

SCOTTISH METEOROLOGICAL SOCIETY.

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

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

During the MONTH of *January* 186*4*.

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. Temperature at 1 fathoms and Depth. | OZONE. 0-10. | GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended. | Days of Month. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, 4 feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | Readings of the H-Cup Anemometer. | | No. of hours in which it fell. | Amount in inches. | 9 A.M. | | P.M. | | 9 h. A.M. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Barometer. No. | Attach- ed Ther- mometer | Barometer. No. | Attach- ed Ther- mometer | Max. No. | Min. No. | Max. in sun's rays No. | Min. on Grass. No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direc- tion. | Force | | | Direc- tion. | Force | Velocity, (0-6), and Direc- tion. | Amount, (0-10), and Species. | Velocity, (0-6), and Direc- tion. | Amount, (0-10), and Species. | | No. 3 inches. | No. 12 inches. | No. 22 inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | No. | inches. | No. | inches. | No. | inches. | No. | inches. | No. | inches. | No. | inches. | No. | inches. | No. | inches. | No. | inches. | No. | inches. | No. | inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 30.16 | 50 | 30.39 | 58 | 37 | 29 | | | 36 | 34 | 34 | 33 | E | 1 | SE | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Lunar Halo on the 17th
Rainbow on the 21st & 31st

NOTATION USED IN GENERAL REMARKS.

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

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ = *29.969*
for Temp. (Col. 2), = *30.020* - *0.051* = *29.969*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ = *29.963*
for Temp. (Col. 4), = *30.021* - *0.058* = *29.963*
Mean at Station, corrected, and at 32°, = *29.966*
Correction for Height, feet, above Mean Sea-level, = *101*
Mean, reduced to 32°, and Sea-level, = *30.067*
Highest Reading, corrected for Index error, on the *4* th, = *30.600*
Lowest Do., Do., on the *22* th, = *29.200*
Difference, or Monthly Range, = *1.400*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *24* th, = *49.0*
Lowest in Month, corrected for Index errors, on the *4* th, = *17.0*
Difference, or Monthly Range, = *32.0*
"Corrected Mean" of all the Highest, (Col. 5), = *40.8*
"Corrected Mean" of all the Lowest, (Col. 6), = *21.5*
Difference, or Mean Daily Range, = *9.3*
** Calculated Mean Temperature of Month, = *36.2*

S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the *14* th, = *54.0*
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = *54.0*
Lowest at Night, Black Bulb, (corrected for Index errors), on the *14* th, = *54.0*
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, = *54.0*
Difference of above Means or Range ("exposed"), = *54.0*

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *35.4*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *34.2*
Computed Temperature of Dew-point, = *32.3*
Do. Elastic Force of Vapour, = *1.84*
Do. Weight of Vapour in a Cubic Foot of Air, = *89*
Relative Humidity, (Saturation = 100), = *89*
RAIN fell on *9* Days; Amount in Inches, = *1.19*

| 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 | 3 | 11 | 14 | 2 | | | 216 | |
| P.M. | | | 1 | 1 | 10 | 16 | 2 | 1 | | 231 | |
| Mean. | 0 | 0 | 1 | 2 | 10 | 15 | 2 | 1 | | 224 | |

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

Observations made and Return verified by *Wm. Maule*

(Signed)

AB

FOR TAKING METEOROLOGICAL WITH REMARKS ON THE USE OF INSTRUMENTS

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

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

The 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

ction, 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 thermometer is encased in a tin case, which also supports the water cup underneath. This arrangement must be immediately altered by pulling the boxwood frame out of the tin case, and hanging them side by side, so that the forementioned requirements shall be complied with, as far as possible.

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or *column* of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read— $38^{\circ}.9$, $40^{\circ}.4$, or $40^{\circ}.1$; or again, $40^{\circ}.3$, $40^{\circ}.6$, or $40^{\circ}.6$, according as it indicates a little under, an exact coincidence with, or a little over 40° , or $40\frac{3}{10}$, respectively. So also $40\frac{1}{10}$, and $40\frac{7}{10}$, more or less, must be respectively $40^{\circ}.2$ or $40^{\circ}.3$, and $40^{\circ}.8$ or $40^{\circ}.9$ respectively. In reading Rutherford's "*Mer.*" 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

Reading Rutherford's "Max" and "Min" Thermometers, the indication of that end of the *index* which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry *bulbs*, must be rapidly taken, being so readily affected by heat from the person of the observer.

Hour of Observation.—The Hygrometer is read at 3 a.m. and 9 p.m. The self-registering Thermometers are read only at 9 p.m.; as indicating the greatest and least degrees of interference when the self-registering Thermometers are read, in summer, 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.

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 true 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 Observing Station 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 *Windmill* Anemometer is also recommended; the method of *Estimating* Wind Force by such tables as that given in the schedule *S*, say the least, unsatisfactory.

reasonable 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 loose cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day in 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 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 forwards

[illegible][illegible]

| | | | |
|-----------------------|------------------------|---|----------------|
| WITH THE PERIODICAL R | Invested of Leaves. | Barley,..... Bere or Biers,..... Oats,..... Wheat,..... Beans,..... Peas,..... Potatoes,..... Turnips,..... Rye Grass,..... | South Pland |
|-----------------------|------------------------|---|----------------|

[illegible]

| |
|--------------------|
| FOREST TREES. |
| Alder, |
| Asp., |
| Beech, |
| Birch, |
| Elm, |
| Larch, |
| Limbe, |
| Oak, |
| Sycamore or Plane, |

OBSERVATIONS,

NS.

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|----------------------|
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| |
| |
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| |
| |
| Raised. First Cut |

781
1891
The National Library of Medicine
Washington, D.C.

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| | | | | | | | | | | |
|-----------------------|-------------|---------------------|--------------|-------------|--------------|--------------|-------------|-----------------|----------------|------------------|
| WITH THE PERIODICAL R | Invested of | Barley, | Here or Bigg | Oats, | Wheat, | Beans, | Peas, | Potatoes, | Turnips, | Rye Grass, |
| South | CROPS, | mentioning variety. | | | | | | | | |

[illegible]

| |
|----------------|
| FOREST TREES. |
| Alder, |
| Asp., |
| Beech, |
| Birch, |
| Elm, |
| Larch, |
| Limbe, |
| Oak, |
| Spruce or Fir, |

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

| FOREST TREES. | | In flower. | In leaf buds. | In leaf. | Decided of leaves. | Decided of mentioning variety. | CROPS. | Sowing or planting. | Appearing above ground. | In ear. | First Cut |
|--------------------------|--|------------|---------------|----------|--------------------|--------------------------------|--------|---------------------|-------------------------|---------|-----------|
| Alder, | | | | | | Barley, | | | | | |
| Asb., | | | | | | Bere or Bieg, | | | | | |
| Beech, | | | | | | Oats, | | | | | |
| Birch, | | | | | | Wheat, | | | | | |
| Clm., | | | | | | Beans, | | | | | |
| Larch, | | | | | | Pease, | | | | | |
| Lime, | | | | | | Potatoes, | | | | | |
| Oak, | | | | | | Turnips, | | | | | |
| Sycamore or Plane, | | | | | | Rye Grass, | | | | | |

| SHRUBS, ETC. | | First in Blossom. | FRUITS. | | | | First in Blossom. | First in Fruiting Season. | First in Season. | First in Season. | First in Season. | | | | | | | |
|-----------------|--------------|-------------------|-------------|-------------|--------------|-------------------|-------------------|---------------------------|------------------|----------------------|------------------|-------------|---------------------------|---------------------------|------------------------------|------------------------------|------------------------------|-------------|
| Barberry, | Apple, | Strawberry, | Plum, | Pear, | Peach, | Gooseberry, | Lapwing, | Cuckoo, | Curlew, | House-Swallow, | Starling, | Swan, | Rail or Corn Crane, | Other Birds, naming them— | Red Flowering Currant, | Mountain Ash or Rowan, | Rhododendron Ponticum, | Whin, |

POXBURGH, 9th December 1863.

KONBUCH, 9th December 1963.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, County of *Midlothian*, in Lat. *55°58'00"N*, Long. *3°2'40"W*, Distance from Sea *one* miles.

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

During the MONTH of *February* 186*4*.

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. | No. of hours in which it fell. | Amount in inches. No. | Velocity, (0-6), and Direction. | Amount, (0-10), and Species. | Velocity, (0-6), and Direction. | Amount, (0-10), and Species. | No. 3 inches. | No. 12 inches. | No. 27 inches. | | | | | | | |
| | | Inches. | " | Inches. | " | No. | No. | No. | No. | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | " | | | | | |
| | 1 | 29.85 | 54 | 29.60 | 54 | 46 | 36 | | | 40 | 39 | 40 | 40 | SW | 1 | SW | 3 | | | | | | | | | | | | on the 8 th . | 1 | | | |
| | 2 | 29.74 | 52 | 29.50 | 54 | 42 | 34 | | | 40 | 38 | 38 | 38 | SW | 3 | SW | 2 | | | | | | | | | | | | a beautiful star or meteor | 2 | | | |
| | 3 | 29.53 | 50 | 29.84 | 53 | 37 | 29 | | | 34 | 33 | 30 | 29 | SW | 1 | SW | 4 | | | | | | | | | | | | San Shooking to the south | 3 | | | |
| | 4 | 30.10 | 50 | 30.23 | 48 | 38 | 29 | | | 34 | 33 | 30 | 28 | N | 1 | N | 2 | | | | | | | | | | | | with a very long brilliant | 4 | | | |
| | 5 | 30.36 | 43 | 30.40 | 46 | 37 | 25 | | | 30 | 30 | 32 | 31 | N | 1 | N | 1 | | | | | | | | | | | | sparkling fire tail | 5 | | | |
| | 6 | 30.20 | 42 | 30.16 | 45 | 35 | 26 | | | 30 | 29 | 27 | 26 | N | 1 | N | 1 | | | | | | | | | | | | Remained on the 12 th | 6 | | | |
| | 7 | 30.02 | 44 | 30. | 42 | 34 | 18 | | | 32 | 31 | 24 | 23 | E | 1 | E | 1 | | | | | | | | | | | | at 8 9/11 A.M. and on | 7 | | | |
| | 8 | 29.83 | 42 | 29.66 | 43 | 36 | 15 | | | 20 | 20 | 21 | 20 | E | 1 | S | 1 | | | | | | | | | | | | on the 15 th | 8 | | | |
| | 9 | 29.60 | 40 | 29.54 | 44 | 34 | 27 | | | 19 | 19 | 29 | 28 | SW | 1 | SW | 1 | | | | | | | | | | | | | great gale on the 13 th Barom. | 9 | | |
| | 10 | 29.50 | 43 | 29.67 | 46 | 40 | 27 | | | 33 | 32 | 32 | 31 | E | 1 | E | 2 | | | | | | | | | | | | at 9 A.M. 29.00 | 10 | | | |
| | 11 | 29.70 | 44 | 29.46 | 44 | 39 | 33 | | | 34 | 33 | 35 | 32 | S | 1 | S | 1 | | | | | | | | | | | | | at 2 P.M. 28.80 | 11 | | |
| | 12 | 29.00 | 47 | 29.31 | 48 | 45 | 35 | | | 38 | 38 | 39 | 37 | SW | 4 | SW | 2 | | | | | | | | | | | | | at 5 P.M. 29.24 | 12 | | |
| | 13 | 29.00 | 49 | 29.75 | 50 | 54 | 36 | | | 50 | 48 | 38 | 37 | SW | 6 | SW | 6 | | | | | | | | | | | | | at 7 P.M. 29.50 | 13 | | |
| | 14 | 29.80 | 48 | 29.60 | 51 | 49 | 43 | | | 47 | 45 | 46 | 45 | SW | 5 | SW | 5 | | | | | | | | | | | | | at 9 P.M. 29.75 | 14 | | |
| | 15 | 29.50 | 51 | 29.39 | 54 | 49 | 33 | | | 44 | 43 | 41 | 41 | SW | 4 | SW | 4 | | | | | | | | | | | | | Range in twelve hours—95 | 15 | | |
| | 16 | 29.40 | 46 | 29.60 | 48 | 37 | 32 | | | 36 | 35 | 35 | 32 | SW | 3 | SW | 1 | | | | | | | | | | | | | This gale has done considerable | 16 | | |
| | 17 | 30. | 48 | 30.18 | 49 | 39 | 31 | | | 35 | 32 | 36 | 35 | N | 1 | N | 1 | | | | | | | | | | | | | Damage by blowing down | 17 | | |
| | 18 | 30.28 | 45 | 30.40 | 45 | 41 | 26 | | | 33 | 32 | 30 | 29 | N | 1 | N | 1 | | | | | | | | | | | | | | Chimney Bams and uprooted | 18 | |
| | 19 | 30.48 | 45 | 30.34 | 42 | 39 | 23 | | | 31 | 29 | 29 | 28 | SE | 1 | SE | 1 | | | | | | | | | | | | | | a number of large trees, the | 19 | |
| | 20 | 30.16 | 44 | 30. | 42 | 38 | 22 | | | 30 | 30 | 27 | 26 | SE | 1 | E | 1 | | | | | | | | | | | | | | gale continued for fully | 20 | |
| | 21 | 29.85 | 45 | 29.84 | 45 | 36 | 24 | | | 26 | 25 | 26 | 26 | N | 1 | N | 1 | | | | | | | | | | | | | | two days | 21 | |
| | 22 | 29.84 | 42 | 29.90 | 44 | 39 | 25 | | | 27 | 26 | 28 | 27 | S | 1 | N | 1 | | | | | | | | | | | | | | Snow fell on the 20 th & 21 st | 22 | |
| | 23 | 29.96 | 46 | 30.02 | 54 | 34 | 15 | | | 29 | 28 | 19 | 19 | S | 1 | SW | 1 | | | | | | | | | | | | | | to about 3 inches deep | 23 | |
| | 24 | 30. | 42 | 30. | 46 | 40 | 19 | | | 16 | 15 | 23 | 22 | SW | 1 | SW | 1 | | | | | | | | | | | | | | which remained on the | 24 | |
| | 25 | 30.07 | 43 | 30. | 42 | 41 | 25 | | | 23 | 22 | 31 | 29 | SW | 1 | SW | 1 | | | | | | | | | | | | | | | ground to the 28 th | 25 |
| | 26 | 30. | 44 | 29.95 | 50 | 40 | 27 | | | 30 | 29 | 31 | 30 | S | 1 | S | 1 | | | | | | | | | | | | | | | | 26 |
| | 27 | 29.75 | 45 | 29.77 | 48 | 42 | 24 | | | 29 | 28 | 34 | 33 | S | 1 | SW | 1 | | | | | | | | | | | | | | | | 27 |
| | 28 | 29.74 | 49 | 29.76 | 50 | 38 | 36 | | | 37 | 36 | 37 | 36 | SE | 1 | SE | 2 | | | | | | | | | | | | | | | | 28 |
| | 29 | 29.74 | 48 | 29.75 | 48 | 42 | 34 | | | 37 | 36 | 38 | 37 | SE | 1 | SE | 1 | | | | | | | | | | | | | | | | 29 |
| | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 30 |
| | 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 31 |
| Sums. | | 145.03 | 121 | 174.62 | 125 | 151 | 149 | | | 114 | 144 | 156 | 145 | | | | | | | | | | | | | | | | | | | | |
| | | 24.03 | 171 | 24.62 | 215 | 1239 | | | | 74 | 44 | 56 | 25 | | | 48 | 51 | | | | | | | | | | | | | | | | |
| Means. | | 29.829 | 459 | 29.849 | 474 | 400 | 285 | | | 32.5 | 31.5 | 31.9 | 30.8 | | | 165 | 176 | | | | | | | | | | | | | | | | |
| * Total corrections for Instru- mental Errors. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correc- tions for Diurnal Range. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| * Cor- rected Means." | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. of column. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ = *29.782*
for Temp. (Col. 2), = *29.829*... - *0.047*...
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ = *29.798*
for Temp. (Col. 4), = *29.849*... - *0.051*...
Mean at Station, corrected, and at 32°, = *29.790*
Correction for Height, feet, above Mean Sea-level, = *10.1*
Mean, reduced to 32°, and Sea-level, = *29.891*
Highest Reading, corrected for Index error, on the *19*th, = *30.480*
Lowest Do., Do., on the *12*th-*13*th, = *29.000*
Difference, or Monthly Range, = *1.480*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *13*th, = *54.0*
Lowest in Month, corrected for Index errors, on the *8*th, = *15.0*
Difference, or Monthly Range, = *39.0*
"Corrected Mean" of all the Highest, (Col. 5), = *40.0*
"Corrected Mean" of all the Lowest, (Col. 6), = *28.5*
Difference, or Mean Daily Range, = *11.5*
** Calculated Mean Temperature of Month, = *34.2*

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *32.2*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *31.2*
Computed Temperature of Dew-point, = *29.0*
Do. Elastic Force of Vapour, = *1.58*
Do. Weight of Vapour in a Cubic Foot of Air, =
Relative Humidity, (Saturation = 100), = *86*
RAIN fell on *16* Days; Amount in Inches, = *2.36*

| WIND. | | SUMMARY. | | | | | | | | | |
|------------|--|----------|----|---|----|---|----|---|----|-------------------|-------------|
| Direction. | | N | NE | E | SE | S | SW | W | NW | Calm or Variable. | Mean Force. |
| A.M. | | 6 | 1 | 5 | | 4 | 10 | 3 | | | 272 |
| P.M. | | 6 | 1 | 5 | | 4 | 9 | 4 | | | 309 |
| Mean. | | 6 | 1 | 5 | 0 | 4 | 9 | 4 | 0 | 0 | 290 |

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

Observations made and Return verified by

Wm. Mansel

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inverisk*

County of *Mid-Lothian*

in Lat. *55° 58' N*, Long. *2° 14' W*, Distance from Sea *One* miles.

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

During the MONTH of *March*

1864

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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, 4 feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | Readings of the H-Cup Anemometer. | | 9 A.M. | | P.M. | | 9 h. A.M. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Barometer. No. | Attach- ed Ther- mometer | Barometer. No. | Attach- ed Ther- mometer | Max. No. | Min. No. | Max. in sun's rays No. | Min. on Grass. No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direction. | Force. | Direction. | Force. | Velocity (0-6), and Direction. | Amount (0-10), and Species. | Velocity (0-6), and Direction. | Amount (0-10), and Species. | No. 3 inches. | | | | | No. 12 inches. | No. 22 inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | inches. | inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 29.90 | 48 | 29.87 | 49 | 42 | 35 | - | - | 38 | 37 | 37 | 36 | SE | 1 | SE | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = *29.548* - *0.54* = *29.544*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = *29.602* - *0.57* = *29.545*
Mean at Station, corrected, and at 32°, = *29.544*
Correction for Height, feet, above Mean Sea-level, = *10.1*
Mean, reduced to 32°, and Sea-level, = *29.645*
Highest Reading, corrected for Index error, on the *16* th, = *30.100*
Lowest Do., Do., on the *7* th, = *28.940*
Difference, or Monthly Range, = *1.160*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the *31* th, = *55.0*
Lowest in Month, corrected for Index errors, on the *9* th, = *21.0*
Difference, or Monthly Range, = *34.0*
"Corrected Mean" of all the Highest, (Col. 5), = *44.7*
"Corrected Mean" of all the Lowest, (Col. 6), = *32.6*
Difference, or Mean Daily Range, = *12.1*
** Calculated Mean Temperature of Month, = *38.6*

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *36.8*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *35.0*
Computed Temperature of Dew-point, = *32.5*
Do. Elastic Force of Vapour, = *1.84*
Do. Weight of Vapour in a Cubic Foot of Air, = *85*
Relative Humidity, (Saturation = 100), = *85*
RAIN fell on *13* Days; Amount in Inches, = *2.66*

| WIND. | | | | | | | | | | | | SUMMARY. | | | |
|------------|---|----|---|----|---|----|---|----|-------------------|-------------|---------------------------------|----------|--|--|--|
| Direction. | N | NE | E | SE | S | SW | W | NW | Caln or Variable. | Mean Force. | Mean Velocity in miles per day. | | | | |
| A.M. | 3 | 3 | 5 | 4 | 5 | 7 | 4 | 2 | | 1.92 | | | | | |
| P.M. | 2 | 3 | 6 | 2 | 3 | 7 | 4 | 2 | | 2.71 | | | | | |
| Mean. | 2 | 3 | 5 | 3 | 4 | 7 | 4 | 2 | | 2.32 | | | | | |

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

Returns from the "Principal Towns" should be in Edinburgh not later than the 2nd; those from Other Places, not later if possible than the 6th.

This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by

Wm. Maunderson

(Signed)

AB

OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance, to the Societies of 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 situation 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, 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.—*Wetther-glasses* and *Aerovials*, though universally 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 *adjusted 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 underventurized 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 Aale of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-marks* 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 Geological Committee of the British Association. In another form of the Barometer, the sides of the *cistern* are of leather, and thus, by the aid of a screw acting on the bottom, the surface of the contained mercury can be adjusted to the *zero-point* of the fixed scale; whose coincidence being indicated by a little ivory float, whose stem passes freely through the lid and case of the cistern. When the *index-line* on this little piston-rod is brought, by the adjusting screws, to *form one straight line* with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this *preliminary setting* must be made with scrupulous accuracy; as a slight error would vitiate the readings from the *vernier*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *screw up* the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern upright almost. 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 turning the ivory peg), and gently tapping it; and if this is not sufficient, the instrument must be repaired.

The Barometer should be suspended in a good *balin*, 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 atmosphere adjusted carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate accurate adjustment and reading of the Barometrical height.

Protection of Thermometers.—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box painted white outside, and black within, and fixed 4 feet above grass in an exposed position, free from any nearby local influences. The laths forming the sides and floors 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 desirably done, the doors are also made to open to the south. These Boxes may be obtained from the Society’s Office.

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

The above remarks apply equally to the Thermometers 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 mentally, 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 sun's wind. The "*Acetaminum*" should be freely exposed to the Sun, and the "*Minimum*" surface 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. For the Sun's heat to affect the alcohol by distillation.

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes, that has not been carefully tested by comparison with a *Standard Thermometer*. When such a thermometer is not graduated on the stem, but merely upon 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 *"Wittman"* Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing-point of each Thermometer (indicated by a scratch on the tube) ought to be tested once a year, in snow or melting ice. For comparison of Thermometers, a properly tested Thermometer may be had, on loan, by any observer, from the Meteorological Secretary.

The *Hygrometer* consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved and *well-tested* form of this Apparatus seriously vitiate the "Hygrometrical Deductions," Observers are specially requested to attend to the following conditions:—The bulbs must *hang down* by at least an inch from the scales and frame to which they are attached;—the frame must be so high as will bring the tubes forward by an inch, from any board on which it may be suspended; the water-out must be covered, and placed to the side, and a little below the level of the wet bulb,—in no case under the bulbs;—the muslin must be of medium fineness, and fastened at the neck of the bulb, by a

cotton, which also supplies it with water. It must be seen to the observer that the mistlin 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 bath 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 cloud 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.

¹ *Reading of the Thermometer*.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading must be taken to tenths of a degree, and noted in decimal form. Thus the thermometer will be read 39·9, 40·0, or 40·1, according as the mercury is a little over, at, or a little under 40°; and 40·4, 40·5, or 40·6, according as it is a little over 40°, or 40½°, or 40·5°, respectively. So also 40¼°, and 40¾°, more or less, must be registered 40·2, 40·3, and 40·7, or 40·8, respectively. In reading Rutherford's *Wet-bulb* and *Wet-bulb* 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 observing.

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, and, consequently, in winter at least, the extremes may occur at any hour; and, therefore, it is necessary to refer their occurrence to their proper meteorological hour. In the Society's schedule, 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 2nd.

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

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

The Council will strongly recommend that every 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 Lunds Anemometer is also recommended: the method of *Estimating* Wind Force by such tables as that given in the schedule to saving the least unsatisfactory.

Run-gauges. Many causes conspire to produce anomalies in rain return.³ 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 should 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 when the rain fell.

Snowfalls may, for convenience, be registered in the rain gauge columns under the following conditions:—When a snow shower occurs it must be noted in the "Remarks" and the depth of snowfall 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 noted in every column, the observer cannot be too careful to register *observations only*; and nothing that putakes of the nature of deduction or inference.

Clouds. -- Convenient abbreviations for Luke Howard's

renomenclature 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 at the *observation*, as so on.

Observations of the clouds are made at $z = 0$ and at angles θ as illustrating the condition undercurves 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” W , W , 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 $\frac{2}{3}$, $\frac{1}{3}$, or $\frac{1}{4}$, 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.

Stankline.—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 3, 6, 9, 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 atmosphere, a very important branch of Meteorology. The Council, therefore, recommended that the temperature of the sea be carefully taken by a properly constructed apparatus, from the ends of the 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 1st, 3rd, 11th, 15th, and 25th of each month, the thermometer ought to be taken at least six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient, extra sea observations might be taken for other and greater depths, nothing always the temperature of the air, and the hour of observation; and continuing to observe for particular depths.

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

Ozone.—Mention whether Schönbain's or Moffat's papers are used. Moffat's are preferred. The paper is affixed by a pin to the board in the specimen box, and the indication registered as usual. The scale is 0—6. The wind is indicated by the letters A, B, C, 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 *gsw*, as an *ozone* entry in the schedule, will indicate that the *ozone* paper is turned at *a* 3° on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is *u4*; *u*, *i.e.*, that it is *blowing fresh*.

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

Remarks.—The "*Remarks*" column is too narrow, but unavoidably so. Some of the most valuable observations that can be made are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, &c. Remarks ought to be made on the occurrence of meteors, aurora borealis, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on storms as have been hinted at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the low-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 either side, or in two, ruled off for the purpose, from that intended "Remarks." It is intended that observations by the Meteorometer should be entered in this manner; or, on the 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 in a selected piece of ground or farm.

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

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

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

| FOREST TREES. | In flower. | In leaf buds. | In leaf. | Diseased of leaves. | CROPS, mentioning variety. | Sown or planted. | Apparent or above ground. | In ear or flower. | First cut or raised. |
|----------------------|------------|---------------|----------|---------------------|----------------------------|------------------|---------------------------|-------------------|----------------------|
| Alder, | | | | | Barley, | | | | |
| Ash, | | | | | Bare or Bigger, | | | | |
| Beech, | | | | | Oats, | | | | |
| Birch, | | | | | Wheat, | | | | |
| Elm, | | | | | Beans, | | | | |
| Larch, | | | | | Peas, | | | | |
| Lime, | | | | | Potatoes, | | | | |
| Oak, | | | | | Turnips, | | | | |
| Spruce or Fir, | | | | | Rye Grass, | | | | |

| SHRUBS, ETC. | | FRUITS. | | MICKLETON BIRDS. | |
|------------------------------|--|----------------------|-----------------------------|---------------------------|---------------------------|
| First in Blossom. | Apple, Cherry, Gooseberry, Currant, Black Currant, &c. | First in Blossom. | First in Fruit & generally. | First Arrival. | Departure. |
| Barberry, | Apple, | Apple, | Apple, | Chickadee, | Chickadee, |
| Bourtree or Elder, | Black Currant, | Black Currant, | Black Currant, | Curlew, | Curlew, |
| Broom, | Cherry, | Cherry, | Cherry, | House Sparrow, | House Sparrow, |
| Hazel, | Gean, | Gean, | Gean, | Lapwing, | Lapwing, |
| Hawthorn, | Gooseberry, | Gooseberry, | Gooseberry, | Plover, | Plover, |
| Holly, | Peach, | Peach, | Peach, | Sand-Martin, | Sand-Martin, |
| Laburnum, | Pear, | Pear, | Pear, | Starling, | Starling, |
| Lilac, | Plum, | Plum, | Plum, | Swan, | Swan, |
| Mezerion, | Strawberry, | Strawberry, | Strawberry, | Rail or Corn Crane, | Rail or Corn Crane, |
| Red Flowering Currant, | | | | Other Birds, naming them— | Other Birds, naming them— |
| Mountain Ash or Rowan, | | | | | |
| Rhododendron Ponticum, | | | | | |
| Viburnum, | | | | | |

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.

EDINBURGH.

Secretary of the Meteorological Society of Scotland.

Mr ALEXANDER BUCHAN.

 T_G

Imperial
March 1844

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Mid-Lothian, in Lat. 55° 56' 16" N Long. 3° 7' 40" W, Distance from Sea one miles.

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

During the MONTH of April 1864.

The Hours of Observation are of Greenwich Time.

| ELECTRICITY. | Days of Month. | BAROMETER. | | | | SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M. | | | | HYGROMETER. | | | | WIND. | | | | RAIN. | | CLOUDS. | | | | THERMOMETERS. under Ground. | | | TEMPERATURE OF WELL at Depth of feet. No. | 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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, 4 feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | 9 h. A.M. | | 9 h. P.M. | | Readings of the H-Cup Anemometer. | | No. of hours in which it fell. | Amount in inches. | 9 A.M. | | P.M. | | 9 h. A.M. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Barometer. | Attached Ther- | Barometer. | Attach- | Max. | Min. | Max. in | Min. on | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direction. | Force. | Direction. | Force. | No. | 9 h. A.M. | | | 9 h. P.M. | Velocity (0-6), and Direction. | Amount (0-10), and Species. | Velocity (0-6), and Direction. | Amount (0-10), and Species. | | | | | | No. | 3 inches. | 12 inches. | 22 inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | * No. | meter. | No. | meter. | No. | No. | No. | No. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ = 29.928
for Temp. (Col. 2) = 30.003..... - 0.75.....
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ = 29.938
for Temp. (Col. 4) = 30.014..... - 0.76.....
Mean at Station, corrected, and at 32°, = 29.933
Correction for Height, feet, above Mean Sea-level, = 1.01
Mean, reduced to 32°, and Sea-level, = 30.034
Highest Reading, corrected for Index error, on the 24 th, 27... = 30.300
Lowest Do., Do., on the 1 th, = 29.350
Difference, or Monthly Range, = 0.950

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 21 th, = 74.0
Lowest in Month, corrected for Index errors, on the 12 th, = 30.0
Difference, or Monthly Range, = 44.0
"Corrected Mean" of all the Highest, (Col. 5), = 57.1
"Corrected Mean" of all the Lowest, (Col. 6), = 39.5
Difference, or Mean Daily Range, = 17.6
** Calculated Mean Temperature of Month, = 48.3

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 46.9
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 43.3
** Computed Temperature of Dew-point, = 39.2
** Do. Elastic Force of Vapour, = 2.40
** Do. Weight of Vapour in a Cubic Foot of Air, =
** Relative Humidity, (Saturation = 100), = 76
RAIN fell on 9 Days; Amount in Inches, = 1.21

| WIND. | | SUMMARY. | | | | | | | | | |
|------------|--|----------|----|---|----|---|----|---|----|-------------------|-------------|
| Direction. | | N | NE | E | SE | S | SW | W | NW | Calm or Variable. | Mean Force. |
| A.M. | | 3 | 7 | 2 | 2 | 4 | 7 | 5 | | | 1.74 |
| P.M. | | 4 | 6 | 3 | 2 | 3 | 6 | 6 | | | 1.87 |
| Mean. | | 4 | 6 | 3 | 2 | 3 | 6 | 6 | 0 | 0 | 1.80 |

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

Observations made and Return verified by W. Macdonald

(Signed)

AB

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

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

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

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

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

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

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

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

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

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

Registration of Thermometers.—No instrument ought to be used for Meteorological purposes, that has not been carefully tested by comparison with a Standard Thermometer. When such Thermometers are not graduated on the stem, but merely on an attached scale, under repairs, they are very liable to be moved from their position on the Scale, and ought never after-wards 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. Its 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 keep the tubes forward by an inch, from any board on which it may be suspended; the water-cup must be covered, and placed to the side, and a little below the level of the wet bulb;—in no case under the bulb;—the muslin must be of medium fineness and fastened at the neck of the bulb by the cotton, which also supplies it with water. It must be seen to by the observer that the muslin is always *clean* and *moist*, and the water pure. In frosty weather observation is a matter of much delicacy, and must be made with great care. The bulb must be moistened by immersion from 15 to 30 minutes before the hour of observation. From the film of ice thus formed evaporation will proceed as from the moist cloth in ordinary circumstances.

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and read in tenths. 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 40th, 40th, or 40th, under an exact coincidence with, or a little over 40th, or 40th, respectively. So also 40.4, and 40.7, or 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 Thermometers.—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read, since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological day. In the Society's schedules, the indications registered on the 3rd are those of a series of phenomena commencing at 9 P.M. on the 2nd, and extending till 9 P.M. on the 3rd.

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

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

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

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

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—When a snow shower occurs it must be noted in the "Remarks," and the depth of 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.

(By Order,) A. B.

EDINBURGH, 9th December 1863.

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

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

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

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

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

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

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

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

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

(By Order,) A. B.

EDINBURGH, 9th December 1863.

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

| FOREST TREES. | | FRUITS. | | MIGRATORY BIRDS. | |
|--------------------|--------------------|-------------------|----------------------|---------------------------|------------------|
| In Flower. | Last buds in leaf. | First in blossom. | First in fruit ripe. | First arrival. | First departure. |
| Alder. | | | Apple. | Cuckoo. | |
| Beech. | | | Cherry. | Curlew. | |
| Birch. | | | Gean. | House-Swallow. | |
| Elm. | | | Holly. | Lapwing. | |
| Larch. | | | Gooseberry. | Plover. | |
| Oak. | | | Laburnum. | Sand-Martin. | |
| Sycamore or Plane. | | | Plum. | Swan. | |
| | | | Strawberry. | Other birds, naming them. | |

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

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

SCOTTISH METEOROLOGICAL SOCIETY.

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

Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 14 feet.

During the MONTH of May 1864

The Hours of Observation are of Greenwich Time.

[illegible]

| | | |
|--|---|---------------|
| BAROMETER, "corrected Mean" at 9 A.M., <i>minus</i> the Correction ++ | = | |
| for Temp. (Col. 2). = 29.994 <i>0884</i> | = | <u>29.910</u> |
| "Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction ++ | = | |
| for Temp. (Col. 4). = 29.975 <i>084</i> | = | <u>29.891</u> |
| Mean at Station, corrected, and at 32° , | = | <u>29.900</u> |
| Correction for Height, feet, above Mean Sea-level, | = | <u>101</u> |
| Mean, reduced to 32°, and Sea-level , | = | <u>30.001</u> |
| Highest Reading, corrected for Index error, on the <i>14</i> th, | = | <u>30.300</u> |
| Lowest Do., Do., on the <i>2</i> th, | = | <u>29.640</u> |
| Difference, or Monthly Range , | = | <u>0.660</u> |

| | | |
|--|---|-------------|
| S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the <u>17</u> th, | = | <u>79.0</u> |
| Lowest in Month , corrected for Index errors, on the <u>30</u> th, | = | <u>32.0</u> |
| Difference, or Monthly Range , | = | <u>47.0</u> |
| " Corrected Mean " of all the Highest , (Col. 5), | = | <u>63.3</u> |
| " Corrected Mean " of all the Lowest , (Col. 6), | = | <u>43.4</u> |
| Difference, or Mean Daily Range , | = | <u>19.9</u> |
| ** Calculated Mean Temperature of Month, | = | <u>53.4</u> |

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

| | | |
|---|---|------|
| HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, | = | 50.7 |
| Mean (corrected) A.M. and P.M. Reading of Wet Bulb, | = | 47.3 |
| ¶ Computed Temperature of Dew-point, | = | 43.7 |
| ¶ Do. Elastic Force of Vapour, | = | 2.88 |
| ¶ Do. Weight of Vapour in a Cubic Foot of Air, ... | = | |
| ¶ Relative Humidity, (Saturation = 100),..... | = | 78 |
| RAIN fell on 9 Days; Amount in Inches, | = | 2.31 |

| WIND. | SUMMARY. | | | | | | | | | | | |
|------------|----------|----|---|----|---|----|---|----|-------------------|-------------|--------------------------------|--|
| Direction. | N | NE | E | SE | S | SW | W | NW | Calm or Variable. | Mean Force. | Mean Velocity in miles per day | |
| A.M. | 3 | 2 | 5 | | 4 | 7 | 8 | 2 | | 1.21 | | |
| P.M. | 2 | 4 | 5 | | 3 | 7 | 8 | 2 | | 1.48 | | |
| Mean. | 3 | 3 | 5 | 0 | 3 | 7 | 8 | 2 | 0 | 1.34 | | |

Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S." and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.

+ Embracing corrections for both capillary and Index Errors.

† The Diurnal Range for Scotland is as yet unknown.

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

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

|| While the Diurnal Range is unknown, the Ethnical Mean of Col. 5 and 6 will be entered as the "Calculated Mean Temperature."

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

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

Observations made and
Return verified by

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Mid-Lothian, in Lat 55°56'N Long 3°2'45"W, Distance from Sea one miles.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.During the MONTH of June 1864.

The Hours of Observation are of Greenwich Time.

| ELECTRICITY. | Days of Month. | BAROMETER. | | | | SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M. | | | | HYGROMETER. No. | | | | WIND. | | | | RAIN. | | CLOUDS. | | | | THERMOMETERS. under Ground. | | | SEA. | OZONE. 0-10. | GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended. | Days of Month. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, 4 feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | 9 h. A.M. | | 9 h. P.M. | | 9 A.M. | | P.M. | | 9 h. A.M. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Barometer. * No. | Attach- ed Ther- mometer | Barometer. No. | Attach- ed Ther- mometer | Max. No. | Min. No. | Max. in Sun's rays No. | Min. on Grass. No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direction. | Force. | Direction. | Force. | Readings of the H-Cup Anemometer. No. | No. of hours in which it fell. | Amount in inches. No. | Velocity (0-6), and Direction. | Amount, (0-10), and Species. | Velocity (0-6), and Direction. | Amount, (0-10), and Species. | No. 3 inches. | No. 12 inches. | | | | | No. 22 inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | inches. | " | inches. | " | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ = 29.711
for Temp. (Col. 2) = 29.79.8... - 0.67...
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ = 29.713
for Temp. (Col. 4) = 29.80.2... - 0.90...
Mean at Station, corrected, and at 32°, = 29.712
Correction for Height, feet, above Mean Sea-level, = 1.01
Mean, reduced to 32°, and Sea-level, = 29.813
Highest Reading, corrected for Index error, on the 47th, = 30.160
Lowest Do., Do., on the 15th, = 29.400
Difference, or Monthly Range, = 0.760

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 27th, = 74.0
Lowest in Month, corrected for Index errors, on the 1th, = 36.0
Difference, or Monthly Range, = 38.0
"Corrected Mean" of all the Highest, (Col. 5), = 65.4
"Corrected Mean" of all the Lowest, (Col. 6), = 49.2
Difference, or Mean Daily Range, = 16.2
** Calculated Mean Temperature of Month, = 57.3

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 55.2
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 51.2
** Computed Temperature of Dew-point, = 47.6
** Do. Elastic Force of Vapour, = 3.28
** Do. Weight of Vapour in a Cubic Foot of Air, =
** Relative Humidity, (Saturation = 100), = 75
RAIN fell on 11 Days; Amount in Inches, = 2.17

| WIND. | | SUMMARY. | | | | | | | | | |
|------------|---|----------|----|----|----|----|----|---|----|-------------------|-------------|
| Direction. | | N | NE | E | SE | S | SW | W | NW | Calm or Variable. | Mean Force. |
| A.M. | 1 | 1 | 4 | 5 | 9 | 9 | 2 | | | | 2.56 |
| P.M. | 2 | | 4 | 15 | 6 | 3 | | | | | 2.25 |
| Mean. | 1 | 0 | 3 | 0 | 5 | 12 | 7 | 2 | 0 | | 2.40 |

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

Observations made and Return verified by

William Maule

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inverurie, County of Edinburgh, in Lat. 55° 50' 0" N, Long. 3° 2' 40" W, Distance from Sea one miles.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.During the MONTH of July 1864.

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. No. _____ | | | | RAIN. No. of hours in which it fell. | Amount in inches. | CLOUDS. | | | | SUNSHINE. Hours. | THERMOMETERS. under Ground. | | | SEA. Temperature at 1 fathom, and Density. | OZONE. 0-10. | GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended. | Days of Month. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, 4 feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | 9 h. A.M. | | | | 9 h. P.M. | | 9 A.M. | | | P.M. | | 9 h. A.M. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Barometer. | Attached Thermometer. | Barometer. | Attached Thermometer. | Max. No. | Min. No. | Max. No. | Min. No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direction. | Force. | | | Direction. | Force. | Velocity, (0-10), and Direction. | Amount, (0-10), and Species. | | Velocity, (0-10), and Direction. | Amount, (0-10), and Species. | No. 3 inches. | | | | | No. 12 inches. | No. 22 inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | * No. | | No. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 29.847
"Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 29.827
Mean at Station, corrected, and at 32°, = 29.837
Correction for Height, feet, above Mean Sea-level, = 1.01
Mean, reduced to 32°, and Sea-level, = 29.938
Highest Reading, corrected for Index error, on the 11 th, = 30.300
Lowest Do., Do., on the 2 th, = 29.280
Difference, or Monthly Range, = 1.020

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 17 th, = 80.0
Lowest in Month, corrected for Index errors, on the 3 th, = 45.0
Difference, or Monthly Range, = 35.0
"Corrected Mean" of all the Highest, (Col. 5), = 67.7
"Corrected Mean" of all the Lowest, (Col. 6), = 51.4
Difference, or Mean Daily Range, = 16.3
** Calculated Mean Temperature of Month, = 59.6

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

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 57.7
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 53.0
II Computed Temperature of Dew-point, = 48.7
II Do. Elastic Force of Vapour, = 3.44
II Do. Weight of Vapour in a Cubic Foot of Air, =
II Relative Humidity, (Saturation = 100), = 72
RAIN fell on 9 Days; Amount in Inches, = 1.61

| WIND. | | SUMMARY. | | | | | | | | | |
|------------|--|----------|----|---|----|---|----|---|----|-------------------|-------------|
| Direction. | | N | NE | E | SE | S | SW | W | NW | Calm or Variable. | Mean Force. |
| A.M. | | 3 | 5 | 1 | 1 | 3 | 17 | 1 | | | 1.77 |
| P.M. | | 3 | 4 | 1 | 2 | 4 | 12 | 3 | 2 | | 2.34 |
| Mean. | | 3 | 4 | 1 | 2 | 3 | 15 | 2 | 1 | 0 | 2.06 |

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

Observations made and
Return verified by

Wm. Macdonald

(Signed)

ONE of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite 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-sized Barometers have been approved of by the Council; if properly tested and attended to, they are both well adapted to Meteorological purposes.

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

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *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 bells forming the sides and doors of the Boxes are arranged so as to open to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-rails, 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 glass stem. 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 the spirit disals by high temperature, it will be found in the upper lobe, and must be dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal: the bulb end should incline slightly downwards, rather than the other.

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

Verification of Thermometers.—No instrument ought to be used for Meteorological purposes, that has not been carefully tested for 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 Society.

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

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

Reading of the Thermometer.—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39°·9, 40°·0, or 40°·1; or again, 40°·4, 40°·5, or 40°·6, according as it indicates a little under, an exact coincidence with, or a little over 40°, or 40½, respectively. So also 40½°, and 40¾°, more or less, must be registered 40°·2 or 40°·3, and 40°·7 or 40°·8 respectively. In reading Rutherford's "*Max*," and "*Min*," Thermometers, the indication of that end of the *bulb* which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry *bulbs*, must be rapidly taken, being so readily affected by heat from the person of the observer.

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

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

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

Rain-gauges.—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavourable situation for observation, and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily, and the readings entered in the returns on the day 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 63, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as indeed in every column, the observer cannot be too careful to register *observations only*; and nothing that partakes of the nature of deduction or inference.

Clouds.— Convenient abbreviations for Luke Howard's

OBSERVATIONS.

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 2, W., (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of 2, *sc.* (i.e., *stratus*) 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 Schönbein's or Moffat's papers are used.—Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 3³⁰ W., as an ozone entry in the schedule, will indicate that the ozone paper is tinted as "3" on the scale, that the wind is from the N.W., and that its force on the scale 0-6 is "4," i.e., that it is *blowing* fresh.

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

Remarks.—The "Remarks" column is too narrow, but unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use at Greenwich and Southampton, are given at the foot of the column. Besides special and extraordinary observations, great prominence ought to be given in this column to prevalent diseases, differences in character, colour, velocity, and direction between the lower and upper strata of clouds, the colour of the sky, &c. Remarks ought to be made on the 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 fogs as have been limited at above. When lofty hills are in the vicinity of an Observatory, the height of clouds and of the snow-line in winter ought to be recorded.

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

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

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

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

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

(By Order.) A. B.

Edinburgh, 20th December 1863.

BOOK-POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

| OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS. | | | |
|---|------------------|-----------------|-------------------|
| FOREST TREES. | IN FLOWER. | IN LEAF. | IN FRUIT. |
| Alder,..... | | | |
| Asp.,..... | | | |
| Beech,..... | | | |
| Birch,..... | | | |
| Elm,..... | | | |
| Larch,..... | | | |
| Line,..... | | | |
| Oak,..... | | | |
| Sycamore or Plane,..... | | | |
| CROPS. | | | |
| Planted or sown. | Harvested. | First cut. | Second cut. |
| Barley,..... | | | |
| Bere or Bigg,..... | | | |
| Oats,..... | | | |
| Wheat,..... | | | |
| Beans,..... | | | |
| Peas,..... | | | |
| Potatoes,..... | | | |
| Turnips,..... | | | |
| Rye Grass,..... | | | |
| MIGRATORY BIRDS. | | | |
| First arrival. | First departure. | First in fruit. | First in blossom. |
| Apple,..... | | | |
| Black Currant,..... | | | |
| Cherry,..... | | | |
| Gooseberry,..... | | | |
| Hawthorn,..... | | | |
| Holly,..... | | | |
| Laburnum,..... | | | |
| Lily,..... | | | |
| 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, &c., whether plentiful, or in perfection; whether any have suffered from blight, disease, &c. Whether the disease prevails among Cattle; and the Agricultural condition of the district generally.



9 Inverness
July 1864.

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55° 56' N Long. 3° 2' 40" W, Distance from Sea one miles.Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet.During the MONTH of August 1864.

The Hours of Observation are of Greenwich Time.

| Days of Month. | BAROMETER. | | | | SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M. | | | | HYGROMETER. No. | | | | WIND. | | | | RAIN. | | CLOUDS. | | | | THERMOMETERS. under Ground. | | | SEA. | OZONE. | GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended. | Days of Month. | | | |
|--|---------------------|---------------------------------|-------------------|---------------------------------|---|-------------|------------------------------|--------------------------|--------------------|--------------|--------------|-----------------|--------------------------------------|-----------------|---|--------------------------------|-----------------|--------|--|---------------------------------------|--|---------------------------------------|--------------------------------|--|---|------|--|---|----------------|---------------|----------------------|----------------------|
| | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, & feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | Readings of the H-Cup Anemometer. | | No. of hours in which it fell. | Amount in Inches. No. | 9 A.M. | | P.M. | | 9 h. A.M. | | | Temperature of WELL at Depth of feet. No. | Temperature at 1 fathom, and Density. | | | | | 9 A.M. 9 P.M. | | |
| | Barometer. * No. | Attach- ed Ther- mometer. | Barometer. No. | Attach- ed Ther- mometer. | Max. No. | Min. No. | Max. in Sun's rays No. | Min. on Grass. No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direc- tion. | Force. | | | Direc- tion. | Force. | Velocity, (0-10), and Direc- tion. | Amount, (0-10), and Species. | Velocity, (0-10), and Direc- tion. | Amount, (0-10), and Species. | No. 3 inches. | | | | | | | | No. 12 inches. | No. 22 inches. |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Inches. | Inches. | Inches. | Inches. | No. | No. | No. | No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direc- tion. | Force. | Direc- tion. | Force. | 9 h. A.M. | 9 h. P.M. | Hours. | No. 3 inches. | No. 12 inches. | No. 22 inches. | | | | | | | | | | | |
| 1 | 29.80 | 64 | 29.87 | 64 | 66 | 51 | | 60 | 54 | 54 | 51 | SW | 2 | SW | 2 | | | .10 | | | | 6 | | | | | Barley Harvest commenced here on the 1 st of the month in this Locality and the Crops were nearly all cut down by the last of the month and mostly all in the stacks - very fine weather all the month but a gale coast of rain | 1 | | | | |
| 2 | 29.93 | 65 | 30.05 | 62 | 66 | 45 | | 57 | 52 | 50 | 46 | SW | 1 | SW | 1 | | | - | | | | 7 | | | | | | 2 | | | | |
| 3 | 30.08 | 63 | 29.97 | 63 | 65 | 53 | | 58 | 50 | 54 | 51 | N | 1 | N | 1 | | | .02 | | | | 6 | | | | | | 3 | | | | |
| 4 | 29.80 | 65 | 29.87 | 66 | 68 | 53 | | 63 | 56 | 60 | 56 | SW | 1 | SW | 2 | | | .01 | | | | 2 | | | | | | 4 | | | | |
| 5 | 30.00 | 63 | 30. | 63 | 64 | 52 | | 60 | 57 | 58 | 54 | SW | 2 | SW | 1 | | | - | | | | 2 | | | | | | 5 | | | | |
| 6 | 29.98 | 63 | 29.90 | 65 | 65 | 53 | | 59 | 54 | 50 | 53 | SW | 2 | SW | 2 | | | - | | | | 4 | | | | | | 6 | | | | |
| 7 | 29.85 | 63 | 29.60 | 64 | 61 | 54 | | 59 | 55 | 56 | 53 | SW | 2 | SW | 1 | | | .47 | | | | - | | | | | | 7 | | | | |
| 8 | 29.64 | 62 | 29.82 | 66 | 63 | 49 | | 60 | 54 | 57 | 46 | SW | 3 1/2 | SW | 3 1/2 | | | - | | | | 5 | | | | | | 8 | | | | |
| 9 | 29.78 | 61 | 29.63 | 60 | 63 | 46 | | 58 | 55 | 46 | 44 | SW | 1 | SW | 2 | | | .13 | | | | 2 | | | | | | 9 | | | | |
| 10 | 30.08 | 60 | 30.16 | 61 | 60 | 42 | | 57 | 53 | 49 | 46 | SW | 1 | SW | 1 | | | .05 | | | | 2 | | | | | | 10 | | | | |
| 11 | 30.30 | 60 | 30.30 | 63 | 70 | 51 | | 51 | 46 | 59 | 55 | N | 1 | N | 1 | | | - | | | | 10 | | | | | | 11 | | | | |
| 12 | 30.30 | 64 | 30.29 | 69 | 72 | 52 | | 67 | 63 | 64 | 60 | N | 1 | N | 1 | | | - | | | | 9 | | | | | | 12 | | | | |
| 13 | 30.35 | 65 | 30.30 | 69 | 77 | 51 | | 63 | 57 | 66 | 59 | N | 1 | N | 1 | | | - | | | | 11 | | | | | | 13 | | | | |
| 14 | 30.47 | 65 | 30.51 | 71 | 78 | 51 | | 63 | 57 | 60 | 56 | N | 1 | N | 1 | | | - | | | | 9 | | | | | | 14 | | | | |
| 15 | 30.55 | 64 | 30.40 | 70 | 74 | 54 | | 62 | 56 | 60 | 55 | N | 1 | N | 1/2 | | | - | | | | 5 | | | | | | 15 | | | | |
| 16 | 30.26 | 67 | 30.25 | 68 | 73 | 49 | | 66 | 59 | 58 | 54 | N | 1 | N | 1 | | | - | | | | 7 | | | | | | 16 | | | | |
| 17 | 30.25 | 63 | 30.17 | 65 | 62 | 46 | | 56 | 50 | 53 | 48 | N | 1 | N | 1 | | | - | | | | 5 | | | | | | 17 | | | | |
| 18 | 30.00 | 65 | 29.80 | 64 | 59 | 50 | | 54 | 47 | 54 | 49 | N | 1 | N | 1 | | | - | | | | 6 | | | | | | 18 | | | | |
| 19 | 29.80 | 63 | 29.82 | 62 | 60 | 43 | | 56 | 50 | 51 | 48 | SW | 1 | SW | 1 | | | - | | | | 6 | | | | | | 19 | | | | |
| 20 | 29.83 | 62 | 29.88 | 60 | 62 | 45 | | 50 | 47 | 47 | 45 | N | 1 | N | 2 | | | .03 | | | | 4 | | | | | | 20 | | | | |
| 21 | 29.90 | 62 | 29.94 | 62 | 63 | 46 | | 56 | 50 | 47 | 45 | N | 1 | N | 2 | | | .06 | | | | 5 | | | | | | 21 | | | | |
| 22 | 30.00 | 60 | 30.00 | 62 | 64 | 46 | | 52 | 44 | 50 | 45 | N | 1 | N | 2 | | | - | | | | 6 | | | | | | 22 | | | | |
| 23 | 30.00 | 58 | 30.00 | 63 | 62 | 44 | | 53 | 46 | 50 | 45 | N | 1 | N | 1 | | | - | | | | 8 | | | | | | 23 | | | | |
| 24 | 30.10 | 60 | 30.14 | 63 | 63 | 42 | | 54 | 46 | 50 | 46 | N | 1 | N | 1 | | | - | | | | 8 | | | | | | 24 | | | | |
| 25 | 30.20 | 60 | 30.25 | 60 | 63 | 42 | | 52 | 46 | 46 | 43 | N | 1 | N | 1 | | | - | | | | 9 | | | | | | 25 | | | | |
| 26 | 30.34 | 60 | 30.30 | 62 | 64 | 40 | | 51 | 46 | 47 | 43 | N | 1 | N | 1 | | | - | | | | 9 | | | | | | 26 | | | | |
| 27 | 30.22 | 61 | 29.98 | 64 | 64 | 53 | | 54 | 48 | 57 | 53 | S | 2 | S | 2 | | | - | | | | 4 | | | | | | 27 | | | | |
| 28 | 29.97 | 61 | 29.93 | 66 | 70 | 53 | | 61 | 55 | 56 | 50 | SW | 1 | SW | 2 | | | - | | | | 8 | | | | | | 28 | | | | |
| 29 | 29.96 | 64 | 29.87 | 66 | 66 | 52 | | 62 | 57 | 60 | 57 | SW | 1 | SW | 1 | | | .05 | | | | 3 | | | | | | 29 | | | | |
| 30 | 29.80 | 66 | 29.56 | 71 | 75 | 54 | | 63 | 57 | 69 | 59 | SW | 2 | S | 2 | | | - | | | | 7 | | | | | | 30 | | | | |
| 31 | 29.55 | 62 | 29.70 | 64 | 69 | 51 | | 54 | 51 | 50 | 47 | SW | 1 | N | 3 | | | .03 | | | | 5 | | | | | | 31 | | | | |
| Sums. | 109 81 | 26 | 138 | 191 | 273 | | | 238 | 68 | 137 | 12 | 385 | 45 | | | | | 0.95 | | | | 180 | | | | | | | | | | |
| Means. | 30.035 | 62.6 | 30.008 | 64.4 | 66.2 | 48.8 | | 57.7 | 52.2 | 54.4 | 50.4 | 124 | 145 | | | | | | | | | | | | | | | | | | | |
| Total corrections for instrumental errors. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Corrections for diurnal range. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Corrected means. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. of | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = 29.943
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = 29.912
 Mean at Station, corrected, and at 32°, = 29.928
 Correction for Height, feet, above Mean Sea-level, = 1.01
 Mean, reduced to 32°, and Sea-level, = 30.029
 Highest Reading, corrected for Index error, on the 14th, = 30.510
 Lowest Do., Do., on the 31th, = 29.550
 Difference, or Monthly Range, = 0.960

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 14th, = 78.0
 Lowest in Month, corrected for Index errors, on the 26th, = 40.0
 Difference, or Monthly Range, = 38.0
 "Corrected Mean" of all the Highest, (Col. 5), = 66.2
 "Corrected Mean" of all the Lowest, (Col. 6), = 48.8
 Difference, or Mean Daily Range, = 17.4
 ** Calculated Mean Temperature of Month, = 57.5

S.-R. THERMOMETER, Black Bull in Sun, Highest, (corrected, for Index Errors), = 78.0
 "Corrected Mean," = 66.2
 Lowest at Night, = 40.0
 "Corrected Mean," = 48.8
 Difference of above Means or Range ("exposed"), = 38.0

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 56.0
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 51.8
 ** Computed Temperature of Dew-point, = 46.9
 ** Do. Elastic Force of Vapour, = 3.27
 ** Do. Weight of Vapour in a Cubic Foot of Air, = 74
 ** Relative Humidity, (Saturation = 100), = 74
 RAIN fell on 10 Days; Amount in Inches, = 0.95

| WIND. | SUMMARY. | | | | | | | | | |
|-------|------------|---|----|---|----|---|----|----|----|-------------------|
| | Direction. | N | NE | E | SE | S | SW | W | NW | Calm or Variable. |
| A.M. | 63 | | | | | 1 | 14 | 25 | | 154 |
| P.M. | 63 | | | | | 2 | 12 | 35 | | 2.07 |
| Mean. | 63 | | | | | 2 | 13 | 25 | | 180 |

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

Observations made and
Return verified by

Wm. McQuhane

(Signed)

ONE of the objects of immediate importance, that the Scottish Meteorological Society has proposed to itself, is to secure a *perfect uniformity* in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Resolutions 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.

Barometers.—*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 the means of *adjustment or compensation* as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every Barometer shall have been compared with a *Standard*.

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

An excellent Barometer is constructed by Mr. Adie of London, the use of which is attended with the great convenience of requiring *no adjustment* of the cistern. Its *scale-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 *float* lies on the *level* line with those on its ivory frame, the surface of the mercury is then at the exact height from which the scale is graduated. In taking an observation, this *preliminary* setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *venier*.

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

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

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

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

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

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

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

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

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

Wind.—A wind-rose 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 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 should 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 indeed in every column, the observer cannot be too careful to register observations only; and nothing that partakes of the nature of deduction or inference.

Clouds.—Convenient abbreviations for Luke Howard's

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

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 2, W. (for example), will indicate that the upper strata of clouds travel with extreme velocity from S.W., and those in the lower regions from W., with one-third the (extreme) speed of the former. Again, in the second "Cloud" column, an entry of 2, *ci-st.*, (*ci*, *st*) 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 land, 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 light 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 Schüben's or Moffat's papers are used—Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 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:—first 3, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as 3 on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is 4; i.e., that it is blowing fresh.

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

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

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

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

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

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

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

(By Order,) A. B.

Consent, 30th December 1866.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

| FOREST TREES. | FRUITS. | First in Blossom. | First in Fruit. | First in Blossom. | First in Fruit. |
|---------------|----------------|------------------------|------------------------|------------------------|-----------------|
| Alder. | Barley. | Apple. | Cuckoo. | Black Currant. | Cutew. |
| Ash. | Broom. | Cherry. | House-Swallow. | Lapwing. | Plover. |
| Beech. | Gooseberry. | Holly. | Laburnum. | Lily. | Mezereon. |
| Birch. | Hawthorn. | Mountain Ash or Rowan. | Red Flowering Currant. | Rhododendron Ponticum. | Whin. |
| Elm. | Black Currant. | Black Currant. | Black Currant. | Black Currant. | Black Currant. |
| Willow. | Black Currant. | Black Currant. | Black Currant. | Black Currant. | Black Currant. |
| Yew. | Black Currant. | Black Currant. | Black Currant. | Black Currant. | Black Currant. |
| ... | ... | ... | ... | ... | ... |

| SHRUBS, ETC. | FRUITS. | First in Blossom. | First in Fruit. | First in Blossom. | First in Fruit. |
|--------------|---------|-------------------|-----------------|-------------------|-----------------|
| ... | ... | ... | ... | ... | ... |

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

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

10, St Andrew Square,

EDINBURGH.

BOOK-POST.

19

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, County of *Edinburgh*, in Lat. *55°56'08"*, Long. *3°21'40"W*, Distance from Sea *one* miles.Height of Cistern of the Barometer above Mean Sea-level *90* feet, above Ground *4* feet.During the MONTH of *September* 1864.

The Hours of Observation are of Greenwich Time.

| Days of Month. | BAROMETER. | | | | SELF-REGISTERING THERMOMETERS. Read daily, at 9 P.M. | | | | HYGROMETER. | | | | WIND. | | | | RAIN. | | CLOUDS. | | | | THERMOMETERS. under Ground. | | | Temperature of WELL at Depth of feet. No. | SEA. Temperature at 1 fathom, and Density. | OZONE. 0—10. 9 A.M. 9 P.M. | GENERAL REMARKS. As to occurrence of Thunder, Lightning, Storms, Hail, Meteors, Remarkable Depression or Elevation of Barometer, Prevalent Diseases, etc. Mention the hour at which Storms began and ended. | Days of Month. | |
|--|---------------------|--------------------------------|-------------------|--------------------------------|---|-------------|------------------------------|--------------------------|--------------|--------------|--------------|--------------|--------------------------------------|-------|---|--------------------------------|-----------------|-------|---|---------------------------------------|---|---------------------------------------|--------------------------------|-----|-----|---|---|---|---|----------------|-----------|
| | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, 4 feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | Readings of the H-Cup Anemometer. | | No. of hours in which it fell. | Amount in inches. No. | 9 A.M. | | P.M. | | 9 h. A.M. | | | | | | | | | | |
| | Barometer. * No. | Attach- ed Ther- mometer | Barometer. No. | Attach- ed Ther- mometer | Max. No. | Min. No. | Max. in Sun's rays No. | Min. on Grass. No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direc- tion. | Force | | | Direc- tion. | Force | Velocity, (0—6), and Direc- tion. | Amount, (0—10), and Species. | Velocity, (0—6), and Direc- tion. | Amount, (0—10), and Species. | No. | No. | No. | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 9 h. A.M. |
| inches. | inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 29.68 | 62 | 29.59 | 66 | 66 | 52 | | | 60 | 57 | 56 | 54 | S | 3 | S | 5 | | — | | | | | | | | | Strong gales of wind | 1 | | | |
| 2 | 29.60 | 63 | 29.63 | 65 | 63 | 52 | | | 56 | 52 | 53 | 48 | S | 1 | S | 1 | | .14 | | | | | | | | | on the 1st 5th and 8th and | 2 | | | |
| 3 | 29.60 | 63 | 29.60 | 66 | 62 | 46 | | | 56 | 52 | 55 | 57 | S | — | S | 1 | | .12 | | | | | | | | | great gale on the 9th which | 3 | | | |
| 4 | 29.72 | 60 | 29.45 | 64 | 63 | 51 | | | 55 | 51 | 56 | 57 | S | 1 | S | 4 | | .02 | | | | | | | | | did much damage in | 4 | | | |
| 5 | 29.50 | 60 | 29.30 | 62 | 62 | 47 | | | 56 | 49 | 52 | 50 | S | 5 | S | 5 | | — | | | | | | | | | Shaking Barn Crops and | 5 | | | |
| 6 | 29.82 | 61 | 29.69 | 64 | 61 | 46 | | | 52 | 50 | 51 | 47 | S | 1 | S | 2 | | .51 | | | | | | | | | fruit and breaking down | 6 | | | |
| 7 | 29.83 | 62 | 29.62 | 65 | 64 | 53 | | | 53 | 49 | 52 | 46 | S | 1 | S | 1 | | .16 | | | | | | | | | Branches of Trees | 7 | | | |
| 8 | 29.78 | 63 | 29.72 | 64 | 66 | 52 | | | 57 | 54 | 53 | 49 | S | 5 | S | 3 | | — | | | | | | | | | Rainbows seen on the | 8 | | | |
| 9 | 29.30 | 63 | 29.74 | 64 | 62 | 48 | | | 57 | 52 | 51 | 47 | S | 6 | S | 6 | | .16 | | | | | | | | | 21st and 22nd | 9 | | | |
| 10 | 29.80 | 62 | 29.67 | 60 | 60 | 42 | | | 56 | 50 | 48 | 46 | S | 4 | S | 3 | | .20 | | | | | | | | | for the last seven days | 10 | | | |
| 11 | 29.66 | 60 | 29.74 | 61 | 60 | 45 | | | 52 | 48 | 50 | 45 | S | 1 | S | 2 | | — | | | | | | | | | of the month the weather | 11 | | | |
| 12 | 29.95 | 60 | 29.90 | 59 | 58 | 44 | | | 54 | 49 | 45 | 42 | S | 1 | S | 1 | | .06 | | | | | | | | | has been very fine and | 12 | | | |
| 13 | 29.70 | 60 | 29.65 | 62 | 62 | 51 | | | 54 | 50 | 53 | 50 | S | 2 | S | 1 | | .05 | | | | | | | | | warm with much sun | 13 | | | |
| 14 | 29.28 | 60 | 29.38 | 62 | 60 | 48 | | | 56 | 53 | 48 | 45 | S | 4 | S | 2 | | .10 | | | | | | | | | Shine | 14 | | | |
| 15 | 29.43 | 60 | 29.37 | 62 | 63 | 52 | | | 54 | 49 | 52 | 50 | S | 1 | S | 1 | | — | | | | | | | | | | | 15 | | |
| 16 | 29.25 | 59 | 29.24 | 60 | 54 | 42 | | | 53 | 51 | 50 | 48 | S | — | S | 1 | | .85 | | | | | | | | | | | 16 | | |
| 17 | 29.25 | 60 | 29.32 | 63 | 61 | 47 | | | 47 | 46 | 50 | 46 | S | 1 | S | 3 | | — | | | | | | | | | | | 17 | | |
| 18 | 29.33 | 60 | 29.34 | 60 | 60 | 50 | | | 54 | 50 | 53 | 50 | S | 1 | S | 2 | | .03 | | | | | | | | | | | 18 | | |
| 19 | 29.50 | 60 | 29.72 | 60 | 63 | 44 | | | 57 | 50 | 52 | 50 | S | 1 | S | 1 | | .16 | | | | | | | | | | | 19 | | |
| 20 | 29.80 | 58 | 29.60 | 61 | 60 | 48 | | | 49 | 45 | 51 | 49 | S | 1 | S | 1 | | — | | | | | | | | | | | 20 | | |
| 21 | 29.54 | 60 | 29.53 | 62 | 63 | 50 | | | 55 | 50 | 52 | 49 | S | 2 | S | 1 | | .54 | | | | | | | | | | | 21 | | |
| 22 | 29.56 | 60 | 29.62 | 62 | 63 | 50 | | | 57 | 53 | 53 | 50 | S | 2 | S | 2 | | — | | | | | | | | | | | 22 | | |
| 23 | 29.74 | 60 | 29.90 | 61 | 62 | 50 | | | 57 | 52 | 55 | 54 | S | 1 | S | 1 | | .24 | | | | | | | | | | | 23 | | |
| 24 | 30. | 60 | 30.20 | 61 | 60 | 46 | | | 57 | 50 | 54 | 51 | S | 1 | S | 1 | | — | | | | | | | | | | | 24 | | |
| 25 | 30.28 | 61 | 30.25 | 63 | 62 | 53 | | | 53 | 49 | 55 | 53 | S | 1 | S | 1 | | .10 | | | | | | | | | | | 25 | | |
| 26 | 30.25 | 61 | 30.24 | 62 | 65 | 41 | | | 59 | 55 | 49 | 47 | S | 1 | S | 1 | | — | | | | | | | | | | | 26 | | |
| 27 | 30.28 | 62 | 30.26 | 63 | 63 | 53 | | | 48 | 47 | 50 | 48 | S | 1 | S | 1 | | — | | | | | | | | | | | 27 | | |
| 28 | 30.25 | 62 | 30.23 | 62 | 63 | 50 | | | 54 | 49 | 50 | 45 | S | 1 | S | 1 | | — | | | | | | | | | | | 28 | | |
| 29 | 30.10 | 62 | 30.13 | 64 | 60 | 35 | | | 53 | 48 | 47 | 45 | S | 1 | S | 2 | | — | | | | | | | | | | | 29 | | |
| 30 | 30.20 | 62 | 30.17 | 62 | 57 | 33 | | | 40 | 39 | 44 | 42 | S | 1 | S | 1 | | — | | | | | | | | | | | 30 | | |
| 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 31 | | |
| Sums. | 2198 | 26 | 2177 | 72 | 48 | 221 | | | 121 | 299 | 40 | 248 | | 52 | | 58 | | 3.44 | | | | | | | | | | | | | |
| Means. | 29.733 | 608 | 29.726 | 62.4 | 61.6 | 47.4 | | | 54.2 | 50.0 | 51.3 | 48.3 | | 1.73 | | 1.93 | | | | | | | | | | | | | | | |
| † Total corrections for Instru- mental Errors. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Correc- tions for Diurnal Range. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| "Cor- rected Means." | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. of Column. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† = *29.647*
for Temp. (Col. 2), = *29.733*..... *-0.86*.....
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = *29.625*
for Temp. (Col. 4), = *29.746*..... *-0.91*.....
Mean at Station, corrected, and at 32°, = *29.636*
Correction for Height, feet, above Mean Sea-level, = *1.01*
Mean, reduced to 32°, and Sea-level, = *29.737*
Highest Reading, corrected for Index error, on the 25th, 27th, = *30.280*
Lowest Do., Do., on the 16th, = *29.240*
Difference, or Monthly Range, = *1.040*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 1th, = *66.0*
Lowest in Month, corrected for Index errors, on the 30th, = *33.0*
Difference, or Monthly Range, = *33.0*
"Corrected Mean" of all the Highest, (Col. 5), = *61.6*
"Corrected Mean" of all the Lowest, (Col. 6), = *47.4*
Difference, or Mean Daily Range, = *14.2*
** Calculated Mean Temperature of Month, = *54.5*

S.-R. THERMOMETER, in Sun, Highest, (corrected, for Index errors), on the 1th, = *66.0*
"Corrected Mean" of all the Highest, (Col. 5), = *61.6*
Lowest at Night, corrected for Index errors, on the 1th, = *33.0*
"Corrected Mean" of all the Lowest, (Col. 6), = *47.4*
Difference of above Means or Range ("exposed"), = *14.2*

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *52.6*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *49.2*
†† Computed Temperature of Dew-point, = *45.6*
†† Do. Elastic Force of Vapour, = *.308*
†† Do. Weight of Vapour in a Cubic Foot of Air, = *.78*
†† Relative Humidity, (Saturation = 100), = *78*
RAIN fell on 16 Days; Amount in Inches, = *3.44*

| WIND. | | SUMMARY. | | | | | | | | | |
|------------|---|----------|---|----|---|----|----|----|-------------------|-------------|---------------------------------|
| Direction. | N | NE | E | SE | S | SW | W | NW | Calm or Variable. | Mean Force. | Mean Velocity in miles per day. |
| A.M. | 1 | | | | 2 | 3 | 16 | 7 | 1 | 2.69 | |
| P.M. | | | | | 3 | 15 | 10 | 2 | | 3.72 | |
| Mean. | 1 | 0 | 0 | 1 | 3 | 15 | 9 | 1 | | 3.35 | |

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

Observations made and
Return verified by

W. Munro

(Signed)

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

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

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

(By Order,) A. B.
Ensign, 4th December, 1863.

(by Ornel,)

(by Ornel,)

EDINBURGH.

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

[illegible]

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

SCOTTISH METEOROLOGICAL SOCIETY.

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

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

During the MONTH of *October* 186*4*.

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. | No. of hours in which it fell. | Amount in inches. | Velocity, (0-10), and Direction. | Amount, (0-10), and Species. | Velocity, (0-10), and Direction. | Amount, (0-10), and Species. | No. | No. | | | | | No. | | | | | |
| | | inches. | | inches. | | | | | | | | | | | | | | | | | | | | | | No. 3 inches. | | | | | | | | | | |
| | | No. | | No. | | No. | | No. | | No. | | No. | | No. | | No. | | No. | | No. | | No. | | No. | | No. | | | | | | | | | | |
| | 1 | 30.14 | 55 | 30.20 | 58 | 59 | 36 | | | 40 | 38 | 41 | 39 | W | 1 | S | 1 | | | | | | | | | | | | | | The first 15 days of this month have been very dry, not a drop of rain fell during that time, but from the 16 to the end of the month it rained almost every day and the quantity fallen in that period is unprecedented in this locality viz 8.06 inches | 1 | | | | |
| | 2 | 30.33 | 57 | 30.41 | 60 | 57 | 35 | | | 49 | 46 | 48 | 45 | E | 1 | E | 1 | | | | | | | | | | | | | | | | 2 | | | |
| | 3 | 30.47 | 56 | 30.40 | 55 | 55 | 44 | | | 44 | 42 | 45 | 42 | E | 1 | E | 1 | | | | | | | | | | | | | | | | | 3 | | |
| | 4 | 30.26 | 55 | 30.26 | 57 | 55 | 43 | | | 46 | 43 | 47 | 45 | E | 1 | E | 1 | | | | | | | | | | | | | | | | | 4 | | |
| | 5 | 30.26 | 55 | 30.25 | 56 | 55 | 42 | | | 48 | 44 | 46 | 44 | SE | 2 | SE | 1 | | | | | | | | | | | | | | | | | 5 | | |
| | 6 | 30.29 | 55 | 30.30 | 57 | 57 | 38 | 34 | | 49 | 47 | 43 | 40 | SE | 1 | SE | 1 | | | | | | | | | | | | | | | | | 6 | | |
| | 7 | 30.34 | 54 | 30.30 | 57 | 57 | 42 | 42 | | 46 | 44 | 48 | 46 | SW | 1 | SE | 1 | | | | | | | | | | | | | | | | | 7 | | |
| | 8 | 30.34 | 56 | 30.28 | 54 | 57 | 44 | 32 | | 46 | 44 | 39 | 37 | SE | 1 | SE | 1 | | | | | | | | | | | | | | | | | 8 | | |
| | 9 | 30.30 | 54 | 30.29 | 56 | 55 | 40 | 40 | | 36 | 35 | 41 | 39 | SE | 1 | SE | 1 | | | | | | | | | | | | | | | | | 9 | | |
| | 10 | 30.40 | 53 | 30.40 | 56 | 54 | 44 | 44 | | 46 | 44 | 47 | 45 | N | 1 | SE | 1 | | | | | | | | | | | | | | | | | 10 | | |
| | 11 | 30.38 | 56 | 30.30 | 59 | 57 | 43 | 48 | | 49 | 46 | 50 | 45 | SW | 1 | W | 1 | | | | | | | | | | | | | | | | | | 11 | |
| | 12 | 30.25 | 57 | 30.15 | 58 | 59 | 40 | 45 | | 53 | 48 | 47 | 44 | W | 1 | W | 2 | | | | | | | | | | | | | | | | | | 12 | |
| | 13 | 30.04 | 56 | 30.06 | 59 | 57 | 43 | 43 | | 51 | 47 | 49 | 47 | N | 2 | N | 1 | | | | | | | | | | | | | | | | | | 13 | |
| | 14 | 30.10 | 57 | 30.14 | 58 | 55 | 41 | 30 | | 47 | 46 | 41 | 37 | SW | 1 | SW | 1 | | | | | | | | | | | | | | | | | | 14 | |
| | 15 | 30.12 | 56 | 29.87 | 57 | 49 | 44 | 42 | | 35 | 34 | 44 | 42 | SW | 1 | S | 1 | | | | | | | | | | | | | | | | | | 15 | |
| | 16 | 29.50 | 57 | 29.36 | 60 | 53 | 43 | 41 | | 52 | 48 | 50 | 48 | SW | 3 | W | 3 | | | 22 | | | | | | | | | | | | | | | 16 | |
| | 17 | 29.30 | 58 | 29.25 | 58 | 54 | 44 | 44 | | 49 | 47 | 47 | 46 | W | 3 | W | 3 | | | 16 | | | | | | | | | | | | | | | 17 | |
| | 18 | 29.40 | 55 | 29.36 | 58 | 49 | 43 | 43 | | 44 | 43 | 48 | 46 | W | 3 | W | 1 | | | 03 | | | | | | | | | | | | | | | 18 | |
| | 19 | 29.06 | 56 | 28.76 | 56 | 53 | 44 | 44 | | 46 | 45 | 49 | 48 | W | 1 | E | 2 | | | 2.05 | | | | | | | | | | | | | | | 19 | |
| | 20 | 28.70 | 54 | 29.26 | 56 | 50 | 40 | 29 | | 47 | 44 | 39 | 36 | SW | 3 | SW | 2 | | | 14 | | | | | | | | | | | | | | | 20 | |
| | 21 | 29.60 | 50 | 29.55 | 52 | 49 | 42 | 38 | | 32 | 31 | 41 | 38 | E | 1 | E | 2 | | | 26 | | | | | | | | | | | | | | | 21 | |
| | 22 | 29.38 | 49 | 29.21 | 58 | 40 | 41 | 40 | | 40 | 39 | 40 | 40 | E | 2 | E | 6 | | | 1.74 | | | | | | | | | | | | | | | 22 | |
| | 23 | 29.20 | 48 | 29.30 | 56 | 43 | 42 | 42 | | 43 | 43 | 40 | 40 | SE | 6 | SE | 5 | | | 1.82 | | | | | | | | | | | | | | | | 23 |
| | 24 | 29.35 | 49 | 29.57 | 53 | 49 | 47 | 31 | | 44 | 42 | 44 | 40 | SE | 1 | SE | 2 | | | 04 | | | | | | | | | | | | | | | | 24 |
| | 25 | 29.64 | 51 | 29.66 | 55 | 47 | 40 | 42 | | 40 | 36 | 44 | 42 | W | 1 | W | 1 | | | - | | | | | | | | | | | | | | | | 25 |
| | 26 | 29.46 | 53 | 29.55 | 58 | 53 | 44 | 42 | | 50 | 49 | 49 | 47 | SE | 1 | SE | 1 | | | 28 | | | | | | | | | | | | | | | | 26 |
| | 27 | 29.60 | 55 | 29.64 | 66 | 49 | 44 | 44 | | 45 | 44 | 48 | 46 | SE | 2 | SE | 2 | | | 60 | - | | | | | | | | | | | | | | | 27 |
| | 28 | 29.68 | 53 | 29.80 | 67 | 50 | 44 | 44 | | 45 | 44 | 48 | 46 | SE | 2 | SE | 2 | | | 56 | - | | | | | | | | | | | | | | | 28 |
| | 29 | 29.85 | 58 | 30. | 61 | 52 | 46 | 46 | | 48 | 47 | 47 | 46 | E | 1 | E | 1 | | | 16 | - | | | | | | | | | | | | | | | 29 |
| | 30 | 30.10 | 55 | 30.20 | 60 | 50 | 33 | 33 | | 47 | 46 | 44 | 43 | SE | 1 | SE | 1 | | | - | | | | | | | | | | | | | | | | 30 |
| | 31 | 30.28 | 53 | 30.27 | 55 | 50 | 37 | 37 | | 38 | 37 | 42 | 39 | SE | 1 | SE | 1 | | | - | | | | | | | | | | | | | | | | 31 |
| Sums. | | 926.22 | 1686 | 926.35 | 1786 | 1629 | 1240 | | | 1392 | 1333 | 1398 | 1318 | 49 | 51 | | | | | 8.06 | | | | | | | | | | | | | | | | |
| Means. | | 29.87 | 54.3 | 29.88 | 57.6 | 52.5 | 40 | | | 44.9 | 43 | 45 | 42.5 | 1.5 | 1.6 | | | | | 2.6 | | | | | | | | | | | | | | | | |
| † Total Corrections by Instrumental Errors. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Corrections for Diurnal Range. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| “Corrected Means.” | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| No. of Column. | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | | | | |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction ++ = *29.810*
for Temp. (Col. 2), = *29.878* - *0.068*
"Corrected Mean" of Barometer at 9 P.M., minus the Correction ++ = *29.801*
for Temp. (Col. 4), = *29.880* - *0.079*
Mean at Station, corrected, and at 32°, = *29.805*
Correction for Height, feet, above Mean Sea-level, = *1.01*
Mean, reduced to 32°, and Sea-level, = *29.906*
Highest Reading, corrected for Index error, on the 3 th, = *30.470*
Lowest Do., Do., on the 20 th, = *28.700*
Difference, or Monthly Range, = *1.770*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 1 th, = *59.0*
Lowest in Month, corrected for Index errors, on the 20 th, = *29.0*
Difference, or Monthly Range, = *30.0*
"Corrected Mean" of all the Highest, (Col. 5), = *52.5*
"Corrected Mean" of all the Lowest, (Col. 6), = *40.0*
Difference, or Mean Daily Range, = *12.5*
** Calculated Mean Temperature, Month, = *46.2*

S.-R. THERMOMETER, in Sun, Highest, (corrected for Index errors), on the 1 th, = *59.0*
"Corrected Mean" of all the Highest, (Col. 5), = *52.5*
Lowest at Night, corrected for Index errors, on the 20 th, = *29.0*
"Corrected Mean" of all the Lowest, (Col. 6), = *40.0*
Difference, or Mean Daily Range, = *12.5*

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = *45.0*
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = *42.8*
II Computed Temperature of Dew-point, = *40.2*
II Do. Elastic Force of Vapour, = *2.49*
II Do. Weight of Vapour in a Cubic Foot of Air, = *8.4*
RAIN fell on 13 Days; Amount in Inches, = *8.06*

| WIND. | SUMMARY. | | | | | | | | | |
|-------|------------|---|----|----|----|---|----|---|----|-------------------|
| | Direction. | N | NE | E | SE | S | SW | W | NW | Calm or Variable. |
| A.M. | | 2 | 2 | 10 | 5 | | 4 | 6 | 2 | 2.25 |
| P.M. | | 3 | 4 | 10 | 4 | 2 | 1 | 6 | 1 | 2.56 |
| Mean. | | 2 | 3 | 10 | 4 | 1 | 3 | 6 | 2 | 2.80 |

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
† The Diurnal Range for Scotland is as yet unknown.
‡ These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
§ While the Diurnal Range is unknown, the 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 2nd; those from Other Places, not later if possible than the 6th. This Schedule not to be Gummed or Fastened, and Forwarded by Book Post, prepaid.

Observations made and Return verified by *Wm. Mauleston*

(Signed)

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.

PARLIAMENT, 1906. *The Meteorological Service.*

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 run-gauge. For wind, rain, and snow, as registered in every column, the observer cannot be too careful to note of deduction or interference.

recommended; printed directions for their use may be obtained with each instrument. The "*Monimur*." Thermometer of Rutherford is recommended when graduated on the glass stem and affixed to a frame separate from the "*Monimur*." 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 temperatures, it may be found in the upper lobe, and must be discarded from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. This instrument must be hung perfectly horizontal; the bulb end should incline

EDINBURGH.

[illegible]

Luke Howard's

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Inveresk*, County of *Mid-Lothian*, in Lat. *55° 58' 0" N*, Long. *3° 2' 40" W*, Distance from Sea *one* mile.Height of Cistern of the Barometer above Mean Sea-level *90* feet, above Ground *4* feet.During the MONTH of *November* 186*4*.

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. | | Readings of the H-Cup Anemometer. No. — | No. of hours in which it fell. | Amount in inches. | 9 A.M. | | P.M. | | 9 h. A.M. | | | | | | | | | | | |
| | | Barometer. | At- tached Ther- mometer. | Barometer. | At- tached Ther- mometer. | Max. | Min. | Max. in Sun's rays | Min. on Grass. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direction. | Force. | Direction. | Force. | | | | Velocity, (0—6), and Direc- tion. | Amount, (0—10), and Species. | Velocity, (0—6), and Direc- tion. | Amount, (0—10), and Species. | No. | No. | | | | | No. | | | | | |
| | | * No. | | No. | | No. | No. | No. | No. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | inches. | | inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | 30.28 | 56 | 30.30 | 58 | 54 | 37 | | | 41 | 40 | 42 | 40 | S | 1 | SW | 1 | | | | | | | | | | | | | | Had 2 5 strong gale | 1 | | | | |
| | 2 | 30.30 | 54 | 30.30 | 57 | 55 | 34 | | | 37 | 36 | 40 | 38 | SW | 1 | SW | 1 | | | | | | | | | | | | | | | and rain | 2 | | | |
| | 3 | 30.29 | 50 | 30.30 | 53 | 51 | 37 | | | 36 | 34 | 47 | 43 | N | 1 | W | 2 | | | | | | | | | | | | | | | 30th Aurora & shooting | 3 | | | |
| | 4 | 30.27 | 49 | 30.30 | 51 | 50 | 40 | | | 44 | 43 | 41 | 40 | SW | 2 | SW | 1 | | | .04 | | | | | | | | | | | | stars seen | 4 | | | |
| | 5 | 30.45 | 50 | 30.59 | 53 | 47 | 35 | | | 44 | 41 | 40 | 36 | N | 2 | N | 1 | | | .03 | | | | | | | | | | | | Very High Barom | 5 | | | |
| | 6 | 30.70 | 50 | 30.58 | 52 | 45 | 33 | | | 38 | 35 | 34 | 33 | W | 1 | W | 1 | | | — | | | | | | | | | | | | on the 6th by 30.70 | 6 | | | |
| | 7 | 30.30 | 50 | 30.10 | 54 | 43 | 37 | | | 39 | 37 | 39 | 37 | SW | 1 | SW | 1 | | | — | | | | | | | | | | | | | Very Low Barom | 7 | | |
| | 8 | 30.20 | 50 | 30.28 | 51 | 44 | 31 | | | 42 | 39 | 37 | 36 | SE | 1 | SE | 1 | | | — | | | | | | | | | | | | | on the 25th by 28.50 | 8 | | |
| | 9 | 30.24 | 47 | 30.16 | 49 | 47 | 27 | | | 33 | 32 | 37 | 36 | W | 1 | W | 1 | | | — | | | | | | | | | | | | | | | | |
| | 10 | 30.00 | 44 | 29.99 | 51 | 42 | 31 | | | 30 | 30 | 35 | 33 | W | 1 | W | 1 | | | — | | | | | | | | | | | | | | | | |
| | 11 | 29.90 | 44 | 29.90 | 51 | 42 | 32 | | | 34 | 33 | 35 | 34 | W | 1 | W | 1 | | | — | | | | | | | | | | | | | | | | |
| | 12 | 29.80 | 47 | 29.47 | 48 | 42 | 30 | | | 35 | 34 | 32 | 29 | W | 1 | W | 1 | | | — | | | | | | | | | | | | | | | | |
| | 13 | 29.26 | 48 | 28.86 | 52 | 45 | 40 | | | 37 | 36 | 44 | 43 | SE | 3 | SE | 2 | | | .04 | | | | | | | | | | | | | | | | |
| | 14 | 28.57 | 51 | 28.60 | 63 | 51 | 40 | | | 44 | 43 | 44 | 42 | SE | 1 | SE | 1 | | | .10 | | | | | | | | | | | | | | | | |
| | 15 | 28.88 | 53 | 28.94 | 60 | 57 | 33 | | | 42 | 40 | 38 | 37 | E | 0 | SE | 3 | | | .30 | | | | | | | | | | | | | | | | |
| | 16 | 29.30 | 50 | 29.46 | 58 | 47 | 30 | | | 34 | 33 | 30 | 30 | SW | 1 | SW | 1 | | | — | | | | | | | | | | | | | | | | |
| | 17 | 29.20 | 49 | 28.79 | 53 | 47 | 42 | | | 38 | 37 | 45 | 43 | E | 2 | SE | 4 | | | .14 | | | | | | | | | | | | | | | | |
| | 18 | 28.70 | 50 | 29.28 | 55 | 46 | 38 | | | 44 | 43 | 42 | 41 | SE | 2 | SW | 4 | | | .08 | | | | | | | | | | | | | | | | |
| | 19 | 29.64 | 51 | 29.56 | 54 | 49 | 40 | | | 40 | 38 | 42 | 40 | S | 1 | S | 1 | | | — | | | | | | | | | | | | | | | | |
| | 20 | 29.55 | 50 | 29.60 | 56 | 49 | 38 | | | 44 | 43 | 41 | 39 | S | 0 | S | 1 | | | — | | | | | | | | | | | | | | | | |
| | 21 | 29.64 | 52 | 29.56 | 56 | 50 | 39 | | | 45 | 44 | 44 | 42 | S | 0 | SW | 1 | | | — | | | | | | | | | | | | | | | | |
| | 22 | 29.35 | 50 | 29.35 | 55 | 45 | 38 | | | 43 | 41 | 39 | 37 | S | 1 | SW | 1 | | | .04 | | | | | | | | | | | | | | | | |
| | 23 | 29.37 | 50 | 29.46 | 58 | 45 | 28 | | | 44 | 42 | 33 | 32 | SW | 1 | SW | 1 | | | — | | | | | | | | | | | | | | | | |
| | 24 | 29.40 | 47 | 29.07 | 51 | 42 | 35 | | | 30 | 29 | 41 | 39 | S | 1 | S | 1 | | | .50 | | | | | | | | | | | | | | | | |
| | 25 | 29.10 | 45 | 28.50 | 51 | 40 | 33 | | | 36 | 35 | 38 | 38 | SW | 2 | SW | 5 | | | .60 | | | | | | | | | | | | | | | | |
| | 26 | 28.70 | 45 | 28.98 | 49 | 41 | 37 | | | 37 | 36 | 38 | 36 | SW | 1 | S | 1 | | | — | | | | | | | | | | | | | | | | |
| | 27 | 29.38 | 46 | 29.48 | 50 | 44 | 40 | | | 41 | 40 | 41 | 39 | SW | 1 | SW | 4 | | | .24 | | | | | | | | | | | | | | | | |
| | 28 | 29.20 | 53 | 29.56 | 54 | 54 | 36 | | | 53 | 51 | 42 | 40 | SW | 2 | SW | 3 | | | .14 | | | | | | | | | | | | | | | | |
| | 29 | 30.03 | 50 | 29.90 | 55 | 50 | 40 | | | 37 | 35 | 40 | 40 | SW | 2 | SW | 4 | | | .02 | | | | | | | | | | | | | | | | |
| | 30 | 29.70 | 51 | 29.65 | 53 | 47 | 40 | | | 42 | 41 | 41 | 38 | SW | 2 | SW | 2 | | | — | | | | | | | | | | | | | | | | |
| | 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Sums. | 889.84 | 1484 | 888.85 | 1603 | 1417 | 1071 | | | 1154 | 1141 | 1182 | 1141 | | 37 | | 55 | | | 2.27 | | | | | | | | | | | | | | | | |
| | Means. | 29.661 | 49.46 | 29.628 | 53.43 | 47.23 | 35.7 | | | 38.46 | 38.03 | 39.4 | 38.83 | | 123 | | 183 | | | | | | | | | | | | | | | | | | | |
| | † Total Corrections for Instrumental Errors. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | † Corrections for Diurnal Range. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | "Corrected Means." | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | No. of Column. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | | | | |

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction++ for Temp. (Col. 2), = *29.605*
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction++ for Temp. (Col. 4), = *29.563*
Mean at Station, corrected, and at 32°, = *29.584*
 Correction for Height, feet, above Mean Sea-level, = *1.01*
Mean, reduced to 32°, and Sea-level, = *29.685*
 Highest Reading, corrected for Index error, on the *6* th, = *30.700*
 Lowest Do., Do., on the *25* th, = *28.500*
 Difference, or **Monthly Range**, = *2.200*

* Each instrument tested at the Office in Edinburgh bears the stamp "S.M.S.," and a number to be entered in the Heading; or the Number and Initials of the Maker may be here given.
 † Embracing corrections for both capillarity and Index Errors.
 ‡ The Diurnal Range for Scotland is as yet unknown.
 § These "Hygrometrical Deductions" are calculated from Glaisher's Hygrometrical Tables, Second Edition only.
 || While the Diurnal Range is unknown, the Arithmetical Mean of Col. 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 *17* th, = *57.0*
Lowest in Month, corrected for Index errors, on the *23* th, = *28.0*
 Difference, or **Monthly Range**, = *29.0*
"Corrected Mean" of all the Highest, (Col. 5), = *47.2*
"Corrected Mean" of all the Lowest, (Col. 6), = *35.7*
 Difference, or **Mean Daily Range**, = *11.5*
 ** Calculated **Mean Temperature** of Month, = *41.4*

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

HYGROMETER, **Mean** (corrected) A.M. and P.M. Reading of **Dry Bulb**, = *39.0*
Mean (corrected) A.M. and P.M. Reading of **Wet Bulb**, = *38.0*
 †† Computed **Temperature of Dew-point**, = *36.7*
 †† Do. **Elastic Force of Vapour**, = *2.28*
 †† Do. **Weight of Vapour in a Cubic Foot of Air**, = *.92*
 †† **Relative Humidity**, (Saturation = 100), = *92*
RAIN fell on *13* Days; Amount in Inches, = *2.27*

| WIND. | SUMMARY. | | | | | | | | | |
|-------|------------|---|----|---|----|---|----|---|----|-------------------|
| | Direction. | N | NE | E | SE | S | SW | W | NW | Calm or Variable. |
| A.M. | | 2 | 1 | 2 | 4 | 6 | 10 | 5 | 1 | 172 |
| P.M. | | 1 | 2 | | 2 | 5 | 12 | 6 | 1 | 335 |
| Mean. | | 1 | 2 | 1 | 3 | 6 | 11 | 5 | 1 | 254 |

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

Observations made and
Return verified by

William McWilliam

(Signed)

SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Inveresk, County of Edinburgh, in Lat. 55° 56' N., Long. 3° 2' 45" W., Distance from Sea one miles.

Height of Cistern of the Barometer above Mean Sea-level 90 feet, above Ground 4 feet. During the MONTH of December 1864.
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. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | 9 h. A.M. | | 9 h. P.M. | | Protected, in Shade, 4 feet above Ground. | | Exposed Black Bulbs. | | 9 h. A.M. | | 9 h. P.M. | | Readings of the H-Cup Anemometer. No. | | No. of hours in which it fell. | Amount in inches. | 9 A.M. | | P.M. | | 9 h. A.M. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Barometer. * No. | Attach- ed Ther- mometer | Barometer. No. | Attach- ed Ther- mometer | Max. No. | Min. No. | Max. in Sun's rays No. | Min. on Grass. No. | Dry bulb. | Wet bulb. | Dry bulb. | Wet bulb. | Direc- tion. | Force | | | Direc- tion. | Force | Velocity, (0-6), and Direc- tion. | Amount, (0-10), and Species. | Velocity, (0-6), and Direc- tion. | Amount, (0-10), and Species. | No. 3 inches. | No. 12 inches. | No. 29 inches. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | SUNSHINE. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† = 29.840
for Temp. (Col. 2), = .29.845 - .05.5
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = 29.824
for Temp. (Col. 4), = .29.837 - .06.3
Mean at Station, corrected, and at 32°, = 29.832
Correction for Height, feet, above Mean Sea-level, = 10.1
Mean, reduced to 32°, and Sea-level, = 29.933
Highest Reading, corrected for Index error, on the 26th, = 30.550
Lowest Do., Do., on the 11th, = 29.270
Difference, or Monthly Range, = 1.280

S.-R. THERMOMETER, (in shade, etc.), Highest in Month (corrected for Index errors), on the 4th, = 57.0
Lowest in Month, corrected for Index errors, on the 30th, = 26.0
Difference, or Monthly Range, = 31.0
"Corrected Mean" of all the Highest, (Col. 5), = 44.3
"Corrected Mean" of all the Lowest, (Col. 6), = 35.3
Difference, or Mean Daily Range, = 9.0
** Calculated Mean Temperature of Month, = 39.8
S.-R. THERMOMETER, Black Bulb, in Sun, Highest, (corrected, for Index Errors), on the th, =
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, =
Lowest at Night, Black Bulb, (corrected for Index errors), on the th, =
"Corrected Mean," (Col. 8), of Black Bulb Min. on grass, =
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, = 58.8
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, = 37.0
†† Computed Temperature of Dew-point, = 34.6
†† Do. Elastic Force of Vapour, = 2.01
†† Do. Weight of Vapour in a Cubic Foot of Air, =
†† Relative Humidity, (Saturation = 100), = 85
RAIN fell on 11 Days; Amount in Inches, = 1.79

| WIND. | | SUMMARY. | | | | | | | | | |
|------------|--|----------|----|---|----|----|----|----|----|-------------------|-------------|
| Direction. | | N | NE | E | SE | S | SW | W | NW | Calm or Variable. | Mean Force. |
| A.M. | | | | | 4 | 7 | 8 | 12 | | | 215 |
| P.M. | | 1 | 1 | 4 | 5 | 11 | 8 | | | | 324 |
| Mean. | | 1 | 0 | 4 | 6 | 10 | 10 | 0 | 0 | 0 | 274 |

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

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

Observations made and Return verified by W. A. Houston

(Signed)

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

Hour of Observation.—The Council recommend that Observations be made precisely at 9 o'clock (Greenwich or Railway Time only) twice a-day for some, and once (morning or evening) for other instruments, as specified, in the following remarks, 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.—*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-marks* 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 *coincide* with those on its ivory frame, the *index* of the surface of the mercury is then at the exact height from which the setting must be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *vernier*.

When a Barometer having adjustable surfaces has to be removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *screw* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it may then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air it may be removed by 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 *level*, 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 noticed: the tube must then be gently tapped and the cistern-adjustment carefully made. By raising and lowering the eye, it must be brought into the plane of the back and front of the index—usually the lower edge of the vernier, which must be carefully adjusted to form exactly a tangent to the convex surface of the mercury in the tube. Observations must be taken quickly; so as to prevent heat from the observer's hands and person from affecting the mercury. The use of a lens will greatly facilitate an accurate adjustment and reading of the Barometer.

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

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

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

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

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

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

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

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

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

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

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

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

Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:—When a snow shower occurs it must be noted in the "Remarks," and the letter S affixed to the depth of water received in gauge. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as 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

OBSERVATIONS.

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

Observations of the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity and Direction," 2, W., (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of 2, *cu-st.* (*cu*, for example,) 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.

Smoke.—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 8, 12, and 22 inches, and the stems above ground protected from the sun's rays, and fitted with sloping tin collars, to prevent rain-water being conveyed to the bulbs by the stems or 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 30th, 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.

Notes.—Mention whether Schindler's or Moffat's papers are used. Moffat's are preferred. The paper is affixed by a pin to a board in the thermometer box, and the indication registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind, at the time of observation, in the following manner:—thus 5, *z*, 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—9 is "4," i.e., that it is *blowing fresh*.

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

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

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. ought to be registered, either in two columns otherwise unoccupied, or in two ruled off for the purpose, from that headed "Remarks." It is intended that observations by the Electrometer should be entered in this manner, 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 *twice-a-day* observations be taken;—viz., on the 21st days of March, June, September, and December. For these hourly observations separate schedules will be furnished to observers.

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

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

(By Order.) A. B.

FORWARDED, 9th December, 1864.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

| FOREST TREES. | In flower. | Leaf buds first appear. | In leaf. | Deciduous of leaves. | CROPS. | Soiling or sowing in ground. | Appearance above ground. | In flower or fruit. | First cut |
|--------------------|------------|-------------------------|----------|----------------------|---------------|------------------------------|--------------------------|---------------------|-----------|
| Alder. | | | | | Barley. | | | | |
| Aspen. | | | | | Bare or high. | | | | |
| Beech. | | | | | Oats. | | | | |
| Birch. | | | | | Wheat. | | | | |
| Elm. | | | | | Beans. | | | | |
| Larch. | | | | | Peas. | | | | |
| Lime. | | | | | Potatoes. | | | | |
| Oak. | | | | | Turnips. | | | | |
| Sycamore or Plane. | | | | | Rye Grass. | | | | |

| SHRUBS, ETC. | First in blossom. | First in blossom. | First in blossom. | FRUIT. | First in blossom. | First in blossom. | First in blossom. | First in blossom. | First in blossom. |
|------------------------|-------------------|-------------------|-------------------|-----------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Barberry. | | | | Apple. | | | | | |
| Bourtree or Elder. | | | | Black Currant. | | | | | |
| Broom. | | | | Cherry. | | | | | |
| Hazel. | | | | Gean. | | | | | |
| Hawthorn. | | | | Gooseberry. | | | | | |
| Holly. | | | | Peach. | | | | | |
| Laburnum. | | | | Pear. | | | | | |
| Lilac. | | | | Plum. | | | | | |
| Mountain Ash or Rowan. | | | | Strawberry. | | | | | |
| Rhododendron Ponticum. | | | | Other Berries, naming them. | | | | | |
| White. | | | | | | | | | |

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.

EDINBURGH.

10, St Andrew Square,

Secretary of the Meteorological Society of Scotland,

Mr ALEXANDER BUCHAN,

To

BOOK-POST.