37			39	38	45	43	SW	2	SW	2					-								23		
	24	29.50	50	29.79	56	46	33			39	37	39	37	SW	2	SW	2					-								24		
	25	30.06	51	29.92	54	50	35			41	40	42	40	SW	1	SE	1					-								25		
	26	29.55	48	29.94	52	47	29			37	37	37	36	SW	1	SW	2					.15								26		
	27	30.05	47	29.62	50	43	41			33	32	42	40	S	2	S	2					-								27		
	28	29.72	52	29.16	55	45	32			43	41	37	35	SW	2	SW	2					-								28		
	29																													29		
	30																													30		
	31																													31		
Sums.		834.04	1218	934.22	1310	1083	830			929	912	928	903	36		38		1.09				55										
Means.		29.791	43.95	29.797	46.8	38.7	29.6			33.4	32.6	33.1	32.2	1.35		1.35		.038				1.964										
+ 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 ++ for Temp. (Col. 2), = *29.750*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = *29.748*
Mean at Station, corrected, and at 32°, = *29.749*
Correction for Height, feet, above Mean Sea-level, = *1.01*
Mean, reduced to 32°, and Sea-level, = *29.850*
Highest Reading, corrected for Index error, on the *10* th, = *30.580*
Lowest Do., Do., on the *1* th, = *28.260*
Difference, or Monthly Range, = *1.800*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *25* th, = *50.0*
Lowest in Month, corrected for Index errors, on the *16* th, = *16.0*
Difference, or Monthly Range, = *34.0*
"Corrected Mean" of all the Highest, (Col. 5), = *38.7*
"Corrected Mean" of all the Lowest, (Col. 6), = *28.6*
Difference, or Mean Daily Range, = *9.1*
** Calculated Mean Temperature of Month, = *34.2*
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected for Index Errors), on the th, =
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =
Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, =
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *33.2*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *32.4*
II Computed Temperature of Dew-point, = *30.9*
II Do. Elastic Force of Vapour, = *1.73*
II Do. Weight of Vapour in a Cubic Foot of Air, =
II Relative Humidity, (Saturation = 100), = *91*
RAIN fell on *11* Days; Amount in Inches, = *1.09*

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		3	6		2	3	5	6	3		1.64
P.M.		4	7	1	1	3	2	7	3		1.95
Mean.		4	6	1	1	3	4	6	3	0	1.80

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 McAuslane

(Signed)



EDINBURGH.

[illegible][illegible]

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, 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 *90* feet, above Ground *4* feet.

During the MONTH of *March* 186*5*.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE. 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.	Attach- ed Ther- mometer	Barometer. No.	Attach- ed Ther- mometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H-Cup Anemometer. No.	No. of hours in which it fell.	Amount in inches.	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.	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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1	29.40	52	29.56	55	50	37			38	37	42	40	SW	2	SW	2			-																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

NOTATION USED IN GENERAL REMARKS.			
a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ms.	" meteors.
ci-cu.	" cirro-cumulus.	h.	" nimbus.
ci-s.	" cirro-stratus.	r.	" rain.
cu.	" cumulus.	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.	" squalls.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t.-s.	" thunder-storm.
li. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	w.	" gale of wind.
lu. ha.	" lunar halo.	g.	" gale of wind.

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-1.	Common Designation.	Estimated Force, 1-2.	Common Designation.	Estimated Force, 2-3.	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), = *29.785*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = *29.805*
Mean at Station, corrected, and at 32°, = *29.795*
Correction for Height, feet, above Mean Sea-level, = *10.1*
Mean, reduced to 32°, and Sea-level, = *29.896*
Highest Reading, corrected for Index error, on the *20*th, = *30.200*
Lowest Do., Do., on the *5*th, = *29.100*
Difference, or Monthly Range, = *1.100*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *2*th, = *54.0*
Lowest in Month, corrected for Index errors, on the *26*th, = *27.0*
Difference, or Monthly Range, = *27.0*
"Corrected Mean" of all the Highest, (Col. 5), = *44.0*
"Corrected Mean" of all the Lowest, (Col. 6), = *32.5*
Difference, or Mean Daily Range, = *11.5*
** Calculated Mean Temperature of Month, = *38.2*

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *36.2*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *34.7*
†† Computed Temperature of Dew-point, = *32.4*
†† Do. Elastic Force of Vapour, = *1.86*
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = *87*

RAIN fell on *7* Days; Amount in Inches, = *1.03*

WIND.												SUMMARY.	
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.		
A.M.	4	3	3	5		8	6	3		2.56			
P.M.	6	3	4	4	1	7	3	3		2.56			
Mean.	5	3	4	4	1	7	4	3		2.56			

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 Ainslie

(Signed)

INSTRUCTIONS

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 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, at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances, they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

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

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

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

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then 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 ease, and kept 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 should be repaired.

The Barometer must 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 "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 tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline slightly downwards, rather than the other.

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 the Thermometers; nor the Sun's heat to affect the alcohol by distillation.

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

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

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39.9, 40.0, or 40.1; or 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 40¼, and 40¾, more or less, must be registered 40.2 or 40.3, and 40.7 or 40.8 respectively. In reading Rutherford's "*Max.*" and "*Min.*" Thermometers, the indication of that end of the *index* which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at 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 depth of snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indeed in every column, the observer cannot be too careful to register *observations* only; and nothing that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's

OBSERVATIONS.

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 6 S.W. (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, *cu-st.* (*i.e.*,) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

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

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

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

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

Ozone.—Mention whether Schönbien's or Moffat's papers are used. Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3 $\frac{1}{2}$, as an *ozone* entry in the schedule, will indicate that the ozone paper is tinted as 3 $\frac{1}{2}$ 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 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 which, on being presented for comparison, does not afford him satisfaction.

(By Order) A. B.

EDINBURGH, 9th December 1865.

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

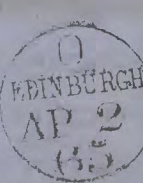
EDINBURGH.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	CROPS.	SOILING.	APPEARING.	IN BUD.	IN FLOW.	FIRST CUT.
Alder,	Barley,	Barley,	Barley,	Barley,	Barley,	Barley,
Aspen,	Bare or High,	Bare or High,	Bare or High,	Bare or High,	Bare or High,	Bare or High,
Beech,	Oats,	Oats,	Oats,	Oats,	Oats,	Oats,
Birch,	Wheat,	Wheat,	Wheat,	Wheat,	Wheat,	Wheat,
Elm,	Beans,	Beans,	Beans,	Beans,	Beans,	Beans,
Larch,	Pease,	Pease,	Pease,	Pease,	Pease,	Pease,
Lime,	Potatoes,	Potatoes,	Potatoes,	Potatoes,	Potatoes,	Potatoes,
Sycamore or Plane,	Rye Grass,	Rye Grass,	Rye Grass,	Rye Grass,	Rye Grass,	Rye Grass,

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit.	First in Ripeness.	First in Arrival.	First in Departure.
Barberry,	Apple,	Apple,	Apple,	Apple,	Apple,	Apple,
Bourree or Elder,	Black Currant,	Black Currant,	Black Currant,	Black Currant,	Black Currant,	Black Currant,
Broom,	Cherry,	Cherry,	Cherry,	Cherry,	Cherry,	Cherry,
Hazel,	Cream,	Cream,	Cream,	Cream,	Cream,	Cream,
Hawthorn,	Gooseberry,	Gooseberry,	Gooseberry,	Gooseberry,	Gooseberry,	Gooseberry,
Holly,	Peach,	Peach,	Peach,	Peach,	Peach,	Peach,
Laburnum,	Pear,	Pear,	Pear,	Pear,	Pear,	Pear,
Lilac,	Plum,	Plum,	Plum,	Plum,	Plum,	Plum,
Mezerion,	Strawberry,	Strawberry,	Strawberry,	Strawberry,	Strawberry,	Strawberry,
Mountain Ash or Rowan,	Other Birds, naming them—	Other Birds, naming them—	Other Birds, naming them—	Other Birds, naming them—	Other Birds, naming them—	Other Birds, naming them—
Red Flowering Currant,						
Rhododendron Ponticum,						
Whin,						

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



Imperial
March 1865.

To

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 90 feet, above Ground 4 feet.During the MONTH of April 1865.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.				SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		Readings of the H-Cup Anemometer. No.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.			Temperature of WELL at Depth of feet. No.	Temperature at and Density.	9 A.M. 9 P.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.	Direc- tion.	Force			Direc- tion.	Force	Velocity, (0-6), and Direc- tion.	Amount, (0-10), and Species.	Velocity, (0-6), and Direc- tion.	Amount, (0-10), and Species.	No. 3 inches.								No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
																																	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
1	30.00	55	30.03	58	53	35			45	43	40	38	SW	2	SW	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 30.118..... - 0.71..... = 30.047

"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 30.104..... - 0.77..... = 30.024

Mean at Station, corrected, and at 32°, = 30.036

Correction for Height, feet, above Mean Sea-level, = 10.1

Mean, reduced to 32°, and Sea-level, = 30.137

Highest Reading, corrected for Index error, on the 20th, = 30.400

Lowest Do., Do., on the 2th, = 29.760

Difference, or Monthly Range, = 0.640

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 16th, = 64.0

Lowest in Month, corrected for Index errors, on the 29th, = 28.0

Difference, or Monthly Range, = 36.0

"Corrected Mean" of all the Highest, (Col. 5), = 56.7

"Corrected Mean" of all the Lowest, (Col. 6), = 28.9

Difference, or Mean Daily Range, = 17.8

* Calculated Mean Temperature of Month, = 47.8

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 16th, = 64.0

"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 56.7

Lowest at Night, Black Bulb, (corrected for Index errors), on the 29th, = 28.0

"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 28.9

Difference of above Means or Range ("exposed"), = 17.8

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 45.2

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 42.9

†† Computed Temperature of Dew-point, = 40.3

†† Do. Elastic Force of Vapour, = 2.49

†† Do. Weight of Vapour in a Cubic Foot of Air, = 8.3

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

RAIN fell on 8 Days; Amount in Inches, = 0.58

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	9	2	1	1	10	3	4			2.56	
P.M.	2	7	2	1	2	9	3	4		2.34	
Mean.	1	8	2	1	2	9	3	4	0	2.45	

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 A. McQuillan

(Signed)

Smock
April 1865

FOREST TREES.	In Flower.	In Leaf Buds.	In Leaf.	Divested of Leaves.	CROPS.	Seeds or Planting.	Appearance above ground.	In Ear or Flower.	First Cut
Alder,					Barley,				
Ash,					Bere or Bidge,				
Beech,					Oats,				
Birch,					Wheat,				
Elm,					Beans,				
Larch,					Pease,				
Lin,					Potatoes,				
Oak,					Turnips,				
Sycamore or Plane,					Rye Grass,				

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Overesk* County of *Mid. Lothian*, in Lat. *55° 56' 08"*, Long. *3° 2' 40" W*, Distance from Sea *one* miles.

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

During the MONTH of *May* 186*5*.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE. 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.	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.	Velocity, (0-6), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.							
	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.					9 h. P.M.	9 h. A.M.	9 h. P.M.
1	29.80	53	29.70	56	56	44			50	45	50	47	S	2	S	2		-											Thunder heard at 6 o'clock P.M.			
2	29.68	55	29.70	58	64	51			53	47	53	49	S	2	SW	3		-											on the 6 th but no lightning seen			
3	29.61	55	29.54	60	66	47			55	52	53	50	S	2	S	3		.02											Thunder with lightning on the 22 nd at 2 P.M. and again			
4	29.74	58	29.77	60	60	40			53	49	48	44	S	4	S	4		.02											Thunder on the 28 th at 5 P.M.			
5	29.80	60	29.70	58	58	45			51	46	47	46	SW	1	NE	1		.56											but no lightning seen	6		
6	29.83	57	29.93	58	48	45			45	44	46	46	SE	1	SE	12		.20											Heavy gale of wind on the 19 th	8		
7	30.00	55	30.03	58	60	43			51	49	49	47	S	1	N	1		-														
8	30.03	54	29.93	57	58	42			46	45	49	46	NE	1	NE	1		=														
9	29.90	53	29.80	56	47	43			45	43	47	46	NE	1	NE	1		.10												Very hot on the 21 st and 22 nd	9	
10	29.65	52	29.65	54	52	42			45	44	42	41	NE	1	NE	1		.23												Booming	10	
11	29.60	53	29.80	55	46	37			44	43	40	39	NE	2	NE	2		.28												Rainbow on the 28 th	11	
12	29.90	52	29.90	51	47	40			41	40	43	42	NE	2	NE	2		.76												Much rain on the 29 th & 30 th	12	
13	29.94	52	29.90	50	45	44			43	41	45	43	NE	1	NE	-		.30												River Eke in full flood	13	
14	29.87	54	29.66	56	54	45			53	48	48	43	SW	2	SW	1		-														
15	29.50	54	29.44	54	59	36			49	47	42	40	SW	2	SW	1		-														
16	29.40	56	29.38	56	56	44			43	40	49	47	SW	2	S	4		-														
17	29.60	54	29.66	57	60	45			54	50	49	46	S	2	S	2		-														
18	29.84	56	30.05	58	62	49			56	50	49	46	SW	2	SW	2		-														
19	30.03	58	30.16	61	63	54			59	53	56	53	SW	5	SW	5		-														
20	30.30	62	30.28	64	66	50			59	57	53	50	W	2	W	2		-														
21	30.17	64	30.13	68	70	54			63	59	58	54	W	1	NE	2		-														
22	30.	66	29.93	66	69	52			60	56	58	56	S	1	SE	1		.14														
23	30.	66	30.04	65	75	50			60	54	56	53	E	1	E	1		-														
24	30.02	65	30.02	62	76	55			58	57	52	50	N	1	NE	1		-														
25	30.09	66	30.03	64	77	50			63	60	54	50	SW	1	SW	1		-														
26	30.	64	29.83	64	68	53			60	54	55	53	SW	1	W	1		.04														
27	29.78	65	29.64	66	68	52			60	54	54	53	SW	2	SW	1		.10														
28	29.50	62	29.70	65	66	48			57	55	56	53	SW	2	SW	2		.20														
29	29.68	60	29.56	62	40	45			54	52	50	49	SW	2	S	3		1.00														
30	29.64	57	29.80	56	56	40			45	45	46	45	W	2	SW	1		.60														
31	29.94	56	29.96	56	63	44			50	46	57	54	S	1	SW	1		-														
Sums.	924.84	1794	924.62	1831	1875	1429			1625	1527	1554	1481		52	545			3.95														
Means.	29.834	57.8	29.826	59.4	60.4	46.1			52.4	49.2	50.1	47.7		1.68	1.82																	
† 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.	u.	nimbus.								
ci-s.	cirro-stratus.	r.	rain.								
cu.	cumulus.	e. h. r.	heavy rain.								
cu-s.	cumulo-stratus.	s.	continued heavy rain.								
d.	dew.	sc.	scud.								
f.	fog.	sl.	sleet.								
fr.	frost.	sn.	snow.								
h-fr.	hoar-frost.	so. ha.	solar halo.								
h.	haze.	sq.	squall.								
h. d.	heavy dew.	sq.	squall.								
hl.	hail.	sq.	squall.								
l.	lightning.	t.	thunder.								
li. cl.	light clouds.	t-s.	thunder-storm.								
li. sh.	light showers.	w.	wind.								
lo. co.	lunar corona.	g.	gale of wind.								
lu. ha.	lunar halo.										

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0-5.	Common Designation.	Estimated Force, 6-10.	Common Designation.	Estimated Force, 11-15.	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), = *29.755*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = *29.744*
Mean at Station, corrected, and at 32°, = *29.750*
Correction for Height, feet, above Mean Sea-level, = *10.1*
Mean, reduced to 32°, and Sea-level, = *29.851*
Highest Reading, corrected for Index error, on the *20*th, = *30.300*
Lowest Do., Do., on the *16*th, = *29.380*
Difference, or Monthly Range, = *0.920*

S-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *25*th, = *77.0*
Lowest in Month, corrected for Index errors, on the *15*th, = *36.0*
Difference, or Monthly Range, = *41.0*
"Corrected Mean" of all the Highest, (Col. 5), = *60.4*
"Corrected Mean" of all the Lowest, (Col. 6), = *46.1*
Difference, or Mean Daily Range, = *14.3*
** Calculated Mean Temperature of Month, = *53.2*

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *51.2*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *48.5*
†† Computed Temperature of Dew-point, = *45.7*
†† Do. Elastic Force of Vapour, = *209*
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = *82*
RAIN fell on *15* Days; Amount in Inches, = *3.95*

WIND.											
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	3	6	2		7	11	2			2.82	
P.M.	1	2	3	1	6	7	2	2		3.30	
Mean.	2	7	3	1	6	9	2	1	0	3.06	

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 Maustane*

(Signed) _____

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Mid-Lothian, in Lat. 55° 36' N, Long. 3° 2' 40" W, Distance from Sea one miles.

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

During the MONTH of June 1865.

The Hours of Observation are of Greenwich Time.

Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M.				HYGROMETER. No.				WIND.				RAIN.				CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.	
	9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.											
	Barometer. No.	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 (0-9), and Direc- tion.	Amount (0-10), and Species.	Velocity (0-9), and Direc- tion.	Amount (0-10), and Species.	No. 3 inches.	No. 12 inches.	No. 22 inches.							
	No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.					
1	29.88	56	29.87	60	60	45			49	47	46	44	SE	1	SE	2							2					June has been a very	1			
2	29.83	57	29.79	60	60	47			55	49	50	47	SW	1	W	1		25					2					hot and dry month	2			
3	29.80	59	30.05	62	65	47			57	53	53	50	SW	1	SW	1							1					rain fell out on three	3			
4	30.20	64	30.20	64	68	54			60	56	60	57	SW	1	SW	1							8					days' moisture fallen	4			
5	30.20	64	30.22	64	68	52			63	58	58	55	SW	2	SW	1							3					in gauge .32 of an inch	5			
6	30.24	64	30.34	65	69	53			64	60	57	53	W	1	SW	1							7					sun shine more or less	6			
7	30.44	65	30.42	68	75	50			65	60	64	60	SW	1	SW	1							9					every day for this month	7			
8	30.35	68	30.35	68	77	55			67	63	66	62	SW	2	SW	4							10					203 hours -	8			
9	30.35	68	30.24	68	68	50			64	59	56	51	SW	2	SW	2							10					Great want of Rain	9			
10	30.14	65	30.10	65	67	45			60	56	51	47	SW	2	SW	2							6					and every thing suffering	10			
11	30.30	60	30.40	66	70	40			53	46	56	50	NE	1	NE	1							7					very much	11			
12	30.40	60	30.41	61	68	46			58	50	54	49	SW	1	SW	1							5							12		
13	30.50	62	30.40	66	79	45			57	52	60	55	SW	1	SW	1							8							13		
14	30.39	63	30.36	62	73	50			57	53	53	50	SE	1	NE	1							10							14		
15	30.38	63	30.46	62	69	50			60	54	54	50	NE	2	NE	1							7							15		
16	30.48	63	30.50	65	75	46			60	54	63	56	NE	1	NE	1							9							16		
17	30.50	63	30.40	67	80	48			60	56	66	60	NE	1	NE	1							13							17		
18	30.40	64	30.39	65	70	53			63	57	55	50	SE	2	W	2							12							18		
19	30.38	65	30.28	68	77	55			63	55	63	58	SW	1	N	1							12							19		
20	30.30	66	30.36	66	70	53			64	56	56	53	N	2	N	1							12							20		
21	30.40	63	30.36	64	68	54			56	54	57	54	NE	-	NE	1							2							21		
22	30.25	65	30.20	71	80	60			60	55	65	60	NE	1	W	1							14							22		
23	30.10	70	30.05	64	68	47			67	62	54	49	SW	3	SW	2		.03					2							23		
24	30.12	64	30.06	63	68	51			55	48	53	49	SW	2	W	2		.04					4							24		
25	29.90	64	29.88	66	63	52			58	52	52	49	W	2	W	2							2							25		
26	30.	62	30.15	64	74	53			63	56	56	52	SW	1	W	1							7							26		
27	30.20	65	30.16	69	71	58			62	56	62	55	W	1	W	1							5							27		
28	30.04	65	29.85	68	70	58			63	58	64	60	SE	1	SE	1							6							28		
29	29.74	68	29.70	64	70	50			63	58	55	50	NE	2	SE	1							3							29		
30	29.70	64	29.75	64	68	47			58	53	53	49	NE	1	NE	2							5							30		
31																														31		
Sums.	118	591	109	570	149	13	14		12	146	212	54		415	41			.32												NOTATION USED IN GENERAL REMARKS.		
Means.	30.197	63.6	30.190	65.0	70.3	50.5			60.1	53.9	57.1	52.8		13.7	13.7																a. denotes aurora.	
† Total Corrections for Instrumental Errors.																															u. denotes meteor.	
† Corrections for Diurnal Range.																															ci. cirrus.	
"Corrected Means."																															ms. meteors.	
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	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.
																																sl. sleet.
																																h-fr. hoar-frost.
																																sn. snow.
																																so. ha. solar halo.
																																sq. squall.
																																h. hail.
																																sq. squalls.
																																l. lightning.
																																t. thunder.
																																t-s. thunder-storm.
																																li. cl. light clouds.
																																w. wind.
																																li. sh. light showers.
																																lu. co. lunar corona.
																																g. gale of wind.
																																lu. ha. lunar halo.

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.	sqa.	" squalls.
l.	" lightning.	t.	" thunder.
li. cl.	" light clouds.	t. s.	" thunder-storm.
li. sh.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	g.	" gale of wind.
lu. ha.	" lunar halo.		

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 30.103
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 30.092
Mean at Station, corrected, and at 32°, = 30.097
Correction for Height, feet, above Mean Sea-level, = 10.1
Mean, reduced to 32°, and Sea-level, = 30.198
Highest Reading, corrected for Index error, on the 16 th, = 30.500
Lowest Do., Do., on the 14 th, = 29.700
Difference, or Monthly Range, = 0.800

S-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 17 th, = 80.0
Lowest in Month, corrected for Index errors, on the 11 th, = 40.0
Difference, or Monthly Range, = 40.0
"Corrected Mean" of all the Highest, (Col. 5), = 70.3
"Corrected Mean" of all the Lowest, (Col. 6), = 50.5
Difference, or Mean Daily Range, = 19.8
** Calculated Mean Temperature of Month, = 60.4
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, = 58.6
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 52.4
Computed Temperature of Dew-point, = 48.8
Do. Elastic Force of Vapour, = 34.5
Do. Weight of Vapour in a Cubic Foot of Air, =
Relative Humidity, (Saturation = 100), = 70
RAIN fell on 3 Days; Amount in Inches, = 0.32

WIND.												SUMMARY.		
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.			
A.M.	1	7	1	4	1	2	4	1		1.87				
P.M.	3	6	1	3	1	1	7			1.87				
Mean.	2	6	0	4	1	1	5	1	0	1.87				

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† Embracing corrections for both capillarity and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ Predictions, though not absolutely, a minus correction.
|| These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
¶ While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
‡ 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 M. Andrew

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

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

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

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

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

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above ground in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as to "project" 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-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 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. "Dew" 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 a wooden support 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 Society.

The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus are specially vitiate the "Hygrometrical Deductions," Observers are requested to attend to the following conditions:—The bulbs must *hang down*, by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any 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 enclosed in a tin case, which The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned requirements shall be complied with as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·9, 40°·0, or 40°·1; or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40°·5, respectively. So also 40°·1, and 40°·3, more or less, must be registered 40°·2 or 40°·3, and 40°·7 or 40°·8 respectively. In reading Rutherford's "Max." and "Min." Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 2, W.; (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of 2, *cast*; (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus*; 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. Motion 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 Schönbom's or Moffat's papers are used.—Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3°, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4," i.e., that it is *blowing fresh*.

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

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

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

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

Enslinham, 9th December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	CROPS.	PLANTING.	SOILING OR ABOVE GROUND.	APPEARING IN BUD.	IN BUD.	FIRST CUT OR REAPED.
Alder,	Barley,	Bare or High,	Oats,	Wheat,	Beans,	Lentils,
Beech,	Peas,	Potatoes,	Rye Grass,	Turnips,	Symmore or Plane,	
Birch,						
Elm,						
Larch,						
Oak,						
Symmore or Plane,						

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit Ripe.	First in Blossom.	First in Fruit Ripe.	First in Blossom.	First in Fruit Ripe.
Barberry,	Apple,	Cuckoo,	Cutew,	House-Sparrow,	Plover,	Sand-Martin,	Starling,
Broom,	Cherry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Hazel,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Hawthorn,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Holly,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Laburnum,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Lilac,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Mezerion,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Mountain Ash or Rowan,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Red Flowering Currant,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Rhododendron Ponticum,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,
Whin,	Gooseberry,	House-Sparrow,	Cuckoo,	Cutew,	Plover,	Sand-Martin,	Starling,

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

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

BOOK-POST.

To

Imperial
June 1865.

111

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

During the MONTH of July 1865

The Hours of Observation are of Greenwich Time.

BAROMETER, "corrected Mean" at 9 A.M., <i>minus the Correction</i> ++	
for Temp. (Col. 2). = 29.861 - 0.98 ... }	<u>29.763</u>
"Corrected Mean" of Barometer at 9 P.M., <i>minus the Correction</i> ++	
for Temp. (Col. 4). = 29.864 - 1.01 ... }	<u>29.763</u>
Mean at Station, corrected, and at 32° ,	<u>29.763</u>
Correction for Height, feet, above Mean Sea-level,	<u>101</u>
Mean, reduced to 32°, and Sea-level ,	<u>29.864</u>
Highest Reading, corrected for Index error, on the 25 th ,	<u>30.300</u>
Lowest Do., Do., on the 14 th ,	<u>29.520</u>
Difference, or Monthly Range ,	<u>0.770</u>

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,	=	58.5
Mean (corrected) A.M. and P.M. Reading of Wet Bulb,	=	55.3
†† Computed Temperature of Dew-point,	=	52.5
†† Do. Elastic Force of Vapour,	=	39.5
†† Do. Weight of Vapour in a Cubic Foot of Air, ...	=	
†† Relative Humidity, (Saturation = 100),	=	80
RAIN fell on 14 Days; Amount in Inches,	=	3.25

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calcu or Variable.	Mean Force.	Mean Velocity in miles per day
A.M.	2	1		2	3	14	8	1		1.3	
P.M.	1		1	1	3	13	8	3		1.2	
Mean.	1	1	1	1	4	13	8	2	0	1.25	

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 Pasted, and Forwarded by Book Post, prepaid.

Observations made and
Return verified by

(Signed)

Sanquhar
July 1883

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 *Anemometers*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Now and then a Barometer has been used for Meteorological Observations, but it 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 screws, 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 *venier*.

When a Barometer having adjustable surfaces has to be removed, from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *serve up* the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern 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 *adjusted*: the tube must then be gently tapped and the cistern-mercury 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 *venier*, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

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

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer sent by the Society 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 re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperatures, 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, 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*" Directions, Observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 20 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-in requirements shall be complied with, as far as possible.

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

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

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

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every Observatory be furnished with a Hemispherical-Cup Anemometer;—a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, the Lind's 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 level cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

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

Clouds.—Convenient abbreviations for Luke Howard's

nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky overhead (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds column, though their 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, *cast.*, (*cf.*) will indicate that the higher regions are covered by 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.

Omne.—Mention whether Schönbach'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 S. 3, as an *omne* entry in the schedule, will indicate 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 boreales, 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 purposes, from that headed "*Remarks*." It is intended that observations by the Electrometer should be entered in this manner, or on the side margin. Additional remarks may be made on the margin.

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

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

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

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

(By Order.) A. B.

Edinburgh, 9th December 1883.

BOOK-POSTS

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

4 Queen Street
10 St Andrew Square

EDINBURGH.

FOREST TREES.		FRUIT.		MIGRATORY BIRDS.		Other Birds, naming them—	
In flower.	In leaf.	First in blossom.	First in blossom.	First in blossom.	First in blossom.	First in blossom.	First in blossom.
Alder,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Apple,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Broom,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Black Currant,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Cherry,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Gooseberry,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Holly,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Laburnum,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Lilac,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Mezopop,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Mountain Ash or Rowan,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Red Flowering Currant,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Rhododendron Ponticum,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,
Viburnum,	Barley,	Berry or Higgs,	Oats,	Wheat,	Beans,	Peas,	Turnips,

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

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 *90* feet, above Ground *4* feet.

During the MONTH of *August* 1865.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		9 h. A.M.		9 h. P.M.		Protected, in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H-Cup Anemometer.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		Barometer. No.	Attached Ther-mometer	Barometer. No.	Attached Ther-mometer	Max. No.	Min. No.	Max. in Sun's rays. No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direc-tion.	Force.	Direc-tion.	Force.	No. 9 h. A.M.	No. 9 h. P.M.			Velocity, (0-6), and Direc-tion.	Amount, (0-10), and Species.	Velocity, (0-6), and Direc-tion.	Amount, (0-10), and Species.	SUNSHINE. Hours.					No. 3 inches.	No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
																																		Temperature of WELL, at Depth of feet. No.			Temperature and Density			0-10.			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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	1	29.79	60	29.70	60	60	47			54	49	54	50	17	1	17	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

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.	st.	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.
h.	hall.	sq.	squalls.
li. cl.	lightning.	t.	thunder.
li. sh.	light showers.	t. s.	thunder-storm.
lu. co.	lunar corona.	w.	wind.
lu. ha.	lunar halo.	g.	gale of wind.

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-6.	Common Designation.	Estimated Force, 7-9.	Common Designation.	Estimated Force, 10-12.	Common Designation.
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), = *29.702*
 “Corrected Mean” of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = *29.708*
 Mean at Station, corrected, and at 32°, = *29.705*
 Correction for Height, feet, above Mean Sea-level, = *10.1*
 Mean, reduced to 32°, and Sea-level, = *29.806*
 Highest Reading, corrected for Index error, on the *26* th, = *30.200*
 Lowest Do., Do., on the *th*, = *29.360*
 Difference, or Monthly Range, = *0.840*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *4* th, = *69.0*
 Lowest in Month, corrected for Index errors, on the *3* th, = *43.0*
 Difference, or Monthly Range, = *26.0*
 “Corrected Mean” of all the Highest, (Col. 5), = *64.9*
 “Corrected Mean” of all the Lowest, (Col. 6), = *50.5*
 Difference, or Mean Daily Range, = *14.4*
 ** Calculated Mean Temperature of Month, = *57.7*
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, = *57.0*
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *53.9*
 II Computed Temperature of Dew-point, = *55.0*
 II Do. Elastic Force of Vapour, = *3.74*
 II Do. Weight of Vapour in a Cubic Foot of Air, =
 II Relative Humidity, (Saturation = 100), = *79*
RAIN fell on *20* Days; Amount in Inches, = *4.55*

WIND. SUMMARY.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	3	5	1	5	9	2	1			1.2	
P.M.	3	5	2	2	4	10	4	1		1.2	
Mean.	3	5	2	3	5	9	3	1		1.2	

* Each instrument tested at the Office in Edinburgh bears the stamp “S.M.S.” and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
 † Embracing corrections for both capillary and Index Errors.
 ‡ The Diurnal Range for Scotland is as yet unknown.
 § These “Hygrometrical Deductions” are calculated from Glaisher’s Hygrometrical Tables, Second Edition only.
 || While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 5 and 6 will be entered as the “Calculated Mean Temperature.”
 ** 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 *Wm. Stevenson*

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, County of *Edinburgh*, in Lat. *55° 56' 0"* Long. *3° 24' 0"* Distance from Sea *100* miles.

Height of Cistern of the Barometer above Mean Sea-level *90* feet, above Ground *44* feet. During the MONTH of *September* 186*5*.
The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.		SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		9 h. A.M.		9 h. P.M.		Protected, in Shade, & 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. No.	Min. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Readings of the H-Cup Anemometer.	No. of hours in which it fell.	Amount in inches.	Velocity (0-6), and Direction.	Amount (0-10), and Species.	Velocity (0-6), and Direction.	Amount (0-10), and Species.					No. 3 inches.	No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		* No.		No.															9 h. A.M.	9 h. P.M.	No.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		inches.		inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++ for Temp. (Col. 2), = *30.145* - *1.1* = *30.044*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++ for Temp. (Col. 4), = *30.142* - *1.0* = *30.040*
Mean at Station, corrected, and at 32°, = *30.042*
Correction for Height, feet, above Mean Sea-level, = *1.01*
Mean, reduced to 32°, and Sea-level, = *30.143*
Highest Reading, corrected for Index error, on the *10*th, = *30.500*
Lowest Do., Do., on the *29*th, = *29.600*
Difference, or Monthly Range, = *0.900*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *9*th, = *76.0*
Lowest in Month, corrected for Index errors, on the *25*th, = *40.0*
Difference, or Monthly Range, = *36.0*
"Corrected Mean" of all the Highest, (Col. 5), = *66.5*
"Corrected Mean" of all the Lowest, (Col. 6), = *52.1*
Difference, or Mean Daily Range, = *14.4*
** Calculated Mean Temperature of Month, = *59.3*
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the *10*th, = *100.0*
Bulb. Max. in Sun, = *100.0*
for Index errors, on the *10*th, = *100.0*
Bulb Min. on grass, = *50.0*

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *58.5*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *55.5*
Computed Temperature of Dew-point, = *52.0*
Do. Elastic Force of Vapour, = *40.0*
Do. Weight of Vapour in a Cubic Foot of Air, = *81*
Relative Humidity, (Saturation = 100), = *81*
RAIN fell on *3* Days; Amount in Inches, = *0.60*

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		1	1	1	1	3	2	4	1		1.7
P.M.		1	1	1	1	5	1	5			1.7
Mean.		1	1	1	1	4	1	4	0	0	1.7

* 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.
† Brackets corrections for both capillary and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ Practically, though not absolutely, a minus correction.
|| These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
** While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature." Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the Observer, in each Schedule. See Over.

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 A. Macdonald*

(Signed)

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 classes are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations. That can only be used for the purpose of *adjustment or compensation* as will be seen from the remarks on the use of the Barometer, and as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

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

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

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

Self-registering Thermometers.—Professor Phillips's, and Negretti and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maximum*." This Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper 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 printers' ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Maximum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation; and the "*Minimum*" should be freely exposed to the Sun, Snow must not be allowed to cover either of these Thermometers; nor the Sun's heat to affect the alcohol by distillation.

Vernier 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 Society.

The *Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and *calibrated form* of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the 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 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 read 39°·9, 40°·0, or 40°·1; or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°; or 40°·1, 40°·2, or 40°·3, and 40°·7, 40°·8, or 40°·9, must be respectively. So also 40°·3, and 40°·7, 40°·8, or 40°·9, must be read as 40°·4, 40°·5, and 40°·6, respectively. In registering 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 schedule, the indications registered at 9 P.M. are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

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

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

Snow-falls met.—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 Lake Howard's

noncondensature 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, W., (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of 2, ⁴⁻⁵ W., 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 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 Schönbein's or Moffat's papers are used.—Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 33, 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—10 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 purposes, 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 Agriculturalist. The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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

(By Order.) A. B.

Edinburgh, 9th December 1863.

FOREST TREES.		FRUITS.		MIGRATORY BIRDS.		OTHER BIRDS, naming them.	
In Flower.	Leaf first apparent.	First in Blossom.	First in Fruiting.	First in Spring.	First in Autumn.	First in Winter.	First in Summer.
Alder.							
Aspen.							
Beech.							
Birch.							
Elm.							
Larch.							
Lin.							
Oak.							
Sycamore or Plane.							
Apple.							
Barberry.							
Bourne or Elder.							
Broom.							
Hazel.							
Holly.							
Laburnum.							
Lilac.							
Mountain Ash or Rowan.							
Red Flowering Currant.							
Rhododendron Ponticum.							
Whin.							

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

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

4 Queen Street,
10, St Andrew Square,

EDINBURGH.

BOOK-POST.

To

Sept. 1865.



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55°56'N, Long. 3°24'W, Distance from Sea one mile.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.During the MONTH of October 1865.

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. 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.	Attached 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 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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
		inches.		inches.															9 h. A.M.	9 h. P.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
	1	30.07	60	30.07	60	58	52			57	53	54	52	SE	1	SE	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

BAROMETER, “corrected Mean” at 9 A.M., minus the Correction†† for Temp. (Col. 2), = 29.530
“Corrected Mean” of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = 29.524
Mean at Station, corrected, and at 32°, = 29.527
Correction for Height, feet, above Mean Sea-level, = 1.01
Mean, reduced to 32°, and Sea-level, = 29.628
Highest Reading, corrected for Index error, on the 3 th, = 30.300
Lowest Do., Do., on the 29 th, = 28.680
Difference, or Monthly Range, = 1.620

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 3 th, = 64.0
Lowest in Month, corrected for Index errors, on the 22 th, = 29.0
Difference, or Monthly Range, = 35.0
“Corrected Mean” of all the Highest, (Col. 5), = 51.8
“Corrected Mean” of all the Lowest, (Col. 6), = 39.6
Difference, or Mean Daily Range, = 12.2
** Calculated Mean Temperature of Month, = 45.7

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, = 45.1
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 43.4
†† Computed Temperature of Dew-point, = 41.5
†† Do. Elastic Force of Vapour, = 2.79
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = 88
RAIN fell on 13 Days; Amount in Inches, = 4.99

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.		5	4	7	4	4	2			1.76
P.M.		9	3	5	5	1	4	3	1	1.70
Mean.		7	4	6	4	1	4	3	2	1.73

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

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

Observations made and
Return verified by

W. Meauslane

(Signed)

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

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, or 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. It is not supplied with the means of adjustment or compensation as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a Standard.

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

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

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

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

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

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

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

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 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, 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 $\frac{2}{2}$ or $\frac{1}{2}$ 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 6 in. to 8 in. 12 and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or wooden frames. Mention must be made of the geological formation and agricultural condition of the soil in which these thermometers are placed.

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

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

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

Electricity.—Too much importance cannot be attached to 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. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, etc. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

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

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

(By Order) A. D.

Edinburgh, 9th December 1865.

Clouds.—Convenient abbreviations for Luke Howard's

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Alder.	Ash.	Beech.	Birch.	Elm.	Larch.	Lime.	Oak.	Sycamore or Plane.
In flower.									
In leaf.									
First buds.									
First appear.									
Leaves.									
Decayed of.									
CROPS.									
Sowing or									
Planting or									
Appearing									
Above ground.									
In flower.									
In ear.									
First cut.									

FRUIT.	Apple.	Black Currant.	Cherry.	Gean.	Hawthorn.	Holly.	Lilac.	Plum.	Strawberry.
First in blossom.									
First in fruit.									
Fruit ripe.									
Other Birds, naming them.									
Swan.									
Starling.									
Sand-Martin.									
Plover.									
Lapwing.									
House-Swallow.									
Curlew.									
Cuckoo.									
First Arrival.									
Departure.									

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 blight, diseases, etc. Whether Epizootic disease prevails among Cattle; and the Agricultural condition of the district generally.

Mr. ALEXANDER BUCHAN.

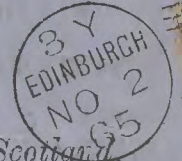
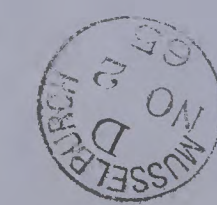
Secretary of the Meteorological Society of Scotland

4 Queen Street
10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

EDINBURGH.

BOOK-POST.

Smuck
Dec 1865



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, County of *Edinburgh*, in Lat. *55°56'28"* Long. *3°24'05"* Distance from Sea *one mile*.

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

During the MONTH of *November* 186*5*.

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 surface and Depth.	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.	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.					Temperature of WELL at Depth of feet. No.	Temperature at 1 fathom, and Dustiness.	
		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.		No.			No.		No.						No.	
		inches.		inches.																														
	1	29.74	52	29.68	53	48	35			42	40	42	40	SW	1	SW	1							1								Stars shooting on the 13 th & 23 rd	1	
	2	29.72	50	29.70	52	44	38			40	37	43	41	SW	1	SW	1		10					2								Aurora on the 20 th	2	
	3	29.90	50	30.04	52	45	32			40	39	36	34	W	1	W	1						4								very Low Barom. on the 22 nd	3		
	4	30.14	50	30.18	50	45	30			39	38	41	39	W	1	W	1						1 1/2								Strong wind on the 17 & 19 th but	4		
	5	30.30	49	30.30	54	40	25			34	33	30	29	W	1	W	1						3								no gales occurred	5		
	6	30.45	45	30.28	50	35	29			26	25	40	38	W	1	W	1						3								the first half of the month	6		
	7	30.30	46	30.31	57	44	33			34	33	34	33	SW	1	SW	2						2								was dry with frost on	7		
	8	30.30	50	30.14	50	43	31			41	38	34	32	W	1	W	1						3								9 nights less or more, the	8		
	9	30.14	50	30.15	50	42	32			36	34	45	43	W	1	W	1						4								latter half wet with	9		
	10	30.15	47	30.15	56	48	36			36	33	46	43	SW	1	W	1						3								rather a high Temperature	10		
	11	30.04	52	30.16	54	53	31			48	35	33	31	W	2	W	1						4											
	12	30.40	51	30.45	52	38	29			34	32	36	34	W	1	W	1						4											
	13	30.24	46	30.24	52	38	31			35	33	38	36	W	1	SW	2						2											
	14	30.	48	29.85	54	42	36			35	33	35	34	SW	1	SW	1		10				3											
	15	30.	50	30.19	50	44	34			40	37	46	43	SW	1	W	1						4											
	16	30.10	50	29.78	52	46	43			37	36	45	43	W	1	SW	1						1											
	17	29.40	53	29.72	55	55	34			53	52	49	46	SW	4	SW	2		14				1/2											
	18	29.95	50	29.78	55	49	41			41	40	44	42	SW	2	SW	3						4											
	19	29.47	49	29.47	60	53	37			52	49	44	41	SW	4	SW	2		10				1/2											
	20	29.50	52	29.30	54	50	41			38	35	48	45	SW	1	SW	1						2											
	21	29.	54	28.85	56	50	43			49	47	47	44	SW	2	SW	1						3											
	22	28.76	52	28.65	56	48	44			44	43	45	42	SW	1	SW	1		20				-											
	23	29.	64	29.23	56	48	41			47	44	45	42	SW	2	SW	2						2											
	24	29.	53	29.15	55	45	38			43	42	42	41	SW	1	SW	1		20				-											
	25	29.28	51	28.65	56	47	36			41	40	46	45	SW	1	SW	1		30				-											
	26	29.10	48	29.30	57	40	30			40	38	31	30	SW	1	SW	2						2											
	27	29.50	50	29.54	55	40	34			34	33	38	36	SW	1	SW	1		12				1											
	28	29.35	50	29.25	55	45	40			41	40	43	42	SW	1	SW	1		30				-											
	29	29.40	50	29.78	56	47	44			43	42	45	44	SW	1	SW	1		16				-											
	30	30.10	52	30.12	55	46	38			45	43	42	41	SW	1	SW	1		34				-											
	31																																	
	Sums.	192.73	1524	892.42	1613	1538	1066			122	8	156	1233	1574	120	30			2.26				58											
	Means.	29.74	50	29.74	53	47	35			40.3	38.5	40.1	39.1	1.3	1.2			.075					1.9											
	† Total Corrections for Instru- mental Errors.																																	
	† Corrections 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	31		

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++
for Temp. (Col. 2), = *29.73*... *0.38*... = *29.699*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++
for Temp. (Col. 4), = *29.74*... *0.66*... = *29.681*
Mean at Station, corrected, and at 32°, = *29.690*
Correction for Height, feet, above Mean Sea-level, = *101*
Mean, reduced to 32°, and Sea-level, = *29.791*
Highest Reading, corrected for Index error, on the 6th, = *30.450*
Lowest Do., Do., on the 24th, = *29.650*
Difference, or Monthly Range, = *1.800*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for
Index errors), on the 17th, = *55.0*
Lowest in Month, corrected for Index errors, on the 5th, = *25.0*
Difference, or Monthly Range, = *30.0*
"Corrected Mean" of all the Highest, (Col. 5), = *45.3*
"Corrected Mean" of all the Lowest, (Col. 6), = *35.5*
Difference, or Mean Daily Range, = *9.8*
** Calculated Mean Temperature of Month, = *40.4*

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for
Index errors), on the 17th, = *55.0*
Black Bulb, Max. in Sun, = *55.0*
(corrected for Index errors), on the 17th, = *55.0*
Black Bulb Min. on grass, = *25.0*
Difference of above Means or Range ("exposed"), = *30.0*

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry
Bulb, = *40.7*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *38.8*
II Computed Temperature of Dew-point, = *36.5*
II Do. Elastic Force of Vapour, = *2.15*
II Do. Weight of Vapour in a Cubic Foot of Air, = *85*
II Relative Humidity, (Saturation = 100), = *85*
RAIN fell on 11 Days; Amount in Inches, = *2.26*

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.		1	2	1	2	6	6	10	2		1.3
P.M.		2	1	1	8	7	10	1			1.2
Mean.		1	2	1	2	6	6	10	1		1.25

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the
Number and Initials of the Maker may be here given.
† Embracing corrections for both capillarity and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ Practically, though not absolutely, a minus correction.
|| These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
¶ While the Diurnal Range is unknown, the Arithmetical Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
** 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 Maudslayi

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55° 56' 12" N Long. 3° 2' 10" W Distance from Sea One miles
Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.
During the MONTH of December 1865
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.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression 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.		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.	Atta- ched Ther- mometer	Barometer. No.	Atta- ched 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. 1 3 inches.					No. 2 12 inches.	No. 3 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		inches.	"	inches.	"																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	1	30.08	54	29.95	54	41	34			38	34	35	34	S	1	S	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

Strong gales of wind occurred on the 19th 21st 28th 29th & 30th
Shots shooting on the 3rd 4th 10th
Very High Broom on the 11th
Blackbirds singing beautifully on the 22nd
Lunar Halo on the 28th

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. d.	" haze.	so. ha.	" solar halo.
hl.	" heavy dew.	sq.	" squall.
li.	" hail.	squ.	" squalls.
li. cl.	" lightning.	t.	" thunder.
li. sh.	" light clouds.	t-s.	" thunder-storm.
lu. co.	" lunar corona.	w.	" wind.
lu. ha.	" lunar halo.	g.	" gale of wind.

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0-6.	Common Designation.	Estimated Force, 0-5.	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), = 30.021 - 0.024 = 29.997
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 29.988 - 0.055 = 29.933
Mean at Station, corrected, and at 32°, = 29.940
Correction for Height, feet, above Mean Sea-level, = 10.1
Mean, reduced to 32°, and Sea-level, = 30.041
Highest Reading, corrected for Index error, on the 11 th, = 30.700
Lowest Do., Do., on the 24 th, = 28.710
Difference, or Monthly Range, = 1.990

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 7 th, = 57.0
Lowest in Month, corrected for Index errors, on the 14 th, = 28.0
Difference, or Monthly Range, = 29.0
"Corrected Mean" of all the Highest, (Col. 5), = 46.4
"Corrected Mean" of all the Lowest, (Col. 6), = 38.2
Difference, or Mean Daily Range, = 8.2
** Calculated Mean Temperature of Month, = 42.3
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the 11 th, = 40.7
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 40.7
Lowest at Night, Black Bulb, (corrected for Index errors), on the 11 th, = 40.7
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = 40.7
Difference of above Means or Range ("exposed"), = 40.7

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 42.8
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 40.7
Computed Temperature of Dew-point, = 38.125
Do. Elastic Force of Vapour, = 23.1
Do. Weight of Vapour in a Cubic Foot of Air, = 84
Relative Humidity, (Saturation = 100), = 84
RAIN fell on 9 Days; Amount in Inches, = 1.33

WIND. SUMMARY.											
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.			1	2	4	18	6			204	
P.M.			1		2	18	5			203	
Mean.			1		1	16	18	5		203	

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

N.B.—The Sums to be correctly added, and the Means deduced. Returns from the "Principal Stations" 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 McLeod

(Signed)

FOR TAKING METEOROLOGICAL
WITH REMARKS ON THE USE OF INSTRUMENTS.

Hour of Observation.—The Council recommends that observations be made precisely at 9 o'clock (Greenwich or Railway Time only) twice a day for some, and once (morning or evening) for other instruments, as specified, in the following remarks, 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 *adjustment* or *compensation*; 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*.

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 *slurp* *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.

Self-Registering Thermometers.—Professor Phillips, 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-unioned by striking the instrument repeatedly against the palm of the hand; when the part of the spirit distils by high temperature, it will be found in the upper tube, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal: the bulb and slotted inclination slightly downwards, 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, 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 loaned, by any observer, from the Meteorological Secretary.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or *column* of mercury. The readings ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read 39°·9, 40°·0, or 40°·1; and under, an exact change, according as it indicates a little under, an exact change with, or a little over 40° or 40½°, respectively. So also 40½, and 40¾; 100·8 or less, must be registered 40·2 or 40·3, and 40°·7 and 40°·8, respectively. In reading Rutherford's *M. 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 *Bulb's*, must be rapidly taken, being so readily affected by heat from the person of the observer.

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 Linde'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.

Clouds, -- Convenient appropriations for Land

OBSERVATIONS,

OBSERVATIONS,

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 plants greatly depend on the temperature of their soil, it is almost and necessary the Council recommend that observations in this interesting argument be made at 9, 12, 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 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.

Geose.—Mention whether Schönbach'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 38°w. an *azone* entry in the schedule, will indicate that the *azone* pressure is entered as 4° on the scale, that the wind is from the N.W. and that its force on the scale 0—6 is $4\frac{1}{2}$, that it is *blowing* fresh.

The use of abbreviations, the state of the weather at 9 and 9 p.m. ought to be registered, either in two columns or by one column, as before. The observations should be wisely unconnected, or, in two ruled off for the purpose, from those headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner, or on the same margin. Additional remarks may be made on the margin.

Observations in connection with the periodic return of seasons," possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such 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 crows, to specified stocks reared from year to year on a selected piece of ground or farm.

(By Order.) A. B.

EDINBURGH, 9th December 1863.

(By Order.)

BOOK-POST

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.		In flower.	In leaf buds.	In leaf.	Divested of leaves.	CROPS, mentioning variety.	Sowing or planting.	Appearance above ground.	In ear.	First Cut or Raised.
Alder,						Barley,				
Ash,						Bere or Bigg,				
Beech,						Oats,				
Birch,						Wheat,				
Blm,						Beans,				
Larch,						Peas,				
Plane,						Potatoes,				
Oak,						Turnips,				
Sycamore or Plane,						Rye Grass,				

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

[illegible]