

SCOTTISH METEOROLOGICAL SOCIETY

Observations taken at Bogside, Leachel-bushnie County of Aberdeen, in Lat. $57^{\circ}10'50''$, Long. $2^{\circ}45'00''$, Distance from Sea 20

Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.

During the MONTH of February 1868.

The Hours of Observation are of Greenwich Time.

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

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

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

Difference, or **Monthly Range**, =

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

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

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

** Calculated Mean Temperature of Month, =

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

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

Lowest at Night, Black Bulb, (corrected for Index errors), on the 11th, ... =

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

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

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

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

‡‡ Computed **Temperature of Dew-Point**,..... =

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

† Relative Humidity (Saturation = 100%) $\frac{\text{mm. Hg.}}{760} \times 100 =$

RAIN	fell on	Days; Amount in Inches, =
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[illegible]

* 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 inserted.

+ Emending corrections for both capability and Index Errors.

† The Diurnal Range for Scotland is as yet unknown.

‡ Practically, "magnitudes not absolutely a minus correction."

§ These "Hygrometric Deductions" are calculated from Glaisher's Hygrometric Tables, Second Edition only.

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

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

Observations made and
Return verified by { W. Mann B. Inc.

(Signed) William Bruce

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

Barometer.—*Weather glasses* and *Aneroids*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of *adjustment or compensation* as will secure the height of the mercury in the tube being inaccurately 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 snuffs has been used, the snuffs must be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *serve up* the instrument to a quarter of an inch of the top of the tube, and take down the instrument; if may then be carried with the tube, and must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp top* is produced. If this is prevented by air it must be removed to the cistern, and got rid of, by inverting the Barometer (care being taken to prevent the loss of mercury by quickening the ivory peg), and gently tapping it; and if this fails, the instrument must be repaired.

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

Self Registering Thermometers.—Professor Phillips, and Cereatti and Zambra's Patent "*Maximin*" Thermometers are recommended; pinned directions for their use may be obtained with each instrument. The "*Maximin*" Thermometer is afterward is recommended when graduated on the glass stem and affixed to a frame separate from the "*Maximin*." 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 a part of the spirit distils by high temperature, it will be found in part over a lamp; the alcohol will evaporate and again come in contact with the body of the liquid. These instruments could be hung horizontally.

The above remarks apply equally to the Thermometers for

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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 'Hygrometric Deductions,' Observations are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch five from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended;—the water-cup must be covered, and placed to the side, and a little below the level of the bulb;—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb by a

Reading or use a 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 -33.9° , 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° , respectively. So also 403.5° , and $403\frac{1}{2}$, more or less must be registered $40^{\circ} 2$ or $40^{\circ} 3$, and $40^{\circ} 7$ or $40^{\circ} 8$ respectively. In reading Rutherford's "*Man*," and "*Woman*," the thermometer, 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 observed.

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.

Pain cannot be recommended to modernize the

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 must be affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift has accumulated, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, snow, sleet, or hail, the observer cannot be too careful to register *disturbances* only; and nothing that partakes of the nature of *deductions* or inference.

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

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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.

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore, recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by the tide of river water. At or near the time of high water, on the 15th, 19th, 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, nothing always to be taken for the temperature of the air, and the bar of observation, and continuing to observe for particular details.

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.

Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, &c. Remarks remarkable 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 straining 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 sun-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 uncoupled, 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.

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

(By Order) A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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Umpires, Prizes, etc., whether plentiful, or in perfection; whether any have suffered from blight, disease, etc. Whether Epizootics, disease prevails among cattle; and the Agricultural condition of the district generally.

BOOK-POST.

EDINBURGH.

Secretary of the Meteorological Society of Scotland.

Mr. ALEXANDER BUCHAN.

To

Boxside
Feb 1868.

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) 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 scale. 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 in 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*.

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 ivory peg, and the mercury to within a quarter of an inch of the top of the tube, and then take down the instrument; it may then be carried with the tube uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp top* is produced. If this is prevented by air it may be removed to the cistern, and got rid of by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this is not sufficient, the instrument must be repaired.

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 grates in an exposed position, free from any and every 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 of 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, the boxes are also made to open to the south. These Boxes may be ordered at the Society's Office.

WITH REMARKS ON THE USE OF INSTRUMENTS.

column, an entry of θ_{air} will indicate that the higher 2. cnst. 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 *cirro-stratus* kind.

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

Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and consistency,—the Council recommend that observations in this interesting department be made at 9 a.m., by thermometers placed in the earth, their bulbs being sunk to 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.

Qzone.—Mention whether Schulzinger's or Moffatt's papers are used. The paper is affixed by a pin to a board in the monomer 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 *azone* entry in the schedule, will indicate that the *azone* paper is tilted at "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 *Whining Fresh*.

By the use of observations, a 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 for the purpose, from that intended "Remarks." It is intended that observations by the Electrometer should be entered in this manner or by the side of the "Remarks." 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 Agricultural. The Council would direct the special attention of Observers to the registration of such elements; that the published Summaries may fairly represent the whole of Scotland. Observations ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year in a selected piece of ground or farm.

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

The *Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and *well-used* 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 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.

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 registering at the 3rd of a series of phenomena commencing at 9 p.m. on the 2nd, and extending till 9 p.m. on the 5th.

Wind.—A wind-gauge 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.

Snow-falls may, for convenience, be registered in the column headed "Snow-fall," or they may occur there as well as in the column headed "Snow-shower." It must be noted in the "Remarks," and the letter S must be written in the "Remarks" column, if the snow has been fixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift has accumulated, and it must be observed, and registered in addition to, by 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 give figures of observation only; and nothing that pertains to the nature of the observations, except such as are necessary to explain them.

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

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

When a Bromometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed up to form a tight plug to the cistern. Then *ascend* 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 instrument uppermost. Before suspending the Bromometer 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 up* is produced. If this is prevented by air it may be removed to the cistern, and got rid of by inverting the Bromometer (care being taken to prevent the loss of mercury by allowing the ivory peg to fall) and gently tapping it; and if this is again failing, the instrument must be repaired.

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 galls in an exposed position, free from any nearby local influences. The laths forming the sides and doors of the Boxes are arranged so as "at once to protect" the thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, the boxes are also made to open to the south. These Boxes may be obtained at the Society's Office.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

One of the objects of immediate importance that the "Scottish Meteorological Society," has proposed to itself, is to secure a perfect uniformity in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incommensurable, 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, or at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances, they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scale-inches are not true inches but so much shorter as to compensate the error that would otherwise arise from the fluctuations of the surface of mercury in the cistern. This form of instrument has been adopted by the Board of Trade, and has received the approval of the Meteorological Committee of the British Association. In another form of the Barometer, the sides of the cistern are of leather; and thus, by 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 scale is graduated. In taking an observation, this preliminary setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the cistern.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then, remove 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 upright. 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 "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors are also made to open to the south. These Boxes may be had at the Society's Office.

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

The above remarks apply equally to the Thermometers for

non-ventilation of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less obscuration of the sky overhead (i.e., within 20° or 30° of the zenith). The strata of clouds that appear near the horizon are viewed obliquely; and thus, being unable to judge of their amount, we ought not to take them into account in the clouds' column, though their appearances and changes ought to be noted among the "Remarks." The amount of cloud is entered from 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 W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of $\frac{1}{2}$ (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with stratus clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the cumulo-stratus kind.

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

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

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

Ozone.—Mention whether Schönbain's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 a.m. and 9 p.m. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus, "S.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—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 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 on the side-margin. Additional remarks may be made on the margin.

Observations in connection with the periodic return of the seasons.—The Council would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observations ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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.

En passant, on December, 1865.

Convenient abbreviations for Lake Howard's

Clouds.—

register observations only; and nothing that partakes of the nature of deduction or inference

Boyside
April 1868.

To

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK-POST.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	In last buds.	In last leaves.	In last fruit.	Barley.	Oats.	Wheat.	Peas.	Potatoes.	Turnips.	Rye Grass.
Alder.											
Aspen.											
Beech.											
Birch.											
Elm.											
Larch.											
Lin.											
Oak.											
Sycamore or Plane.											

SHRUBS, ETC.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.	First in blossom.	First in fruit.
Barberry.												
Boureaux or Elder.												
Black Currant.												
Cherry.												
Geany.												
Gooseberry.												
Holly.												
Hawthorn.												
Laburnum.												
Lilac.												
Myrtles.												
Mountain Ash or Rowan.												
Red Flowering Currant.												
Rhododendron Ponticum.												
Viburn.												

Have the goodness also to state any information you may be able to collect from Blight, diseases, etc. Whether Hay, Potatoes, Turnips, Prunings, etc., whether plentiful, or in perfection; and the Agricultural condition of the district generally.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside, Lochel-bushnie*, County of *Abertoe*, in Lat. $57^{\circ}16'50''$, Long. $2^{\circ}45'00''$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *May* 186*8*.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. —				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.				SEA.	OZONE.		GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.		Days of Month.			
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 h. A.M.		P.M.		9 h. A.M.				0—10.										
		Barometer.	Atmos- phere	Barometer.	Atmos- phere	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	No. — 3 inches.	No. — 12 inches.	No. — 22 inches.	Temperature of WELL at Depth of feet. No.		Temperature at 1 fathom, and Daily.									
		* No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.		No.	No.				No.	No.	No.
		inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.		inches.	inches.				inches.	inches.	inches.
	1	29.890	50.0	29.015	51.6	56.6	41.6	80.0	37.8					W	1	S.W	2			0	0	12								Strong g. during the day.	1					
	2	29.250	53.0	29.160	53.8	53.8	41.9	81.0	34.0					S.W	1	S.W	0			9 cu. st.	10 cu. st.	5								So. co.	2					
	3	29.810	56.2	29.900	54.4	54.6	41.2	77.5	39.0					S.W	1	W	2			0	0	18								Strong g. highest about 1 o'clock P.M.	3					
	4	29.060	55.0	29.240	52.0	48.0	35.0	90.0	31.8					S.W	1	S.W	0			0.22	5 cu. st.	5 cu. st.	5									4				
	5	29.355	55.0	29.410	50.0	40.0	32.2	68.0	24.5					W	1	W	0			0.22	10 cu. st.	6 cu. st.	3									5				
	6	29.400	54.2	29.172	52.4	48.0	29.7	77.0	24.5					S	0	S	0			0.01	10 cu. st.	10 cu. st.	1/2								ho.	6				
	7	29.100	56.0	29.000	56.5	56.5	42.0	104.5	37.0					S	0	S	0			0.22	10 cu. st.	6 cu. st.	2									7				
	8	29.900	58.4	29.880	56.0	55.0	44.0	71.0	36.8					S	1	S	1			0.03	10 cu. st.	10 cu. st.	1									8				
	9	29.910	61.1	29.980	57.0	60.0	45.0	114.0	87.0					W	0	W	0			0.13	10 cu. st.	10 cu. st.	10 1/2									9				
	10	29.000	63.0	29.040	59.0	56.5	46.2	102.0	42.0					W	0	W	0			0.22	10 cu. st.	6 cu. st.	5								f. till 9 o'clock A.M.	10				
	11	29.000	62.0	29.900	59.2	52.0	42.1	77.0	32.6					S.W	0	S.W	0			0.01	10 cu. st.	10 cu. st.	1								f. till 12 P.M. t.	11				
	12	29.910	61.0	29.983	58.4	57.0	48.6	91.0	34.0					S.W	1	S	0			0.22	10 cu. st.	6 cu. st.	8									12				
	13	29.042	61.5	29.000	56.3	60.0	43.0	94.5	32.0					S	1	S	1			0.01	7 cu. st.	10 cu. st.	9									13				
	14	29.115	58.3	29.310	55.0	59.0	44.1	86.0	37.0					S.W	2	S.W	1			0.22	0	0	10									14				
	15	29.340	60.0	29.148	55.0	51.0	41.3	82.1	27.0					S	0	W	0			0.20	10 cu. st.	10 cu. st.	1									15				
	16	29.155	61.0	29.130	57.1	58.1	38.5	107.0	28.5					S	0	S	0			0.22	2 cu. st.	10 cu. st.	10									16				
	17	29.260	59.5	29.282	57.0	59.0	41.8	114.0	30.6					W	0	S	0			0.02	10 cu. st.	10 cu. st.	8									17				
	18	29.300	60.0	29.262	59.0	58.0	42.0	79.0	32.0					S	0	S	0			0.07	10 cu. st.	10 cu. st.	0									18				
	19	29.150	59.0	29.100	62.5	65.0	42.0	102.0	42.0					S.W	1	S	1			0.22	10 cu. st.	10 cu. st.	5 1/2									19				
	20	29.070	65.0	29.930	58.0	68.1	52.0	106.0	42.1					S	0	S	1			0.22	8 cu. st.	5 cu. st.	8									20				
	21	29.915	63.0	29.965	58.5	57.0	48.0	75.0	41.3					S	1	S	0			0.13	5 cu. st.	10 cu. st.	6									21				
	22	29.960	59.5	29.830	57.3	53.8	44.0	59.0	42.0					W	0	W	2			0.11	10 cu. st.	10 cu. st.	1/2									22				
	23	29.500	58.0	29.240	55.0	53.0	42.0	58.5	42.0					S.W	1	W	1			0.24	10 cu. st.	10 cu. st.	0									23				
	24	29.540	54.8	29.535	57.0	56.0	41.6	80.0	46.4					S	1	S.W	0			0.05	10 cu. st.	10 cu. st.	6									24				
	25	29.500	59.2	29.660	54.8	55.0	46.0	83.0	39.5					S	0	S	1			0.02	5 cu. st.	6 cu. st.	4									25				
	26	29.770	59.5	29.780	55.5	56.0	42.0	75.0	39.5					S	1	S	1			0.03	10 cu. st.	3 cu. st.	4									26				
	27	29.865	60.0	29.120	56.0	60.0	47.0	91.0	40.0					S	1	S	1			0.02	10 cu. st.	5 cu. st.	6 1/2									27				
	28	29.182	59.3	29.170	56.2	63.0	45.2	93.0	38.0					S	0	S	0			0.22	10 cu. st.	3 cu. st.	5									28				
	29	29.100	61.2	29.938	62.0	66.0	47.3	94.2	35.2					S	1	S	0			0.22	10 cu. st.	6 cu. st.	7									29				
	30	29.900	64.6	29.030	55.0	58.3	46.2	93.1	33.0					S.W	1	W	0			0.22	2 cu. st.	6 cu. st.	13									30				
	31	29.146	66.0	29.160	60.5	43.3	30.0	30.0	30.0					S	0	S	0			0.22	6 cu. st.	10 cu. st.	12									31				

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm for Temp. (Col. 2), = $\frac{1951}{563}$

"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm for Temp. (Col. 4), = $\frac{835}{427}$

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

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

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

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

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

Difference, or Monthly Range, =

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

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

Difference, or Monthly Range, =

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

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

Difference, or Mean Daily Range, =

** Calculated Mean Temperature of Month, =

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

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

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

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

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

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

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

†† Computed Temperature of Dew-Point, =

†† Do. Elastic Force of Vapour, =

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

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

RAIN fell on Days; Amount in Inches, =

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

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

Observations made and Return verified by *William Bruce*
Bogside, Lochel-bushnie

(Signed) *William Bruce*

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) 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 to each reading, the hour at which 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*.

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

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

Self Registering Thermometers.—Professor Phillips, of Negretti and Zambra's Patent "*Maximum*" Thermometers are recommended; printed directions for their use may be obtained from the makers. The "*Minimum*" Thermometer of the same firm, with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended when graduated on the glass scale, 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 such means. When the *adams* of spirit breaks, it may be re-mended by striking the instrument repeatedly against the palm of the hand; or when a part of the spirit distils by high temperature, it will be found in the upper lobe, and must be disengaged from thence by heating that upper lobe (over a lamp); the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers to

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully *re-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, often frequently, and 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 should be had, *on loan*, by every observer, from the Meteorological Secretary.

cotton, which also supplies it with water. It may be seen to the observer that the mushi 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 the insect's life hereafter is highly objectionable.

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

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 facilitating the Force of the Wind, at any particular hour of observation, the Hemispherical Cup Anemometer is also recommended; the *Land's Anemometer* is also recommended; the method of *Estimating the Force of the Wind*, by the *Land's Anemometer*, and the *measuring Wind Force*, by such tables as that given in the schedule is, to say the least, unsatisfactory.

Snow-falls may, for convenience, be registered in the columns under the following conditions:—when a Snow shower occurs, the depth of the snow 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, 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 in registering observations only; and nothing that partakes of the nature of deduction or inference.

Convenient abbreviations for Luke Howard

Observations of the clouds are made at 9 A.M. and at sunset, illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," $\frac{S.W.}{2, W}$, (for example,) will indicate that the

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

Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil, and 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, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 48, 51, 54, 57, 60, 63, 66, 69, 72, 75, 78, 81, 84, 87, 90, 93, 96, 99, and 102 inches, and the stems above ground, protected from rain, snow, and frost, by covering them with straw or wooden frames, being conveyed to the bulbs by the stems or wooden frames. Information must be made of the geological formation and agricultural condition of the soil in which these thermometers are

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

Ozone.—Mention whether Schlemper's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box and the indication registered at 9 A.M. and 9 P.M. If it is desired that these indicators be registered in connection with the force and direction of the wind at the time of observation, the following manner—thus given, as an *example* in the schedule, will indicate that the ozone paper is used, and that the wind is from the N.W., and that its force is 3, i.e., that it is blowing fresh.

Remarks.—The "*Remarks*" column is too narrow, but it is unavoidable 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.

By the use of abbreviations, the state of the weather at 9 A.M. and 3 P.M. can be registered, either in two columns, otherwise unoccupied, or in two ruled off for observations by the intended "Remarks." It is intended that the observations by the latter 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 the "Remarks" possess not only great scientific value, but are of considerable interest to the Agriculturist. The Captain would direct the special attention of Observers to the registration of such phenomena; that the published Summaries may fairly represent the whole of Scotland. Observations ought to be confined to individual trees and shrubs; to particular species of birds; and in the case of crops, to specific sorts reared from year to year in a selected vine, ground, or farm.

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.

FOREST TREES.	In flower.	Last fall.	In leaf.	Dressed or leaves.
Alder			30	
Ash			18	
Beech			15	
Birch			3	
Elm			5	
Larch			1	
Pine				
Sycamore or Plane				
Bartey				
CROPS				
Growing or planting.				
Appearing above ground.				
In ear or flower.				
First cut or felled.				
Oats			18	
Wheat			15	
Beans			3	
Potatoes			5	
Tumblings			1	
Rye Grass				

[illegible]

The grain crops are promising well, but some farmers the grub has done a good deal of damage, but far less than last year. The boy is working with enjoyment but rain is much needed.

EDINBURGH.

Mr ALEXANDER BUCHAN,

BOOK-POST.

Boxside
c May 1868.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Lochalsh, Inverness-shire County of Aberdeen, in Lat. 57° 10' 54" Long. 2° 45' 09" Distance from Sea 28 miles.Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.During the MONTH of June 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. _____				WIND.				RAIN.		CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended.	Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.									
		Barometer. No. _____	Attach- ed Ther- mometer	Barometer. No. _____	Attach- ed Ther- mometer	Max. No. _____	Min. No. _____	Max. in Sun's rays No. _____	Min. on Grass. No. _____	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force	Readings of the H. Cup Anemometer No. _____	Amount in inches.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. _____ 3 inches.	No. _____ 12 inches.	No. _____ 22 inches.					
		Inches.	°	Inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°					°
	1	29.100	65.0	29.000	66.0	50.0	95.0	37.0					S.W.	1	S.W.	0		2		4.00	10.00	9						h. t.	1		
	2	28.990	64.5	29.050	62.0	59.5	57.0	90.0	42.0					N	0	S	0		2	0.2	10.00	3.00	2							2	
	3	29.080	62.0	28.940	57.0	60.0	41.0	190.0	28.0					S	0	S	0			0.5	5.00	10.00	11							3	
	4	28.650	56.0	29.130	56.0	59.0	47.5	86.5	45.8					N	1	N	0		7		9.00	0	4							4	
	5	29.170	60.0	29.180	57.0	65.5	39.4	111.5	28.6					N	0	N	1		2	0.6	6.00	10.00	3							5	
	6	28.962	60.2	29.100	57.2	62.8	49.2	88.0	46.2					S	2	S.W.	1		3		3.00	3.00	11							6	
	7	29.070	58.0	29.100	56.8	55.0	44.0	90.0	34.1					N	2	N	1		2	0.2	2.00	10.00	14							7	
	8	28.160	56.5	29.200	55.0	55.2	41.0	93.0	34.2					N	1	N	0		7		6.00	2.00	9							8	
	9	29.065	55.3	29.120	57.0	61.0	48.5	98.6	36.3					S.W.	1	S	1				5.00	10.00	12							9	
	10	29.125	60.0	29.100	58.0	59.2	42.5	87.0	29.5					S.W.	1	N	1				10.00	10.00	12 1/2								10
	11	29.240	59.6	29.288	56.0	63.5	43.0	112.0	32.0					S	0	N	0		2	0.1	6.00	9.00	13							11	
	12	29.200	61.0	29.220	57.2	64.1	43.6	95.0	42.1					S	1	S.W.	1		7		4.00	6.00	4							12	
	13	29.135	63.0	29.160	61.0	67.0	53.0	106.3	46.8					S.W.	1	N	0				8.00	2.00	14 1/2							13	
	14	29.135	60.2	28.975	60.0	74.0	47.5	86.5	39.7					S	0	S	1				10.00	0	8							14	
	15	28.940	63.0	29.265	61.0	61.0	51.4	100.0	52.2					S	0	N	0				0	9.00	14							15	
	16	29.345	61.0	29.070	57.6	57.5	41.9	86.0	29.8					S.W.	1	S	1		2	0.5	10.00	5.00	4							16	
	17	29.047	60.6	29.320	57.0	60.0	50.0	96.0	44.0					N	1	N	0		7		10.00	3.00	14 1/2							17	
	18	29.430	58.0	29.400	56.0	68.0	40.4	95.0	29.0					S	0	S	0				0	0	15							18	
	19	29.385	65.3	29.390	59.3	74.5	47.6	104.0	37.0					S	0	S	0				5.00	5.00	16 1/2							19	
	20	29.318	65.0	29.180	62.0	67.5	47.8	98.5	32.4					S.W.	0	S.W.	0				0	10.00	16 1/2							20	
	21	29.100	69.0	29.036	63.5	73.2	53.2	100.0	44.3					S	0	S	0		2	0.1	9.00	6.00	12							21	
	22	28.800	70.0	28.790	68.6	64.3	55.0	95.0	46.8					S	0	S	0		7		10.00	3.00	12 1/2							22	
	23	28.826	66.0	28.810	61.0	66.2	49.3	100.0	48.6					S	0	S	0				5.00	10.00	11							23	
	24	28.770	66.2	29.050	61.2	60.5	56.6	98.2	44.2					N	1	N	0				3.00	2.00	10							24	
	25	28.930	60.2	29.090	56.5	59.5	47.2	100.5	42.0					S.W.	1	S.W.	0				3.00	10.00	13 1/2							25	
	26	29.285	57.0	29.360	55.0	62.0	44.1	105.2	46.5					S.W.	1	N	0		2	33	5.00	9.00	13							26	
	27	29.220	62.6	29.300	59.0	64.5	47.5	100.0	44.0					N	0	N	0		7		6.00	8.00	5							27	
	28	29.400	62.5	29.528	60.0	64.0	46.0	109.5	37.6					N	1	N.W.	0				9.00	0	16							28	
	29	29.500	65.0	29.510	62.8	65.0	45.0	112.5	36.5					N	0	N.W.	0				10.00	10.00	12 1/2							29	
	30	29.537	63.0	29.580	61.5	68.0	52.6	110.0	50.0					N.W.	0	N	0				10.00	10.00	10							30	
	31				66.6																										31
Sums.		6	4		142	148	97	221	87																						
Means.					633	474																									
† Total Corrections for Instrumental Errors.																															
† Corrections for Diurnal Range.																															
"Corrected Means."																															
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \ddagger for Temp. (Col. 2), = 29.100
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \ddagger for Temp. (Col. 4), = 29.050
Mean at Station, corrected, and at 32°, = 29.100
Correction for height, feet, above Mean Sea-level, = 894
Mean, reduced to 32°, and Sea-level, = 29.100
Highest Reading, corrected for Index error, on the 1st day, = 29.100
Lowest "Do., "Do., on the 1st day, = 28.160
Difference, or Monthly Range, = 0.940

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 1st day, = 66.6
Lowest in Month, corrected for Index errors, on the 1st day, = 55.0
Difference, or Monthly Range, = 11.6
"Corrected Mean" of all the Highest, (Col. 5), = 66.6
"Corrected Mean" of all the Lowest, (Col. 6), = 55.0
Difference, or Mean Daily Range, = 11.6
** Calculated Mean Temperature of Month, = 60.8

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the 1st day, = 95.0
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 95.0
Lowest at Night, Black Bulb, (corrected for Index errors), on the 1st day, = 34.1
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass, = 34.1
Difference of above Means or Range ("exposed"), = 60.9

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 60.8

Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 55.0

†† Computed Temperature of Dew-Point, = 55.0

†† Do. Elastic Force of Vapour, = 0.6

†† Do. Weight of Vapour in a Cubic Foot of Air, = 0.001

†† Relative Humidity, (Saturation = 100), = 92.0

RAIN fell on Days; Amount in Inches, = 0.0

WIND.		SUMMARY.									
Direction	No.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	3	1	3	2	8	6	7	-	-	-	-
P.M.	1	2	1	1	9	4	12	-	-	-	-
Mean.											

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† Embracing corrections for both capillarity and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
†† Practically, though not absolutely a minus correction.
††† "Hygrometric Deductions" are calculated from Glashier's Hygrometric Tables, Second Edition only.
†††† While the Diurnal Range is unknown, the Arithmetic 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 3rd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by William Bruce, Bogside, Lochalsh-Inverness-shire

(Signed) William Bruce

Health good, except whooping cough and measles which is still very prevalent. They have only proved fatal in two cases. Both of whooping cough.

* you will observe that I have begun a line too far down the column.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Loch-bus-hinn, County of Aberdeen, in Lat. 57° 10' 50", Long. 2° 45' 0", Distance from Sea 28 miles.Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.During the MONTH of July 1868.

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.				Readings of the H. Cup Anemometer. No. — 9 h. A.M.	RAIN. No. of hours it fell. No. —	Amount in inches. No. —	CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			Temperature of WET Bulb at Depth of feet. No. —	SEA. Temperature at 1 fathom, and Drift.	OZONE. —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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
		Baromet.	Attach- ed Ther- mometer	Baromet.	Attach- ed Ther- mometer	Max.	Min.	Max. in Sun's rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.				Velocity (0—10), and Direction.	Amount (0—10), and Species.	Velocity (0—10), and Direction.	Amount (0—10), and Species.		No. 8 inches.	No. 12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm =
for Temp. (Col. 2), =
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm =
for Temp. (Col. 4), =
Mean at Station, corrected, and at 32°,
Correction for height, feet, above Mean Sea-level,
Mean, reduced to 32°, and Sea-level,
Highest Reading, corrected for Index error, on the th,
Lowest Do., Do., on the th,
Difference, or Monthly Range,
† 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.
† Entering corrections for both capillarity and Index Errors.
† The Diurnal Range for Scotland is as yet unknown.
† Practically, though not absolutely a mean correction.
† These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
† While the Diurnal Range is unknown, the Arithmetic Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
† Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the th,
Lowest in Month, corrected for Index errors, on the th,
Difference, or Monthly Range,
"Corrected Mean" of all the Highest, (Col. 5),
"Corrected Mean" of all the Lowest, (Col. 6),
Difference, or Mean Daily Range,
** Calculated Mean Temperature of Month,
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the th,
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun,
Lowest at Night, Black Bulb, (corrected for Index errors), on the th,
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass,
Difference of above Means or Range ("exposed"),
† 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.
† Entering corrections for both capillarity and Index Errors.
† The Diurnal Range for Scotland is as yet unknown.
† Practically, though not absolutely a mean correction.
† These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
† While the Diurnal Range is unknown, the Arithmetic 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.

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11),
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12),
† Computed Temperature of Dew-Point,
† Do. Elastic Force of Vapour,
† Do. Weight of Vapour in a Cubic Foot of Air,
† Relative Humidity, (Saturation = 100),
RAIN fell on Days; Amount in Inches,
WIND, SUMMARY.
Direction N NE E SE S SW W NW Calm or Variable. Mean Force. Mean Velocity in miles per day.
A.M.
P.M.
Mean.

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

Observations made and Return verified by William Bruce
Bogside, Loch-bus-hinn

(Signed) William Bruce

The hay crop very light, not above half a crop. Oats do not promise well, straw will be very scarce. Barley harvest will soon be general, the crop light. Pasture is very scarce, it is burnt up. Potatoes, and Turnips have an excellent appearance. Rain is very much wanted for every thing. People are healthy. Cattle and horses are not thriving owing to the dry pasture. Stomach staggers prevalent among horses.

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

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

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

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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-tubes* 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 ivory float 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 *readings* 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 *separate* 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 should 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.

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 Minimum Thermometer by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers as are 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 appropriate 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 bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed, evaporation will proceed as from the moist cloth in ordinary circumstances.

One form of "*Mason's*" Hygrometer is highly objectionable. The frame of the Thermometers is enclosed in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered, by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the front ventilation 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 is to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39.3, 40.1, or 40.11; or again, 40.14, 40.3, or 40.6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40.3, respectively. So also 40.3, and 40.7, or 40.8 respectively. In reading Rutherford's "*Max.*" and "*Min.*" Thermometers, reading 40.2 or 40.3 and 40.7 or 40.8 respectively.

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

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

Clouds.—Convenient abbreviations for Luke Howard's Clouds, are given in the following table.

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 drawbacks, 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. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for

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 *on-head* (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*," (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 $\frac{2}{4}$ east, (*or*) 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 Schimben's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3°, as an *ozone* entry in the schedule, will indicate that the ozone paper is tinted as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4"; i. e., that it is *blowing fresh*.

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

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

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns, otherwise unoccupied, or in two ruled off for the purpose, from that headed "*Remarks*." It is intended that observations by the Electrometer should be entered in this manner $\frac{2}{4}$ on the side-margin. Additional remarks may be made on the margin.

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

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

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

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

(By Order) A. B.

EDINBURGH, 30th December 1867.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	CHOPS of wooding variety.	Barley.	Bare or Bigg.	Oats.	Wheat.	Beans.	Peas.	Turnips.	Ilve Grass.
In Flower.	In Leaf.	In Leaf.	In Leaf.	In Leaf.	In Leaf.	In Leaf.	In Leaf.	In Leaf.	In Leaf.
Last Year.	Last Year.	Last Year.	Last Year.	Last Year.	Last Year.	Last Year.	Last Year.	Last Year.	Last Year.
First Year.	First Year.	First Year.	First Year.	First Year.	First Year.	First Year.	First Year.	First Year.	First Year.

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.	First in Blossom.	First in Fruit.
Barberry.	Apple.	Black Currant.	Cherry.	Corn.	Gooseberry.	Holly.	Laburnum.	Lilac.	Mezereum.
Broom.	Hazel.	Hawthorn.	Holly.	Laburnum.	Lilac.	Mezereum.	Mountain Ash or Rowan.	Red Flowering Currant.	Rhododendron Ponticum.
Whin.									

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

BOOK-POST.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Mr ALEXANDER BUCHAN.

Boyside
July 1868.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, County of Aberdeen, in Lat. 57°10'32", Long. 2°45'00", Distance from Sea 28 miles.Height of Cistern of the Barometer above Mean Sea-level 594 feet, above Ground 12 feet.During the MONTH of August 1868.

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. No. _____ of Rain-gauge. No. _____	CLOUDS.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA. No. _____ Temperature at Bottom, and 10 fathoms.	OZONE. No. _____ 0-10.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. <i>Mention the hour at which Storms began and ended.</i>	Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.			9 A.M.		P.M.			9 h. A.M.							
		Barometre * No.	Attach- ed Ther- mometer	Barometre, No.	Attach- ed Ther- mometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb. No.	Wet bulb. No.	Dry bulb. No.	Wet bulb. No.	Direction.	Force.	Direction.	Force.		Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.		No. 9 inches.	No. 12 inches.	No. 22 inches.					
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°		°	°	°	°		°	°	°					°
	1	29.295	66.0	29.350	68.0	71.5	47.0	103.5	32.8					S.W.	0	S.W.	0	7		10 am	10 st	5								1	
	2	29.325	72.0	29.330	71.0	77.0	52.5	130.0	43.0					S	0	S	0	"		6 am	2 am	12								2	
	3	29.356	73.0	29.300	78.0	76.0	58.0	112.0	43.0					S	0	S	0	"		5 am	10 am	11								3	
	4	29.230	66.5	29.300	66.5	76.5	58.0	108.0	50.0					S	1	S	0	"		2 am	0	13								4	
	5	29.068	69.0	29.065	67.4	77.4	56.0	113.5	43.0					S.W.	1	S	0	"		0	10 am	14 1/2								5	
	6	28.860	72.3	28.750	66.0	78.0	59.0	80.0	52.0					S	0	S	0	"		10	10 st	3								6	
	7	28.700	70.0	28.850	62.0	60.0	56.0	80.0	40.0					S	0	S	0	"		0.2	5 st	3 am	8							7	
	8	29.000	65.0	29.035	61.0	63.0	50.0	100.0	39.0					S	1	S	0	"		7	4 st	3 st	7							8	
	9	29.160	63.0	29.125	61.0	64.0	47.0	89.0	32.0					S	0	S	0	"			10 am	10 am	5							9	
	10	29.110	66.0	29.080	62.5	66.0	46.5	100.0	32.5					S.W.	0	S.W.	0	"		14	6 am	10 am	8							10	
	11	29.040	63.5	29.660	60.0	59.0	49.0	59.0	37.0					S	0	S	0	"		12 1/2	10 am	10 am	0							11	
	12	28.570	66.0	28.800	67.0	66.5	50.0	94.0	35.5					S	1	S	0	"		7	5 st	9 st	4							12	
	13	28.958	64.0	28.965	57.5	53.5	46.4	64.0	40.5					S.W.	0	S.W.	1	"		2.26	10 st	10 st	0							13	
	14	28.747	62.0	29.028	60.0	64.0	53.0	100.0	53.0					S	1	S	0	"		7	3 am	0	11							14	
	15	29.110	61.5	29.160	63.0	68.5	49.0	113.0	37.0					S.W.	0	S	0	"			4 am	5 st	10 st	5						15	
	16	29.228	67.0	29.184	65.0	69.2	55.0	103.0	45.0					S	0	S	0	"			10 st	0	9							16	
	17	29.140	69.0	29.100	64.0	58.0	48.5	118.0	36.0					S	0	S	0	"			7 ci	10 am	14							17	
	18	29.078	68.4	29.075	60.0	58.0	50.4	61.0	26.2					S	0	S	1	"		4.2	10 st	10 am	0							18	
	19	29.160	62.4	29.210	58.5	64.5	48.0	83.0	45.0					S	1	S	0	"		7	10 st	10 st	1							19	
	20	29.200	64.3	29.100	60.0	60.0	41.0	116.6	29.0					S	0	S	0	"			3 st	3 am	11							20	
	21	29.030	64.5	28.930	61.4	62.0	46.0	104.4	36.9					S.W.	1	S.W.	0	"		0.7	7 ci	10 st	8							21	
	22	28.700	58.0	28.570	58.5	56.8	49.0	65.0	42.6					S.W.	0	S.W.	0	"		0.3	10 st	10 am	0							22	
	23	28.420	60.5	28.440	57.6	53.0	47.2	80.0	46.2					S.W.	1	S	1	"		7	10 st	10 st	1 1/2							23	
	24	28.470	59.2	28.650	53.0	57.0	48.0	81.5	41.0					S.W.	1	S	0	"		0.7	6 am	2 am	5							24	
	25	28.766	59.0	28.980	52.6	53.0	44.0	77.6	38.2					S.W.	1	S.W.	0	"		0.5	10 st	6 am	3							25	
	26	28.940	59.6	28.742	58.4	60.0	49.0	70.0	43.0					S.W.	0	S	0	"			10 am	10 st	1							26	
	27	28.670	61.0	28.640	53.0	58.0	46.5	83.0	39.8					S.W.	1	S.W.	1	"		0.2	0	0	11							27	
	28	28.790	57.0	29.070	52.8	57.0	44.0	80.0	36.2					S	1	S	1	"			6 am	3 st	10 st	4						28	
	29	29.238	58.3	29.190	62.0	62.0	47.0	97.0	41.0					S	0	S.W.	0	"		0.6	10 am	10 st	3 1/2							29	
	30	29.100	64.5	29.140	63.0	64.0	51.4	104.0	48.0					S.W.	0	S	0	"		7	10 st	0	2 1/2							30	
	31	29.180	62.0	28.900	59.0	57.0	48.0	69.0	32.0					S.W.	0	S.W.	0	"		0.5	10 am	10 st	1							31	
Sums.		144	138	121	138	96	30	148	149										5.6												
Means.						131	49.7																								
† Total Corrections for Instrumental Errors.																															
† Corrections for Diurnal Range.																															
"Corrected Means."																															
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

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

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

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

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

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

†† Computed Temperature of Dew-Point, =

†† Do. Elastic Force of Vapour, =

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

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

RAIN fell on Days; Amount in Inches, =

WIND.	SUMMARY.									
	Direction	N	NE	E	SE	S	SW	W	NW	Mean Velocity in miles per day.
A.M.										
P.M.										
Mean.										

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.;" and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† Embracing corrections for both capillarity and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ Presumably, though not absolutely a, minus correction.
|| These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
** While the Diurnal Range is unknown, the Artificial 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 3rd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gunmed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and
Returns verified by William Bruce
Bogside, Leoch-Gashnie.

(Signed) William Bruce

Potatoes one of excellent quality, but of small size.
People in general are quite healthy, a few cases of measles still prevalent. Typhus fever has broken out in one family, but as yet has spread no further. Cattle quite healthy.

Grain crops are all cut except a few small remnants, and a good number have it all in. The bulk is very little, in general the bulk is one half less than in former years, and in many cases there is two thirds less than what we have had in this country. Therefore straw must be very scarce. The recent rains have greatly improved the turneps, which will now be a good crop.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incompatible may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that these persons who kindly furnish Returns 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-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 lead, and thus, by aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; their coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought, by the adjusting screw, to form one *straight line* with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

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

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

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

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

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

The above remarks apply equally to the Thermometers for

registering the greatest heat from the sun's rays, and the least from radiation during night. Their bulbs have a black 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 Minimum Thermometer by dissipation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers 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 quarked 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 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 mudra must be of medium fineness, and fashioned to the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the mudra is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be immersed 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°. respectively. So also 40½°, and 40¾°, more or less must be registered 40°·2 or 40°·3 and 40°·7 or 40°·8 respectively. In reading Rutherford's "Max" and "Min" Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

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

The Council would strongly recommend that every observer be furnished with a Horizontal 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 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 avoiding that mistake 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 *as viewed* (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 clouds is entered on a scale of 0 to 10; thus when the sky *is* *clouded* is *half* *covered* by clouds, 5 is entered as the *observation*, and so on.

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

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

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

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

Ozone.—Mention whether Schönbain's or Mollat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation in the following manner:—thus "SW," as an ozone entry in the schedule will indicate that the ozone paper is entered as "43" on the scale, that the wind is from the S.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 occurrences 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 observations, 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-marginal. 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 firm.

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

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

(By Order) A. B.

Ensign, 6th December 1867.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	IN	LEAF	LEAVES.	CROPS.	PLANTING	SHOOTING	IN BAR	OR FISHED	OUT.
Alley.	Barley.	...	...	...	...	...
Ash.	Bare or Bigg.	...	...	...	...	...
Beech.	Oats.	...	...	...	...	...
Birch.	Wheat.	...	...	...	...	...
Elm.	Beans.	...	...	...	...	...
Larch.	Potatoes.	...	...	...	...	...
Lime.	Turnips.	...	...	...	...	...
Oak.	Hay Grass.	...	...	...	...	...

SHRUBS, ETC.	First in Bloom.	First in generally.	First in Bloom.	First in generally.	First in Bloom.	First in generally.	First in Bloom.	First in generally.	First in Bloom.	First in generally.
Barberry.
Boultree or Elder.
Broom.
Hazel.
Hawthorn.
Holly.
Laburnum.
Lime.
Mezereum.
Mountain Ash or Rowan.
Red Flowering Currant.
Rhododendron Ponticum.
Whin.

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

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

By order
V. J. 1868

To

15
MAY
1868
SP
10

ABERDEEN
SP
1



SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Loch-buskin County of Aberdeen, in Lat. 57° 10' 50", Long. 2° 45' 00", Distance from Sea 28 miles.Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.During the MONTH of September 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. 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, &c. Mention the hour at which Storms began and ended.	Days of Month.		
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.								
		Baromet.	Atmos- phere	Baromet.	Atmos- phere	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.			Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	Velocity, (0—10), and Direction.	Amount, (0—10), and Species.	No.	No.	No.						
		* No.	inches.	No.	inches.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.			No.	No.	No.	No.	No.	No.	No.					No.	No.
	1	29.030	58.0	29.235	58.0	66.5	46.4	87.0	36.2					N	1	N		7	0.10	6 st	10 st	4								1		
	2	29.310	63.6	29.300	63.0	64.3	48.5	101.0	37.0					N	0	S.W.	0	"		9 st	10 st	6								2		
	3	29.150	60.5	29.182	61.1	64.5	59.5	92.0	45.0					S.W.	0	S.W.	0	N	0.5	10 st	5 1/2 st	5 1/2						20.00			3	
	4	29.220	65.5	29.128	60.6	59.4	47.0	71.0	36.0					S	0	S.W.	0	"	0.4	10 st	10 st	3						20.00			4	
	5	29.223	64.0	29.300	66.0	66.4	57.2	104.0	49.0					S	0	S	0	F		9 st	0	6									5	
	6	29.290	68.0	29.210	68.6	74.0	57.0	102.0	44.0					S	0	S	0	"		2 st	0	11									6	
	7	29.160	71.0	29.285	66.0	68.0	59.0	92.0	56.0					S	0	N	0	N	6.5	9 st	10 st	1 1/2									7	
	8	29.358	66.8	29.566	58.0	58.0	42.0	46.0	33.0					N	0	N	0	F		0	0	1 1/2									8	
	9	29.600	68.0	29.500	59.0	58.5	40.4	92.8	31.0					S.W.	0	S.W.	0	"		0	0	1 1/2									9	
	10	29.300	56.0	29.245	54.4	63.0	41.5	91.5	30.0					S.W.	0	N	0	"		5 st	10 st	9									10	
	11	29.300	64.0	29.236	57.0	52.0	47.0	67.0	42.0					N	0	N	0	N	11	5 st	10 st	0									11	
	12	29.380	56.0	29.373	56.8	47.5	38.6	88.0	33.0					N	0	N	0	F		10 st	10 st	8									12	
	13	29.362	57.2	29.300	52.0	48.0	40.0	76.0	33.2					N	0	N	0	"		8 st	10 st	7									13	
	14	29.270	58.0	29.258	52.0	47.0	38.4	50.0	28.0					N	0	N	0	"		10 st	10 st	0									14	
	15	29.250	55.0	29.253	52.0	47.4	42.6	55.0	38.2					N	0	N	0	N	0.1	10 st	10 st	1 1/2									15	
	16	29.230	53.0	29.120	52.0	52.4	43.0	65.0	34.4					N	0	N	0	F		10 st	10 st	0									16	
	17	29.100	57.0	29.032	53.0	48.0	42.4	62.0	39.7					N	0	N	0	"		10 st	10 st	0									17	
	18	29.035	58.2	29.068	55.0	51.5	44.0	60.0	41.0					N	0	E	0	N	1.2	10 st	10 st	0 1/2									18	
	19	29.050	58.3	29.030	55.5	51.3	46.6	54.2	45.1					N	0	N	0	"	2.04	10 st	10 st	0									19	
	20	28.950	57.6	29.052	58.0	55.0	48.0	58.0	46.0					E	1	E	0	"	1.0	10 st	10 st	0									20	
	21	29.100	59.2	29.110	60.0	53.8	49.0	54.0	40.0					E	0	E	0	"	1.1	10 st	10 st	0									21	
	22	29.100	52.0	29.062	56.6	55.0	47.0	64.2	45.0					E	0	E	0	"	3.0	5 st	10 st	2									22	
	23	28.862	57.0	28.770	53.4	50.6	46.2	53.0	44.5					N	0	N	0	"	5.7	10 st	10 st	0									23	
	24	28.765	57.0	28.800	53.2	50.0	40.0	70.0	46.0					N	0	N	0	"	0.3	10 st	2 1/2 st	2 1/2									24	
	25	28.866	59.0	28.800	52.8	50.3	43.0	75.1	37.0					N	0	N	0	F		10 st	10 st	3									25	
	26	28.810	52.0	28.862	53.0	47.3	41.0	81.3	34.4					N	0	S	0	N	3.5	9 st	10 st	3 1/2									26	
	27	28.870	56.8	28.490	57.0	52.8	42.0	56.0	33.0					E	0	E	0	"	6.8	10 st	10 st	0									27	
	28	28.388	61.0	28.435	61.0	52.6	48.0	89.4	43.6					N.W.	0	S.W.	0	"	1.7	10 st	2 st	3									28	
	29	28.300	54.0	28.272	57.4	53.0	41.0	72.0	33.4					E	0	S.W.	0	"	5.4	10 st	2 1/2 st	1 1/2									29	
	30	28.450	53.0	28.800	57.5	47.0	41.0	44.0	39.0					N	0	N	1	"	2.5	10 st	10 st	1									30	
	31																															31
Sums.						148	145												6.1													
Means.						553	455																									
† Total Corrections for Instrumental Errors.																																
† Corrections for Diurnal Range.																																
"Corrected Means."																																
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

NOTATION USED IN GENERAL REMARKS.

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

TABLE FOR ESTIMATING FORCE OF WIND.

Estimated Force, 0-4.	Common Designation.	Estimated Force, 0-4.	Common Designation.	Estimated Force, 0-4.	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 \pm for Temp. (Col. 2), = _____

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

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

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

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

Highest Reading, corrected for Index error, on the _____, = _____

Lowest Do., Do., on the _____, = _____

Difference, or Monthly Range, = _____

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

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

Difference, or Monthly Range, = _____

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

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

Difference, or Mean Daily Range, = _____

** Calculated Mean Temperature of Month, = _____

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

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

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

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

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

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

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

† Computed Temperature of Dew-Point, = _____

† Do. Elastic Force of Vapour, = _____

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

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

RAIN fell on _____ Days; Amount in Inches, = _____

WIND.	SUMMARY.									
	Direction	N	NE	E	SE	S	SW	W	NW	Mean Velocity in miles per day.
A.M.										
P.M.										
Mean.										

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

Observations made and Return verified by William Bruce
Bogside, Loch-buskin.

(Signed) William Bruce

People healthy. Cattle, horses, and sheep the same.
Turnips greatly improved by the recent rains. They are
an excellent crop. Above an average. Potatoes a good
crop. Large size, and fine quality.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Begsides, Loch-bushna County of Aberdeen, in Lat. 57° 10' 50", Long. 2° 45' 00", Distance from Sea 28 miles.

Height of Cistern of the Barometer above Mean Sea-level 894 feet, above Ground 12 feet.

During the MONTH of October 1868.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. _____				WIND.				RAIN.				CLOUDS.				THERMOMETERS. under Ground.				SEA.	OZONE.	GENERAL REMARKS.				Days of Month.		
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		9 P.M.										
		Baromete * No.	Attach- ed Ther- mometer	Baromete. No.	Attach- ed Ther- mometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb. No.	Wet bulb. No.	Dry bulb. No.	Wet bulb. No.	Direction. No.	Force No.	Direction. No.	Force No.	Readings of the H-Cup Anemometer No.	Amount in inches. No.	Velocity, (0-10), and Species. No.	Amount, (0-10), and Species. No.	Velocity, (0-10), and Species. No.	Amount, (0-10), and Species. No.	Velocity, (0-10), and Species. No.	Amount, (0-10), and Species. No.	Velocity, (0-10), and Species. No.	Amount, (0-10), and Species. No.	Velocity, (0-10), and Species. No.										
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°			°	°					
1	29.074	57.8	29.175	49.4	45.5	37.0	74.5	31.6					h	0	h	0				7 ^{cu}	0	5														1		
2	29.200	52.0	29.210	52.0	50.0	36.0	80.0	29.6					h	0	h	0				10 ^{ci}	10 ^{ci}	7														2		
3	29.130	54.0	28.952	53.0	48.5	39.5	64.4	32.8					h	0	h	0				10 st	10 st	2h														3		
4	28.752	55.2	28.950	52.3	46.2	41.0	59.6	38.6					h	0	h	0				10 st	10 st	0														4		
5	29.100	52.0	29.000	52.4	50.0	38.0	87.0	31.0					h	0	h	0				0	2 ^{ci}	8														5		
6	28.770	52.0	28.848	54.0	52.2	43.0	72.6	37.3					h	1	h	0				10 st	10 ^{ci}	2														6		
7	28.852	49.0	28.895	57.0	50.2	41.0	94.5	31.0					h	0	h	0				2 ^{ci}	5 ^{ci}	6 1/2														7		
8	29.000	53.0	28.913	53.4	52.3	37.0	82.0	27.6					h	0	h	0				0	10 st	6														8		
9	28.800	54.0	28.946	55.0	53.2	45.4	82.0	43.0					h	0	h	0				10 st	10 ^{ci}	4															9	
10	29.160	54.4	29.220	55.0	52.0	37.3	96.4	29.8					h	0	h	0				0	0	10 1/2															10	
11	29.200	56.0	29.158	56.8	55.0	39.0	93.0	31.0					h	0	h	0				0	0	8														11		
12	29.072	56.0	29.047	55.0	51.4	46.0	53.5	39.0					h	0	h	0				10 st	10 st	0															12	
13	29.100	56.0	29.238	53.0	50.8	38.2	77.0	31.0					h	0	h	0				10 st	7 ^{ci}	3															13	
14	29.260	49.5	29.048	51.0	47.4	35.0	87.0	26.0					h	0	h	1				3 ^{ci}	6 ^{ci}	8 1/2															14	
15	28.520	55.0	28.400	52.0	52.0	41.6	73.0	39.0					h	1	h	1				10 st	0	6 1/2															15	
16	28.390	48.0	28.300	46.8	44.0	36.0	75.0	32.0					h	1	h	1				0	3 ^{ci}	8															16	
17	28.360	46.0	28.570	47.0	43.2	34.8	70.0	28.0					h	1	h	0				3 ^{ci}	2 ^{ci}	8															17	
18	28.686	48.3	28.690	51.0	43.4	31.0	76.2	22.6					h	0	h	0				5 ^{ci}	6 st	7															18	
19	28.778	44.2	29.000	48.0	41.5	31.4	54.0	23.0					h	0	h	0				10 st	8 st	2															19	
20	29.030	45.0	28.810	47.0	40.8	28.5	73.0	19.8					h	0	h	0				10 st	4 ^{ci}	9 1/2															20	
21	28.700	50.0	28.830	49.2	39.1	33.0	72.0	23.0					h	0	h	0				10 ^{ci}	10 st	0															21	
22	29.000	48.0	28.870	49.0	46.0	38.0	86.0	28.6					h	0	h	0				0 ^{ci}	7 ^{ci}	8 1/2															22	
23	28.610	53.0	28.684	49.0	43.4	37.0	68.2	31.7					h	1	h	0				10 ^{ci}	6 st	7															23	
24	28.550	48.0	28.320	48.4	42.2	31.0	38.0	21.0					h	0	h	0				10 ^{ci}	10 ^{ci}	0															24	
25	28.622	48.0	28.678	48.2	42.0	33.0	62.4	26.0					h	0	h	0				0	0	9															25	
26	28.640	47.0	28.686	46.7	41.2	33.0	64.0	25.5					h	0	h	0				0	0	8 1/2															26	
27	28.900	47.0	29.143	46.0	38.6	33.0	63.0	27.2					h	0	h	0				0	0	9															27	
28	29.200	47.4	28.654	48.0	42.3	33.2	60.0	26.8					h	0	h	2				10 ^{ci}	10 st	3															28	
29	28.440	46.0	28.700	46.3	44.2	35.0	54.2	30.0					h	1	h	1				4 ^{ci}	9 ^{ci}	8															29	
30	28.900	48.0	28.922	48.6	48.7	34.8	58.0	29.5					h	0	h	1				3 ^{ci}	5 ^{ci}	5															30	
31	28.940	52.0	28.830	53.0	54.5	46.0	77.0	41.2					h	0	h	1				6 ^{ci}	8 ^{ci}	6															31	
Sums.	13158	157	16138	165	115	154	143	152												173																		
Means.																																						
Total Corrections for Instrumental Errors.																																						
Corrected Means.																																						
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30								

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

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

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

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

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

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

Observations made and Return verified by William Bruce
Begsides, Loch-bushna

(Signed) William Bruce

People, cattle, horses, and sheep healthy.
Potatoes all lifted, an excellent crop, much fine quality
Turnips a fair crop, and still improving.

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 incompatible may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns an accuracy and value commensurate with the labour and pains involved in making them; and, for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.

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

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

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

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

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.

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

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

The above remarks apply equally to the Thermometers for

registering the greatest heat from the sun's rays, and the least from radiation during night. Their bulbs have a black coating, which may easily be made, or marked, 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 station. Snow must not be allowed to cover either of these Thermometers; not the sun's heat to affect the Minimum Thermometer by discolouring.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a Standard Thermometer. When such Thermometers 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 "Hygrometric 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 that the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39° 9, 40° 0, or 40° 1; or again, 40° 4, 40° 5, or 40° 6, according as it indicates a little under, an exact coincidence with, or a little over 40°; or 40½, respectively. So also, 40½, or 40¾, more or less must be registered 40° 9, or 40° 8, 1 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 days. In the Society's schedules, the indications registered at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

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

Careful observations ought to be made on the changes in the direction of the wind; and during storms, extra observations ought to be made at every hour of Greenwich time. Such a system of simultaneous observation, pursued at different Stations, would be likely to give highly interesting and important results. The Council would strongly recommend that every observatory be furnished with a Hemispherical-Cup Anemometer, a self-registering instrument which shows the amount of Wind that passes it per day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating the Force of the Wind, at any particular hour of observation, Lind's Anemometer is also recommended; the method of Estimating Wind Force by such tables as that given in the schedule is, to say the least, unsatisfactory.

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

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

Clouds.—Convenient abbreviations for Luke Howard's

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and errors 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," (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 —, (e.g.) will indicate that the higher regions are covered to the amount of 4-tenths with stratus clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the cumulo-stratus kind.

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

Underground Thermometers.—As the germination and health of crops and plants greatly depend on the temperature of the soil,—is amount not constant,—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 Schönbairn's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 8°, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 8° 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 *form day* observations be taken;—viz., on the 21st days of March, June, September, and December.

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

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, 20th December 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In Flower.	Leafless.	In Leaf.	Thyrse of Leaves.	GROUPS.	Sowing or Planting.	Harvesting or Above Ground.	In Ear or Blasted.	First Cut
Alder.					Barley.				
Beech.					Bare or Bigg.				
Birch.					Wheat.				
Blm.					Beans.				
Larch.					Tease.				
Lime.					Potatoes.				
Oak.					Turnips.				
Sycamore or Plane.					Rye Grass.				

SHRUBS, ETC.	First in Blossom.	First in Blossom generally.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.	First in Blossom.
Barberry.									
Bourtree or Elder.									
Broom.									
Hazel.									
Lawthorn.									
Holly.									
Laurum.									
Lilac.									
Mezereum.									
Mountain Ash or Rowan.									
Red Flowering Currant.									
Rhododendron Ponticum.									
Whin.									

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

BOOK-POST.

M. ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Bosside
Oct 1868.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Boyside Loch-Cushnie, County of Aberdeen, in Lat. $57^{\circ}10'30''$, Long. $2^{\circ}45'0''$, Distance from Sea 28 miles.Height of Cistern of the Barometer above Mean Sea-level 392 feet, above Ground 12 feet.During the MONTH of November 1888.

The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS. Read Daily, at 9 P.M.				HYGROMETER. No. _____				WIND.				RAIN.				CLOUDS.				THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. <i>Mention the hour at which Storms began and ended.</i>	Days of Month.
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		Readings of the H. Cup Anemometer. No. _____	Amount in inches. No. _____	9 A.M.		P.M.		9 h. A.M.								
		Baromete	Atmospher	Baromete	Atmospher	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.			Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	Velocity, (0-10), and Direction.	Amount, (0-10), and Species.	No. _____	No. _____	No. _____						
		* No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.			No.	No.	No.	No.	No.	No.	No.	No.					
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°				
1	28.700	59.0	28.745	52.6	56.2	42.5	74.6	39.0					S.W.	0.5	S.W.	1		0.1	10 st		7.5 st	2								1		
2	28.860	48.0	28.678	48.4	45.0	35.0	70.0	32.8					S.W.	1	S.W.	1.5			6 st		5.5 st	4								2		
3	28.340	48.5	28.348	49.6	45.0	35.0	45.0	33.0					S.W.	0.5	S.W.	0		0.30	10 st		10 st	1								3		
4	28.400	44.5	28.320	43.6	39.0	31.6	69.2	27.0					W.	0.5	W.	1.5		0.22	0		6 st	6 1/2								4		
5	28.562	45.1	28.738	44.0	33.4	30.0	50.0	23.0					S.W.	1	W.	1		0.32	10 st		4 st	3								5		
6	28.924	45.0	29.000	42.1	32.0	26.0	55.0	22.0					W.	0.5	S.W.	1		0.41	10 st		10 st	4 1/2								6		
7	28.700	42.4	29.049	45.0	34.8	25.0	59.4	20.5					W.	0.5	S.W.	0.5		0.5	6 st		10 st	3 1/2								7		
8	29.120	44.0	29.281	44.8	34.2	28.2	80.0	23.2					S.W.	0	S.W.	0.5			2 st		6 st	6 1/2								8		
9	29.422	57.4	29.454	48.5	36.0	28.5	74.0	20.0					S.W.	0.5	W.	0			8 st		7 st	6								9		
10	29.458	53.8	29.400	47.2	35.0	27.4	89.0	19.3					W.	0	W.	0		0.03	10 st		0	6								10		
11	29.370	52.0	29.472	50.0	34.4	27.3	85.0	18.4					W.	0	W.	0			10 st		10 st	4								11		
12	29.614	50.0	29.700	49.2	38.0	31.4	50.0	24.0					S.W.	0.5	S.W.	0.5			10 st		0	2								12		
13	29.730	53.0	29.664	49.8	40.2	31.2	50.6	23.6					W.	0.5	S.W.	0.5		0.07	10 st		8 st	1								13		
14	29.585	50.0	29.610	50.0	46.3	37.0	52.4	33.0					W.	1.5	W.	1		0.07	10 st		3 st	3								14		
15	29.628	52.3	29.552	52.0	39.0	34.0	49.2	27.5					W.	0.5	W.	0.5			9 st		6 st	2 1/2								15		
16	29.460	50.0	29.420	51.0	41.5	35.0	53.4	31.6					S.W.	0.5	S.W.	0.5		0.04	10 st		10 st	1								16		
17	29.481	46.0	29.552	52.0	41.2	38.5	42.1	36.4					W.	0.5	S.W.	0			10 st		10 st	0								17		
18	29.520	53.0	29.580	47.6	40.3	32.6	70.0	26.0					S.W.	0.5	W.	0.5		0.03	9 st		10 st	1 1/2								18		
19	29.616	51.5	29.516	47.0	34.2	32.0	36.0	29.0					S.W.	0.5	S.W.	0.5			10 st		10 st	0								19		
20	29.550	50.0	29.100	43.4	33.0	31.6	34.0	27.4					S.W.	0.5	S.W.	1			10 st		10 st	0								20		
21	28.740	40.4	28.270	44.8	37.2	31.0	33.0	27.0					S.	0.5	S.	1.5		0.07	10 st		10 st	1 1/2								21		
22	28.000	49.0	28.028	57.0	47.1	36.0	61.2	33.0					S.W.	1.5	S.W.	0.5			8 st		6 st	2								22		
23	28.340	49.0	28.720	47.2	43.0	32.0	40.0	30.0					S.W.	0.5	S.W.	0.5		0.12	10 st		10 st	0								23		
24	28.923	46.0	28.915	47.0	32.4	27.0	75.0	18.5					W.	0.5	S.W.	0.5		0.18	1 st		10 st	3 1/2								24		
25	28.840	46.8	28.810	50.0	39.0	32.0	40.0	28.3					S.W.	0.5	S.W.	0.5		0.22	10 st		10 st	0								25		
26	28.960	52.0	29.052	47.4	39.2	36.0	48.1	29.2					S.W.	0.5	S.W.	0.5		0.03	10 st		10 st	1								26		
27	29.200	49.3	29.186	53.0	39.4	35.4	42.0	30.6					W.	0	S.W.	0		0.05	9 st		10 st	1								27		
28	29.036	46.0	29.128	48.0	38.0	35.0	38.0	29.7					S.W.	0.5	S.	0.5			10 st		10 st	0								28		
29	29.000	46.0	28.934	44.2	36.0	34.0	38.6	29.3					S.W.	0.5	S.	1.5		0.08	7 st		10 st	0								29		
30	28.840	44.0	28.820	44.0	40.0	37.0	40.0	34.0					S.W.	1.5	S.W.	1.5		0.18	10 st		10 st	0								30		
31																														31		
Sums.		15184	1184	14118	1184	15184	1184	14118	1184								22.8															
Means.																																
+ Total Corrections for Instrumental Errors.																																
+ Corrections for Diurnal Range.																																
+ "Corrected Means."																																
No. of Columns.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction \pm =
for Temp. (Col. 2), =
Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm =
for Temp. (Col. 4), =
Mean at Station, corrected, and at 32°,
Correction for height, feet, above Mean Sea-level,
Mean, reduced to 32°, and Sea-level,
Highest Reading, corrected for Index error, on the th,
Lowest Do., Do., on the th,
Difference, or Monthly Range,
* Each instrument used 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 diurnal correction.
+ These "Hygrometric Deductions" are calculated from Glaisher's Hygrometric Tables, Second Edition only.
+ While the Diurnal Range is unknown, the Arithmetic Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

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

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

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

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

Observations made and Return verified by William Bruce
Boyside Loch-Cushnie(Signed) William Bruce

People healthy, with the exception of a few cases of inflammation on the lungs. Also several cases of Scotch cholera, one of diphtheria, and one of erysipelas. None of them have been fatal. Cattle, horse, and sheep healthy.

INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incomparable, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those persons who kindly furnish Reports to the Society will by a scrupulous attention to the following Directions, secure for their Monthly Returns, an accuracy and value commensurate with the labour and pains involved in making them; and for the Tables published by the Society, an entire comparableness among the several Returns, without which the Society's Reports must inevitably fail in achieving one of the main objects of Meteorological Observation.—The Council recommend that Observations be made precisely at 9 o'clock (Greenwich or Railway Time only) twice a-day for some, and once (morning or evening) for other instruments, as specified, in the following remarks, or at the top of the schedule. It is hoped that the utmost punctuality in the time of reading the instruments will be observed. Observers, in some few cases, may find this impossible; in such instances, they are specially requested to mark opposite every reading at what time it was taken, if not at 9 o'clock.

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

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-rod* 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 convenience being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When 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 *vernier*.

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

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

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

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, boxes 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 "*Minimum*" 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 globe, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

The above remarks apply equally to the Thermometers for the use of which is attended with the great convenience of requiring no adjustment of the cistern. Its scale-rod 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 convenience being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When 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 vernier.

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

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

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

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, boxes 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 "Minimum" 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 globe, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

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 Minimum Thermometer by distillation.

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

The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and well-tested form of this apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must hang down by at least an inch free from the scales and frame to which they are attached;—the frame must be such as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulb;—the muslin must be of medium fineness, and fastened at the neck of the bulb by the cotton which also supplies it with water. It must be seen to by the observer, that the muslin is always *clean* and *moist*, and that the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be notified 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 bringing 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 $-39^{\circ}.9$, $40^{\circ}.0$, or $40^{\circ}.1$; or, again, $40^{\circ}.4$, $40^{\circ}.5$, or $40^{\circ}.6$, according as it indicates a little under, an exact coincidence with, or a little over 40° ; or $40^{\circ}.3$, respectively. So also $40^{\circ}.8$, and $40^{\circ}.9$, more or less must be registered $40^{\circ}.2$ or $40^{\circ}.3$ and $40^{\circ}.7$ or $40^{\circ}.8$ 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, 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 *dry* 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 close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day on which the rain fell.

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

Clouds.—Convenient abbreviations for Luke Howard's

nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from the greater or less observation of the sky or *head* (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 on a scale of 0 to 10; thus, when the sky overhead is half covered by clouds 5 is entered as the *observation*, and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column "Velocity and Direction," 6, S. W., (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S. W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of $\frac{1}{2}$, (*e.g.*) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

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

Temperature of the Sea.—A knowledge of the temperature of the sea is not only in itself, but in its relations to that of our island, a very important branch of Meteorology. The Council, therefore recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by that of river water. At or near the time of high water, on the 3rd, 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 Schindelin's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner;—thus 3^{w} , as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 4^{3} on the scale, that the wind is from the N. W., and that its force on the scale 0—6 is 4^{3} ; i. e., that it is *blowing 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 on the side-margins. Additional remarks may be made on the margin. **Observations** in connection with the periodic return of the seasons, possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena; but 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.

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, 10th December, 1865.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.		Alder.	Ash.	Beech.	Birch.	Elm.	Larch.	Lim.	Oak.	Sycamore or Plane.
In flower.										
First buds										
In fruit										
Divided of leaves.										
CROPS.										
Sowing or planting.		Barley.	Bere or Bigg.	Oats.	Wheat.	Beans.	Lense.	Potatoes.	Turnips.	Rye Grass.
Aperting or above ground.										
In ear or first cut										

SHRUBS, ETC.	Barberry.	Broom.	Hazel.	Hawberry.	Holly.	Laburnum.	Lilac.	Mazeyon.	Mountain Ash or Rowan.	Red Flowering Currant.	Rhododendron Ponticum.	Whin.
First in blossom.												

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 Diplozoa disease prevails among cattle; and the Agricultural condition of the district generally.

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

Mr. ALEXANDER BUCHAN,

BOOK-POST.

Box side Nov. 1868.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Boyside, Lochiel-bushnie*, County of *Aberdeen*, in Lat. $57^{\circ}10'30''$, Long. $2^{\circ}45'0''$, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *894* feet, above Ground *12* feet.During the MONTH of *December* 18*68*.

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.				SUNSHINE. Hours.	THERMOMETERS. under Ground.			SEA.	OZONE.	GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Frequent 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.											
	Barometre * No.	Atmospheric Thermometer	Barometre No.	Atmospheric Thermometer	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity, (0-10), and Species.	Amount, (0-10), and Species.	Velocity, (0-10), and Species.	Amount, (0-10), and Species.	No. — 3 inches.	No. — 12 inches.	No. — 22 inches.									
	inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°		°						
1	28.800	46.3	28.770	49.0	41.2	39.4	42.0	38.0					S. by E.	0.5	S.	0.5	17	10 st	10 st	0								f.	1			
2	28.870	48.0	28.800	49.6	41.0	34.0	60.0	28.0					S. by W.	0.5	S. by E.	0.5	7	10 st	6 st	4								f. h. co.	2			
3	28.570	49.8	28.410	49.0	44.8	37.0	45.0	38.0					S.	1	S. by W.	0.5	17	10 st	10 st	0								f.	3			
4	28.290	50.4	28.013	53.0	50.1	40.6	53.0	38.1					S.	1	S. by W.	1		08	10 st	10 st	1										4	
5	28.063	52.0	28.126	49.7	48.4	43.2	61.4	39.2					S. by W.	1.5	S. by W.	1.5	7	2 st	4 st	4 1/2											5	
6	28.323	49.6	28.360	52.0	46.2	42.0	65.3	37.0					S. by W.	1.5	S. by W.	0.5	17	2 st	4 st	5											6	
7	28.582	53.2	28.710	53.0	46.0	39.0	67.0	31.7					S. by W.	0.5	S. by E.	0.5		25	10 st	10 st	2								f.	7		
8	28.690	52.0	28.942	49.8	42.2	32.0	37.0	27.0					E.	1	W.	0.5		12	10 st	10 st	0								f.	8		
9	29.240	51.0	29.230	49.6	35.3	32.0	56.5	26.0					S.	0.5	S.	0.5		17	10 st	4 st	4										9	
10	28.550	47.0	28.200	50.0	52.5	33.0	54.0	31.2					S.	1.5	S. by W.	2		36	10 st	4 st	0										10	
11	28.250	51.2	28.720	43.0	48.0	30.2	52.0	28.0					W.	1.5	W.	1.5	17	03	10 st	10 st	2 1/2											11
12	29.020	42.8	29.000	44.0	30.6	26.0	46.0	19.0					W.	0.5	S.	0.5	7		10 st	10 st	6								st. co.	12		
13	28.910	47.0	28.670	44.2	36.0	28.6	38.0	26.0					S.	0.5	S.	1.5	17	20	10 st	10 st	1								gale during the whole day.	13		
14	28.345	47.0	28.732	48.2	45.0	36.0	46.0	35.6					S.	2	S.	1.5		19	10 st	10 st	0								a.	14		
15	28.370	50.0	28.390	49.0	45.8	40.6	54.2	37.0					S.	1.5	S. by W.	1	7		10 st	8 st	3								f.	15		
16	28.270	52.0	28.250	52.0	42.0	35.2	42.0	27.0					W.	0.5	S. by W.	0.5	17	39	10 st	10 st	0								a.	16		
17	28.550	50.0	28.660	57.0	42.5	34.0	76.0	27.8					W.	0.5	S.	0.5		03	0	3 st	6								f.	17		
18	28.470	51.0	28.700	50.4	46.0	36.0	68.0	28.0					S.	0.5	S.	0.5	7		10 st	5 st	3								f. a.	18		
19	28.800	57.0	28.720	50.8	40.0	32.2	40.0	25.0					W.	0.5	E.	0.5	17	24	10 st	10 st	0								f. Parulica	19		
20	28.688	55.0	28.680	54.0	40.2	35.0	40.1	30.0					E.	0.5	S. by E.	0.5		15	10 st	10 st	0								f.	20		
21	28.460	48.0	28.000	47.0	41.0	35.2	42.5	32.3					S. by E.	1.5	W.	0.5		77	10 st	10 st	0								gale from 10 a.m. to 6 p.m.	21		
22	28.072	52.0	28.050	48.0	42.5	36.0	48.3	30.0					S. by W.	0.5	S.	0.5	7		8 st	6 st	1 1/2								h. co.	22		
23	28.120	51.0	28.100	49.0	40.1	34.8	73.3	28.2					S. by W.	0.5	S. by W.	0.5	17	11	0	3 st	6 1/2								f.	23		
24	28.020	48.0	28.010	48.0	39.0	33.0	53.0	28.0					S.	0.5	S. by E.	0.5		04	10 st	3 st	3								f.	24		
25	28.210	58.6	28.430	50.0	36.0	29.0	54.0	22.0					S.	0.5	W.	0.5		05	3 st	10 st	3								h. co.	25		
26	28.440	51.0	27.950	43.0	35.0	30.5	45.0	27.0					S. by E.	0.5	W.	2	7	23	4 st	10 st	2 1/2								f.	26		
27	27.620	45.0	27.660	45.0	37.0	32.0	57.0	31.0					W.	1	S. by W.	0.5		18	10 st	9 st	3										27	
28	28.000	46.0	28.120	43.0	40.0	28.0	72.0	21.0					S. by E.	0.5	S.	0.5	7		8 st	3 st	6 1/2								h. co.	28		
29	28.250	47.0	28.260	44.0	33.3	26.2	50.4	19.5					S. by W.	0.5	W.	0.5			3 st	7 st	5								h. co.	29		
30	28.400	47.0	28.370	44.0	31.6	24.0	47.0	18.0					S. by W.	0.5	W.	0.5			6 st	10 st	3										30	
31	28.792	46.0	29.120	42.0	35.0	26.0	56.0	19.2					W.	1	W.	0.5			2 st	1 st	6 1/2										31	
Sums.	133	289	133	289	133	133	133	133									37	10														
Means.																																
† Total Corrections for Instrumental Errors.																																
† Corrections for Diurnal Range.																																
† Corrected Means.																																
No. of Column.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		

NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	cirrus.	ms.	melons.
ci. cu.	cirro-cumulus.	n.	nebula.
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.	se.	seal.
fr.	frost.	sl.	sleet.
h. fr.	hoar-frost.	sn.	snow.
h.	haze.	so. h.	solar halo.
h. d.	heavy dew.	sq.	spall.
h.	hail.	sq.	squall.
l.	lightning.	t.	thunder.
li. cl.	light clouds.	t. s.	thunder storm.
li. sh.	light showers.	w.	wind.
li. co.	light rain.	z.	zephyr.
li. h.	light hail.		

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 \pm =
for Temp. (Col. 2), =
"Corrected Mean" of Barometer at 9 P.M., minus the Correction \pm =
for Temp. (Col. 4), =
Mean at Station, corrected, and at 32°,
Correction for height, feet, above Mean Sea-level,
Mean, reduced to 32°, and Sea-level,
Highest Reading, corrected for Index error, on the th,
Lowest Do., Do., on the th,
Difference, or Monthly Range,
* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† Enhancing corrections for both capillarity and Index Errors.
‡ The Diurnal Range for Scotland is as yet unknown.
§ Practically, though not absolutely a mean correction.
|| These "Hygrometrical Delusions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
** While the diurnal range is unknown, the Arithmetic Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."
Any observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the th,
Lowest in Month, corrected for Index errors, on the th,
Difference, or Monthly Range,
"Corrected Mean" of all the Highest, (Col. 5),
"Corrected Mean" of all the Lowest, (Col. 6),
Difference, or Mean Daily Range,
** Calculated Mean Temperature of Month,
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected, for Index errors), on the th,
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun,
Lowest at Night, Black Bulb, (corrected for Index errors), on the th,
"Corrected Mean" (Col. 8), of Black Bulb Min. on grass,
Difference of above Means or Range ("exposed"),
HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11),
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12),
† Computed Temperature of Dew-Point,
† Do. Elastic Force of Vapour,
† Do. Weight of Vapour in a Cubic Foot of Air,
† Relative Humidity, (Saturation = 100),
RAIN fell on Days; Amount in Inches,

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

Bulb, (Cols. 9 and 11),

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

10 and 12),

† Computed Temperature of Dew-Point,

† Do. Elastic Force of Vapour,

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

† Relative Humidity, (Saturation = 100),

RAIN fell on Days; Amount in Inches,

WIND.		SUMMARY.									
Direction	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	2		2	4	10	8	3	2			
P.M.	3		1	4	9	7	5				
Mean.											

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

Observations made and Return verified by *William Bruce*
Boyside, Lochiel-bushnie(Signed) *William Bruce*

A severe cold prevalent, and one case of typhus fever which proved fatal. Should other weeks go on.

WITH REMARKS ON THE USE OF INSTRUMENTS.

Hour of Observation.—The Council recommends that Observatory observations be made precisely at 9 o'clock (Greenwich or Royal Observatory time) twice a-day for some, and once (morning or evening) for other instruments as specified, in the following remarks, on 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.—*Wentley 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*.

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 gismen. Then *reverse* up the mercury to within a quarter of an inch. The top of the tube, and take down the instrument; it may then be carried with the gismen upmost. Before suspending the Barometer for use, it must be ascertained whether this space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp top* is produced. If this is prevented by air it may be removed to the gismen and got rid of by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory pegs, and gently tapping it; and if this plan fails, the instrument must be repaired).

Self-Registering Thermometers—Professor Phillips's, and Negretti and Zambra's Patent "*Maximum*," Thermometers are distinguished by printed divisions for their use may be obtained with each instrument. The "*Minimum*," Thermometer of Bartholow 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 in part of the spirit distils by high temperature, it will be found in the upper lobe, and must be discolored from thence by heating that upper part a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes till it has been carefully *tested* by comparison with a *Standard Thermometer*. When such Thermometers are *not graduated* on the stem, but merely on an attached scale, undergo repairs, they are very liable to *drift* 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.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or *column* of mercury. The readings ought to be taken to tenths of a degree, and noted in decimals. Thus the thermometer will be read -38.9 , 40.0 , or 40.1 ; or again, 40.4 , 40.5 , or 40.6 , according as it indicates a little under, an exact coincidence with, or a little over 40.0 , or 40.5 , respectively. So also 403.5 and 403.8 more or less must be registered 40.2 or 40.3 and 40.7 or 40.8 respectively. In reading Rutherford's "*Mac.*" and "*4 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 these thermometers, especially of the wet and dry *bulbs*, must be rapidly taken, being so readily affected by heat from the person observing.

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situations for observation and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge, but in all cases the gauge must be sunk in the ground till its edges are on a level with the surface of the 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.

WITH REMARKS ON THE USE OF INSTRUMENTS.

and Direction,"— $\frac{W}{2}$, (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S, W, and those in the lower regions from W, with one-third the (*extreme*) speed of the former. Again, in the second "Cloud 4, st.

Temperature of the Sea.—Our knowledge of the temperature of the sea is not only in itself, but in its relations to that of our atmosphere, a very important branch of Meteorology. The Council, therefore recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of piers and rocks round the coast, where it is not influenced by the flow 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.

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

Ozone.—Mention whether Schönbach's or Moffet's papers are used. The paper is affixed by a pin to a board in the three-meter 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 3.50, as an ozone entry in the schedule, will indicate that the ozone paper is turned at 4.30 on the scale, that the wind is from the N.W., and that its force on the scale is 4.10, i.e., that it is *blowing free*.

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

The Council have agreed to recommend that observers, before purchasing new instruments, should communicate with the Meteorological Secretary, and they consider it desirable that the latter should have full power to reject any instrument which, on being examined, appears to be defective.

(By Order) A. B.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Alder,	Ash,	Beech,	Birch,	Elm,	Lime,	Oak,	Sycamore or Plane,
In Flower.								
In Leaf buds first appear.								
In Leaf.								
Divested of Leaves.								
CROPS, mentioning variety.	Barley,	Dore or Bigger,	Oats,	Wheat,	Beans,	Potatoes,	Turnips,	Rye Grass,
Sowing or above ground.								
Appearing.								
In Ear or flower.								
First cut or lashed.								

SHRUBS, &c.	Barberry, Brown, Hazel, Honeysuckle, Holly, Laburnum, Lilac, Myrtle, Mountain Ash or Rowan, Red Flowering Currant, Rhododendron Ponicum, Viburnum,
First in Blossom.	Apple, Cherry, Gooseberry, Peach, Pear, Plum, Strawberry,
FRUITS.	
First in Blossom.	
First in general.	
MIGRATORY BIRDS.	Cuckoo, House-Swallow, Lapwing, Plover, Sand-Martin, Starling, Swan, Rail or Corn Crane,
First Arrival.	
Departure.	

1. *Trypanosoma*, *Leishmania*, etc., whether plentiful, or in perfection; and the Agricultural condition of the district generally.

BOOK-POST.


Mr. ALEXANDER BUCHAN

Secretary of the Meteorological Society of Scotland.

EDINBURGH.

Boyside
Dec 1868.

 T_c



FORM 100-37 (Rev. 1-25-60)