

# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Leochel-bushnie, County of Aberdeen, in Lat. 57°10'30", Long. 2°45'0", Distance from Sea 28 miles.  
Height of Cistern of the Barometer above Mean Sea-level 885 feet, above Ground 3 feet. During the MONTH of January, 1874.  
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, including Thunder and Lightning, began and ended.	Days of Month.		
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.			9 A.M.		P.M.		9 h. A.M.									
		Barometer. * No. ———	Atmospheric Thermometer	Barometer. No. ———	Atmospheric Thermometer	Max. No. ———	Min. No. ———	Max. in Sun/rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force		Velocity (0—6), and Direction.	Amount, (0—10), and Species.	Velocity (0—6), and Direction.	Amount, (0—10), and Species.	No. 3 inches.	12 inches.	No. 22 inches.							
		inches.	°	inches.	°	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———		No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———	No. ———						
		9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.		9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.	9 h. A.M.	9 h. P.M.						
1	28.900	43	28.530	44	46.0	35.0	48.0	30.0	40.5	38.0	46.0	44.0	SW	5	SW	2.5	26.0	0.3	10	cast	10	0								1		
2	28.500	44	28.465	43	48.0	30.0	49.0	29.0	34.0	32.0	33.0	33.0	SW	1	SW	1.5	41.0	1.5	10	cast	10	2								2		
3	28.500	41	28.220	39	33.0	24.5	37.0	32.0	31.0	30.0	28.0	27.0	W	5	W	5.0	76.0	—	10	cast	10	1									3	
4	28.400	38	28.530	40	33.0	28.0	59.0	28.0	30.0	29.0	28.5	28.0	W	5	W	5.0	43.0	0.2	5	cast	0	6									4	
5	28.900	38	28.890	41	39.0	25.0	58.0	21.0	28.5	28.0	38.0	37.0	SW	5	W	1	27.0	—	10	cast	10	1									5	
6	28.920	42	29.000	44	44.0	35.0	59.0	33.0	41.0	39.0	43.0	40.5	W	1.5	W	3	32.0	—	3	cast	10	2									6	
7	29.000	43	29.845	44	44.0	35.0	50.0	29.0	40.0	37.0	40.0	39.0	W	5	SW	1.5	28.0	—	10	cast	8	1									7	
8	28.900	43	28.700	44	46.0	35.0	48.0	30.0	40.5	38.0	46.0	44.0	SW	5	SW	2.5	26.0	0.2	10	cast	10	0									8	
9	28.610	44	28.840	44	45.0	35.0	60.0	30.0	38.0	36.5	37.0	36.0	SW	5	W	1.5	21.0	—	0	cast	7	4									9	
10	28.100	42	28.120	42	39.0	29.0	45.0	24.0	35.0	34.0	33.0	31.0	W	5	W	5	71.0	—	10	cast	0	3										10
11	28.800	40	28.540	44	46.0	29.0	50.0	24.0	39.0	37.0	47.0	45.0	W	1.5	SW	1.5	53.0	—	10	cast	10	2										11
12	28.600	41	28.770	40	46.0	26.0	46.0	25.0	35.0	32.5	29.5	29.0	W	1.5	W	1.5	57.0	0.3	0	cast	10	2										12
13	28.900	39	28.640	41	44.0	26.0	48.0	24.0	32.0	31.0	43.0	40.0	SW	5	W	1.5	61.0	0.6	5	cast	6	4										13
14	28.630	41	28.800	43	42.0	32.0	46.0	26.0	32.0	31.5	37.0	35.0	W	5	W	1	50.0	0.3	0	cast	0	5										14
15	28.570	42	28.480	47	50.0	34.0	51.0	31.0	46.0	44.0	45.0	44.0	SW	2	W	5	06.0	2.9	10	cast	10	2										15
16	28.350	46	28.260	45	46.0	33.0	48.0	36.0	36.0	35.0	33.0	32.0	W	5	W	5	46.0	1.2	10	cast	10	0										16
17	28.400	41	28.650	41	34.0	28.0	47.0	23.0	31.5	30.0	32.0	31.0	W	2	W	5	09.0	—	3	cast	10	6										17
18	28.300	40	27.900	42	46.0	30.0	46.0	29.0	36.0	35.0	39.0	38.0	SW	5	W	4	82.0	1.0	10	cast	10	2										18
19	28.350	40	28.700	41	39.0	28.0	42.0	21.0	34.0	31.0	30.0	29.0	W	3	W	5	05.0	2.0	0	cast	0	5										19
20	28.350	38	28.500	42	42.0	27.0	46.0	23.0	33.0	32.0	38.0	36.0	W	5	W	1	50.0	—	0	cast	3	4										20
21	28.770	41	29.100	44	45.0	33.0	48.0	27.0	40.0	38.0	42.0	40.0	W	5	W	5	36.0	—	10	cast	0	3										21
22	29.100	44	29.060	45	48.0	39.0	50.0	35.0	44.0	41.0	42.0	39.0	SW	3	SW	5	32.0	0.2	10	cast	8	2										22
23	29.000	45	29.030	44	45.0	36.0	49.0	26.0	41.0	39.0	37.0	34.0	SW	5	SW	2.5	99.0	—	10	cast	10	2										23
24	29.180	40	29.360	41	36.0	29.0	40.0	20.0	33.0	32.0	27.0	26.0	W	5	W	5	65.0	0.3	0	cast	6	3										24
25	29.270	39	29.200	42	43.0	24.0	46.0	20.0	36.0	35.0	43.0	41.0	SW	1.5	W	1	48.0	—	10	cast	10	0										25
26	29.020	45	29.130	45	50.0	38.0	55.0	36.0	49.0	45.0	41.0	38.0	W	1.5	W	4	96.0	—	6	cast	0	5										26
27	29.470	42	29.540	45	43.0	36.0	49.0	33.0	39.0	37.0	43.0	42.0	W	1.5	W	5	98.0	—	10	cast	10	0										27
28	29.520	45	29.430	50	55.0	32.5	72.0	30.0	45.5	43.0	41.0	39.0	W	5	W	5	35.0	—	0	cast	0	7										28
29	29.200	46	29.125	48	48.0	36.0	55.0	29.0	42.0	39.5	39.0	36.0	SW	5	W	1.5	78.0	0.2	0	cast	4	6										29
30	29.340	44	29.400	45	40.0	33.0	56.0	28.0	37.0	34.0	41.0	36.0	W	1	W	1	45.0	—	0	cast	10	5										30
31	29.420	44	29.420	44	45.0	39.0	50.0	34.0	44.0	42.0	41.0	39.0	W	5	W	5	20.0	—	10	cast	5	5										31
Sums.		145	61	1491	10	15	171	16	12	123	142	141	15	305	11	405	11	172														
Means.		28.612	42.0	28.812	43.4	43.5	31.6	54.3	27.3	37.5	35.7	38.2	36.4	10	1.31																	
† Total Corrections for Instrumental Errors.		-100		-100																												
† Corrections for Diurnal Range.																																
"Corrected Means."																																
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† for Temp. (Col. 2), = 28.677  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = 28.673  
Mean at Station, corrected, and at 32°, = 28.675  
Correction for height, feet above Mean Sea-level, = 978  
Mean, reduced to 32°, and Sea-level, = 29.653  
Highest Reading, corrected for Index error, on the 27th, = 29.540  
Lowest Do. Do., on the 18th, = 27.900  
Difference, or Monthly Range, = 1.640

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 28th, = 53.0  
Lowest in Month, corrected for Index errors, on the 25th, = 24.0  
Difference, or Monthly Range, = 39.0  
"Corrected Mean" of all the Highest, (Col. 5), = 43.5  
"Corrected Mean" of all the Lowest, (Col. 6), = 31.6  
Difference, or Mean Daily Range, = 11.9  
\* Calculated Mean Temperature of Month, = 37.6  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 28th, = 72.0  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 54.3  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 18th, = 20.0  
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 27.3  
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 37.8  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 36.0  
† Computed Temperature of Dew-Point, = 33.6  
† Do. Elastic Force of Vapour, = .192  
† Do. Weight of Vapour in a Cubic Foot of Air, = 85  
Relative Humidity, (Saturation = 100), = 85  
RAIN fell on 14 Days; Amount in Inches, = 1.12

WIND.		SUMMARY.									
Direction.	Force.	N	NE	E	SE	S	SW	W	NW	Variable.	Mean Force.
A.M.						2	10	19			
P.M.						7	23	1			
Mean.		0	0	0	0	1	8	21	1		1.15

\* 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 "Hygrometric Deductions" are calculated from Glaisher's Hygrometric Tables, Second Edition only.  
† While the Diurnal Range is unknown, the Arithmetic Mean of Cols. 5 and 6 will be entered as the "Calculated Mean Temperature."  
Any Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

Evaporation 1.12 inches  
Observations made and Return verified by William Bruce  
Bogside, Leochel-bushnie.

(Signed) William Bruce  
The weather has been more than usually mildness, only three times has the ground been white during the whole month, and never above an inch of snow has fallen on any of the three times above referred to. Many of the spring flowers are in flower and vegetation of all kinds is making rapid progress. Turnips are quite plain and full, but straw will be scarce. No disease in the district except spotted fever in one family, severe cold very prevalent. Two cases of Paratyphoid, both proved fatal. Cattle healthy.



WITH REMARKS ON THE USE OF INSTRUMENTS.

not at 9 o'clock. *Barometer*.—*Wentley glasses and Aneroids*, though admirably adapted, as the latter certainly are, to indicate variations of atmospheric pressure, are not well fitted for scientific purposes. Nor can any Barometer be used for Meteorological Observations that is not supplied with such means of *adjustment* or *compensation* as will secure the height of the mercury in the tube being accurately measured from the fluctuating surface of the mercury in the cistern. It is also necessary that every *aneroid* syall have been compared with a *Standard*.

An excellent Barometer is constructed by Mr Adie in 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 used by Mr Adie in the construction of the *Barometer* and *Thermometer* at the Royal Observatory.

When a Barometer having adjustable surfaces has been removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the cistern. Then *serew* up the mercury to within a quarter of an inch of the tube, and take down the instrument; it should 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, the Barometer (care being taken to prevent the loss of mercury) may be again used, by tapping the cistern, and by thus tightening the ivory peg, and gently tapping it; and if this fails, the instrument must be repaired.

**Protection of Thermometers.**—The Council of Hygiene recommends that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inscribed with the following words: "This box contains instruments for the use of the public and is to be kept open at all times." The boxes are to be placed in a place of "protection," that is, in a place where they will not be exposed to the weather, and where they will be accessible to the public. The instruments are suspended on cross-laths, in the interior of the Box, and the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors may also be made to open to the south.

of the bulb now remarks apply really 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 latched 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. Saw must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the *Minimum* Thermometer by distillation.

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 seals and frame into which they are anchored.

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 rounded to decimals. Thus the thermometer will be read  $-39^{\circ}9$ ,  $40^{\circ}0$ , or  $40^{\circ}1$ ; or again,  $40^{\circ}4$ ,  $40^{\circ}5$ , or  $40^{\circ}6$ , according as it indicates a little under, an exact coincidence with, or a little over  $40^{\circ}$ , or  $40\frac{1}{2}$ , respectively. So also  $100^{\circ}$  and  $40\frac{1}{2}$  more or less must be registered  $40^{\circ}2$  or  $40^{\circ}3$  and  $40^{\circ}4$  more or less respectively. In reading Rutherford's "Mtn." and "Mtn." 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 *bobs*, must be rapidly taken, be so readily

mean direction, should be taken; and when it is stationary and always when the wind is feeble, reference may be made 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 recommend that every observatory be furnished with a Hemispherical-Cup Anemometer—a self-registering instrument which shows the amount of Wind that passes in the day; from which also the Velocity of the Wind at the time of observation may be ascertained. For indicating

columns, under the following conditions:—When a Snow shower occurs, it should 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 occurs, 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

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 elements are recorded and noted to be made in the following manner:—In the column "Velocity" 6, S.W., W., N.W., N., E., S.E., and D.R. (for example,) will indicate that the wind direction is from the South West, West, North West, North, East, South East, and Drift Direction," respectively; ( $\frac{2}{W}$ ) 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, 4, st., will indicate that the clouds extend to four stories.

*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 depths of 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 should be made of the geological formation and agricultural condition of the soil in which these thermometers are placed.

*Ozone*.—Mention whether Schindler's or Moritz's papers are used. The paper is indicated by a lettered at 9, A, X, and 9 p.p.t. monomer box and a number at 10, 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, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829,

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EDINBURGH, November 1873.

of their amount, we ought not to take them into account in the *clouds'* column, though their appearances and changes should be noted among the *Remarks*.<sup>1</sup> The amount of cloud is entered from a scale of 0 to 10; thus, when the sky *overcast* is freed from clouds it is entered 0, when *half covered* by clouds, 5 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:<sup>2</sup> In the column "Velocity" 6, S. W. (for example,) will indicate that the wind is from the South West, and Direction,

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EDINBURGH, November 1873.

## OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

SHRUBS, ETC.	Barberry, . . . . .	Whiteberry, . . . . .
	Boutee or Elder, . . . . .	Rhododendron Ponticum, . . . . .
	Broom, . . . . .	Red Flowering Currant, . . . . .
	Hazel, . . . . .	Mountain Ash or Howan, . . . . .
	Flaw Thorn, . . . . .	Alexecon, . . . . .
	Holly, . . . . .	Linna, . . . . .
	Laburnum, . . . . .	Plum, . . . . .
	Pear, . . . . .	Strawberry, . . . . .
	Peach, . . . . .	
	Roseberry, . . . . .	
	Gean, . . . . .	
	Cherry, . . . . .	
	Black Currant, . . . . .	
	Apple, . . . . .	
FRUITS.		
First in Blossom.		
First in Fruit.		
First in Blossom.		
First in Fruit.		
REGULATORY MEDS.	Quince, . . . . .	
	House-swallow, . . . . .	
	Lapwing, . . . . .	
	Plover, . . . . .	
	Sand-Martin, . . . . .	
	Starling, . . . . .	
	Swan, . . . . .	
	Rail or Corn Crane, . . . . .	
ARRIVAL.		
DEPARTURE.		

Have the goods also to state any information you may be able to collect relative to the Corps of Grain, Navy, Potatoes, Turnips, Brants, 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

To

Bogdick  
Jan. 7 1874



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Leochel-Bushnie, County of Aberdeen, in Lat. 57°10'50", Long. 2°45'W, Distance from Sea 28 miles.  
 Height of Cistern of the Barometer above Mean Sea-level 885 feet, above Ground 3 feet. During the MONTH of February, 1874.  
 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, including Thunder and Lightning, begin and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		Barometer.	Attach- ed Ther- mometer	Barometer.	Attach- ed Ther- mometer	Max.	Min.	Max. in Sun-rays	Min. on Grass.	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.	8 inches.	12 inches.					22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
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BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† for Temp. (Col. 2), = 28.892  
 "Corrected Mean" of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = 28.865  
 Mean at Station, corrected, and at 32°, = 28.879  
 Correction for height, feet above Mean Sea-level, = 980  
 Mean, reduced to 32°, and Sea-level, = 29.859  
 Highest Reading, corrected for Index error, on the 4 th, = 29.650  
 Lowest Do. Do., on the 26 th, = 28.120  
 Difference, or Monthly Range, = 1.530

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 6 th, = 52.0  
 Lowest in Month, corrected for Index errors, on the 10 th, = 21.0  
 Difference, or Monthly Range, = 31.0  
 "Corrected Mean" of all the Highest, (Col. 5), = 43.3  
 "Corrected Mean" of all the Lowest, (Col. 6), = 30.2  
 Difference, or Mean Daily Range, = 13.1  
 \*\* Calculated Mean Temperature of Month, = 36.8  
 S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 23 th, = 70.0  
 "Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 51.0  
 Lowest at Night, Black Bulb, (corrected for Index errors), on the 10 th, = 13.0  
 "Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 24.4  
 Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 36.4  
 Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 35.0  
 †† Computed Temperature of Dew-Point, = 33.0  
 †† Do. Elastic Force of Vapour, = 189  
 †† Do. Weight of Vapour in a Cubic Foot of Air, = 88  
 †† Relative Humidity, (Saturation = 100), = 88  
 RAIN fell on 10 Days; Amount in Inches, = 1.35

WIND.		SUMMARY.			
Direction.		N	NE	E	SE
A.M.	1				1
P.M.					2
Mean.	1				2

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

Grain of rain 0.70 of an inch.

Observations made and Return verified by William Bruce  
Bogside, Leochel-Bushnie

(Signed) William Bruce  
 The weather has been excellent during the month, very little snow or rain except on the 26 th, when there was a heavy shower of wind, rain, sleet and snow. Straw, beans and peas, turnips are plentiful. Fasting given in three families, one case proved fatal, severe colds prevalent people otherwise healthy, cattle healthy.



WITH REMARKS ON THE USE OF INSTRUMENTS.

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

*Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:*—When a Snow shower occurs it should 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 in the case of rain, the observer cannot be so 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

FINNBERG, November 1893.

[illegible][illegible] $T_0$ 

*Secretary of the Meteorological Society of Scotland*

EDINBURGH

Boyside  
Feb. 7/84.



## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Boyside, Leochel-bushnie, County of Aberdeen*, in Lat. *57°10'50"*, Long. *2°45'00"*, Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *885* feet, above Ground *3* feet.During the MONTH of *March* 1874.

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, including Thunder and Lightning, 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.	Atmos- phere	Barometer.	Atmos- phere	Max. No.	Min. No.	Max. in Sun-rays	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force	Direction.	Force	Readings of the H. Cup Anemometer. No. —	No. of hours in which it fell.	Amount in inches.	Velocity (0—10), and Direction.	Amount (0—10), and Species.	Velocity (0—10), and Direction.	Amount (0—10), and Species.	No. — 3 inches.	No. — 12 inches.					No. — 22 inches.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°					°
	1	29.010	43	29.240	44	44.0	35.0	48.0	33.0	45.0	44.0	40.0	40.0	S	1	96	5	21630	10	100	10	0	0	0	0	0	0	0	1		
	2	29.500	44	29.630	45	41.0	37.0	45.0	36.0	40.0	40.0	40.0	40.0	S	5	96	5	49020	01	100	10	0	0	0	0	0	0	0	2		
	3	29.615	44	29.530	40	49.0	37.0	55.0	36.0	41.0	40.0	45.0	43.5	S	5	96	1	87520	—	100	10	0	3	0	0	0	0	0	3		
	4	29.530	46	29.520	50	53.0	37.0	71.0	36.0	46.0	44.0	45.0	43.0	S	5	96	5	24290	—	60	10	0	7	0	0	0	0	0	4		
	5	29.630	39	29.850	47	45.0	34.0	47.0	29.0	41.0	40.0	36.0	35.0	S	5	96	5	70920	—	100	10	0	0	0	0	0	0	0	5		
	6	29.910	44	29.750	47	50.0	30.0	55.0	25.0	36.0	34.5	40.0	35.0	S	5	96	1	30660	—	100	10	0	5	0	0	0	0	0	6		
	7	29.625	44	29.300	47	49.0	34.0	60.0	26.0	43.0	39.0	42.0	40.0	S	5	96	1	96520	—	0	0	10	0	0	0	0	0	0	7		
	8	28.900	46	28.720	48	49.0	31.0	55.0	25.0	44.5	41.0	38.0	32.0	S	5	96	2	74550	14	40	30	0	7	0	0	0	0	0	8		
	9	28.810	42	28.830	40	33.0	26.0	40.0	20.0	27.0	26.0	23.0	22.0	S	1.5	96	2	58370	36	100	10	0	9	0	0	0	0	0	9		
	10	28.900	38	28.930	38	35.0	23.0	40.0	18.0	22.0	22.0	23.0	23.0	S	1.5	96	2	49930	54	100	10	0	5	0	0	0	0	0	10		
	11	29.160	35	29.200	39	30.0	20.0	35.0	12.0	26.0	25.0	26.0	25.0	S	1.5	96	1	41140	06	100	10	0	6	0	0	0	0	0	11		
	12	29.100	37	29.200	45	40.0	28.0	56.0	22.0	37.0	35.0	34.0	33.0	S	5	96	5	93220	—	100	10	0	8	0	0	0	0	0	12		
	13	29.300	41	29.440	44	43.0	32.0	48.0	34.0	40.0	38.0	36.0	35.0	S	1.5	96	1	60450	—	30	10	0	5	0	0	0	0	0	13		
	14	29.270	43	29.240	47	48.0	32.0	52.0	28.0	44.0	42.0	45.0	44.0	S	1	96	5	42370	04	100	10	0	2	0	0	0	0	0	14		
	15	29.220	40	29.200	50	54.0	22.0	60.0	38.0	48.0	46.0	46.0	44.0	S	5	96	5	87980	—	100	10	0	0	0	0	0	0	0	15		
	16	29.075	48	28.850	51	53.0	41.0	58.0	36.0	50.0	47.0	50.0	48.0	S	1.5	96	3	78210	—	100	10	0	2	0	0	0	0	0	16		
	17	28.850	50	28.840	52	57.0	46.0	66.0	38.0	53.0	48.0	43.0	41.0	S	5	96	5	91790	—	100	10	0	4	0	0	0	0	0	17		
	18	28.860	48	29.140	48	44.0	35.0	51.0	31.0	43.0	39.0	37.0	35.0	S	1.5	96	2	590280	07	60	10	0	5	0	0	0	0	0	18		
	19	28.700	44	28.600	44	46.0	31.0	50.0	26.0	35.0	34.0	35.0	32.0	S	1.5	96	2	577550	10	100	10	0	5	0	0	0	0	0	19		
	20	28.900	41	29.100	44	43.0	30.0	47.0	25.0	36.0	33.0	33.0	36.0	S	1.5	96	2	519280	20	0	100	0	6	0	0	0	0	0	20		
	21	28.900	43	28.770	47	49.0	32.0	48.0	26.0	39.5	39.0	46.0	44.0	S	1	96	1	52690	—	100	10	0	2	0	0	0	0	0	21		
	22	28.800	47	29.100	51	56.0	42.0	66.0	40.0	49.0	47.0	50.0	47.0	S	1	96	5	36520	—	30	10	0	4	0	0	0	0	0	22		
	23	29.200	49	29.190	53	58.0	39.0	70.0	30.0	49.0	45.0	49.5	47.0	S	1	96	5	83640	—	100	10	0	5	0	0	0	0	0	23		
	24	29.200	50	29.570	51	53.0	37.0	60.0	30.0	45.0	43.0	39.0	37.0	S	1	96	5	72090	—	100	10	0	4	0	0	0	0	0	24		
	25	29.520	46	29.470	50	58.0	30.0	71.0	22.0	43.0	40.0	44.0	40.0	S	5	96	5	86750	—	100	10	0	10	0	0	0	0	0	25		
	26	29.290	53	29.150	52	53.0	37.0	81.0	29.0	57.0	42.0	44.0	40.0	S	1	96	5	31630	—	0	100	0	8	0	0	0	0	0	26		
	27	28.930	50	28.550	51	52.0	39.0	65.0	33.0	46.0	44.0	47.0	44.0	S	5	96	3	64760	—	100	10	0	0	0	0	0	0	0	27		
	28	28.800	48	28.600	48	51.0	35.0	55.0	29.0	45.0	40.0	39.0	37.0	S	1.5	96	3	14840	15	0	300	9	0	0	0	0	0	0	28		
	29	28.560	46	28.500	48	50.0	32.0	60.0	26.0	44.0	41.0	41.0	39.0	S	5	96	1.5	14850	11	50	0	6	0	0	0	0	0	0	29		
	30	28.410	48	28.750	49	46.0	34.0	50.0	31.0	42.0	40.0	37.0	36.0	S	2.5	96	2	54750	15	100	10	0	5	0	0	0	0	0	30		
	31	28.530	47	28.600	48	48.0	34.0	64.0	30.0	44.0	42.0	36.0	34.0	S	1.5	96	2	08590	13	30	10	0	6	0	0	0	0	0	31		
Sums.		1771	14	159	13	14	12	11	13	131	11	13	12	10	9	4	226														
Means.		29.097	44.6	29.109	47.0	47.8	33.9	55.9	29.0	41.7	39.3	39.7	37.8	1.1	1.1																
† Total Corrections for Instrumental Errors.		-100		-100																											
‡ 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		

BAROMETER, “corrected mean” at 9 A.M., minus the Correction†† = *28.955*  
for Temp. (Col. 2), = *28.997*... - *0.042*...  
“Corrected Mean” of Barometer at 9 P.M., minus the Correction†† = *28.961*  
for Temp. (Col. 4), = *29.009*... - *0.048*...  
Mean at Station, corrected, and at 32°, = *28.958*  
Correction for height, feet above Mean Sea-level, = *972*  
Mean, reduced to 32°, and Sea-level, = *29.930*  
Highest Reading, corrected for Index error, on the 6 th., = *29.910*  
Lowest Do. Do., on the 30 th., = *28.410*  
Difference, or Monthly Range, = *1.500*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 25 th., = *58.0*  
Lowest in Month, corrected for Index errors, on the 11 th., = *20.0*  
Difference, or Monthly Range, = *38.0*  
“Corrected Mean” of all the Highest, (Col. 5), = *47.8*  
“Corrected Mean” of all the Lowest, (Col. 6), = *33.9*  
Difference, or Mean Daily Range, = *13.9*  
\*\* Calculated Mean Temperature of Month, = *40.8*  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 26 th., = *81.0*  
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun, = *55.9*  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 11 th., = *12.0*  
“Corrected Mean,” (Col. 8), of Black Bulb, Min. on grass, = *29.0*  
Difference of above Means or Range (“exposed”), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = *40.7*  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = *38.5*  
# Computed Temperature of Dew-Point, = *35.7*  
# Do. Elastic Force of Vapour, = *2.11*  
# Do. Weight of Vapour in a Cubic Foot of Air, = *83*  
# Relative Humidity, (Saturation = 100), = *83*  
RAIN fell on 14 Days; Amount in Inches, = *2.16*

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	7	8	7	4			
P.M.	1			3	5	2	16	3	1		
Mean.	2	0	0	3	6	5	11	3	1	1.19	1.28

\* 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.  
† Embesing corrections for both capillarity and Index Errors.  
‡ The Diurnal Range for Scotland is as yet unknown.  
§ Practically, though not absolutely a minute 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.

Evaporation, 1.76 inches

Observations made and Return verified by *William Bruce*  
*Boyside, Leochel-bushnie.*

Q. B.

Only received four sheets for this year and this is the last one. N.B.

(Signed) *William Bruce*

The weather has been dry and fine during the month, there has been more snow during March this year than for a good many years past. Snow scarce, but turns very plentiful. Snow with very much frost, and a few cases of red-water among crops, potatoes and morris disease among stock on two farms. Stock otherwise healthy.







# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Loch-Cushnie, County of Aberdeen, in Lat. 57° 10' 50", Long. 2° 45' 0", Distance from Sea 28 miles.  
Height of Cistern of the Barometer above Mean Sea-level 885 feet, above Ground 3 feet. During the MONTH of April 1874.

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, including Thunder and Lightning, 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.		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.	Direction.	Force.	Direction.	Force.		Readings of the H.Cup Anemometer No. —	No. of hours in which it fell.	Amount in inches.	Velocity (0—6), and Direction.							Amount (0—10), and Species.	Velocity (0—6), and Direction.	Amount (0—10), and Species.	No. 3 inches.	12 inches.	No. 22 inches.	Temperature of WELL at depth of — feet. No. —	Temperature at 1 fathom, and Density.	9 A.M.	9 P.M.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°		°	°	°	°							°	°	°	°	°	°	°	°	°	°
	1	28.700	44	28.520	46	45.0	31.0	60.0	28.0	39.0	36.0	39.0	38.0	SW	5	SW	2.5	10.60	0.5	—	10 at	9											1					
	2	28.220	45	27.840	50	51.0	36.0	63.0	32.0	45.0	41.0	47.0	44.0	SW	2	SW	3	22.920	0.4	10 at	3 at	3											2					
	3	27.715	46	28.200	46	50.0	32.0	73.0	28.0	41.0	37.0	34.0	32.0	SW	4	SW	1.5	76.822	0.2	5 at	3 at	5											3					
	4	28.130	42	28.250	44	42.0	30.0	59.0	27.0	39.0	34.0	38.0	34.0	SW	2	SW	2	69.130	—	2 at	10 at	6											4					
	5	28.300	43	28.470	46	45.0	34.0	60.0	33.0	40.0	37.5	40.0	37.0	SW	5	SW	—	53.6150	—	10 at	10 at	5											5					
	6	28.740	45	28.990	49	50.0	34.0	68.0	25.0	43.0	40.0	41.0	38.0	SW	5	SW	—	59.6430	—	10 at	3 at	6											6					
	7	29.000	45	28.840	47	49.0	33.0	81.0	25.0	45.0	43.0	44.0	43.0	SW	5	SW	1.5	134.20	0.6	10 at	10 at	2											7					
	8	28.800	46	28.770	48	55.0	34.0	82.0	25.0	45.0	40.0	38.0	35.0	SW	5	SW	—	45.410	0.5	5 at	0	6											8					
	9	28.500	45	28.530	48	55.0	34.0	60.0	23.0	41.0	40.0	37.0	36.0	SW	1.5	SW	—	71.490	0.5	10 at	3 at	4											9					
	10	28.450	45	28.420	48	51.0	30.0	70.0	20.0	40.0	38.0	36.0	35.0	SW	5	SW	—	79.590	1.0	10 at	10 at	3											10					
	11	28.400	46	28.540	48	57.0	27.0	80.0	18.0	42.5	40.0	37.0	36.0	SW	5	SW	—	83.050	—	—	3 at	9											11					
	12	28.700	46	28.800	47	45.0	28.0	60.0	19.0	40.0	37.5	38.0	36.0	SW	5	SW	—	99.630	—	10 at	10 at	—											12					
	13	28.540	44	28.830	47	45.0	29.0	64.0	21.0	41.0	39.0	39.5	38.0	SW	5	SW	—	52.790	—	10 at	10 at	—											13					
	14	29.160	45	29.190	48	50.0	35.0	60.0	30.0	45.0	42.0	43.0	42.0	SW	5	SW	—	52.660	—	10 at	10 at	—											14					
	15	29.150	45	29.130	50	51.0	34.0	59.0	26.0	46.0	45.0	43.0	42.0	SW	5	SW	—	53.7520	2.0	10 at	10 at	1											15					
	16	28.960	46	28.800	49	58.0	33.0	78.0	26.0	45.0	41.0	35.0	32.0	SW	1	SW	3	118.60	0.5	—	10 at	9											16					
	17	28.880	44	29.020	46	44.0	31.0	61.0	27.0	39.0	36.0	37.0	34.0	SW	2	SW	1.5	42.620	—	—	10 at	8											17					
	18	29.100	45	29.050	48	44.0	31.0	90.0	23.0	41.0	36.0	39.0	38.0	SW	5	SW	—	56.9110	1.5	—	10 at	—											18					
	19	29.060	47	29.015	52	57.5	35.0	79.0	34.0	35.0	33.0	50.0	46.0	SW	5	SW	1	0.970	—	—	6 at	4											19					
	20	29.030	52	29.020	53	60.0	40.0	88.0	35.0	55.0	50.0	50.0	46.0	SW	5	SW	—	5.80690	—	6 at	10 at	6											20					
	21	29.015	53	28.940	57	61.0	44.0	94.0	38.0	58.0	50.0	52.0	49.0	SW	5	SW	1	22.970	—	4 at	9 at	8											21					
	22	29.150	53	29.300	57	58.0	40.0	89	31.0	52.0	45.0	45.0	40.0	SW	1	SW	—	5.07070	—	3 at	—	13											22					
	23	29.300	53	29.200	56	53.0	28.0	77.0	18.0	49.0	44.0	51.0	48.0	SW	5	SW	—	5.29010	0.3	10 at	10 at	4											23					
	24	29.200	55	29.220	60	63.0	47.0	93.0	40.0	59.0	53.0	52.0	50.0	SW	5	SW	—	5.42490	—	5 at	10 at	6											24					
	25	29.290	56	29.300	63	70.0	42.0	100.0	34.0	57.0	54.0	56.0	55.0	SW	5	SW	—	5.51760	0.5	8 at	10 at	6											25					
	26	29.390	60	29.400	63	68.0	45.0	95.0	38.0	62.0	59.0	53.0	51.0	SW	—	SW	—	5.69455	—	—	8 at	10											26					
	27	29.440	57	29.500	57	56.0	45.0	85.0	39.0	50.0	49.0	43.0	42.0	SW	5	SW	—	5.82620	0.3	10 at	10 at	6											27					
	28	29.600	57	29.550	54	53.0	38.0	71.0	35.0	49.0	45.0	40.0	39.0	SW	—	SW	—	5.19230	—	3 at	6 at	7											28					
	29	29.490	50	29.370	59	66.0	40.0	101.0	30.0	53.0	49.0	52.0	49.0	SW	5	SW	—	5.36210	—	—	—	14											29					
	30	29.245	57	29.230	56	55.0	39.0	71.0	35.0	56.0	53.0	42.0	40.0	SW	1	SW	—	5.78190	—	—	10 at	3											30					
	31																																	31				
	Sums.	1191	13	139	17	11	11	10	14	13	12	13	14	10	12		4	0.88																				
	Means.	28.889	48.5	28.908	51.4	53.5	35.0	75.8	28.7	46.4	42.9	43.1	40.8																									
	† Total Corrections for Instru- mental Errors.	-100		-100																																		
	† Corrections for Diurnal Range.																																					
	"Cor- rected Means."																																					
	No. of Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30							

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction for Temp. (Col. 2), = 28.737  
for Temp. (Col. 2), = 28.789 — 0.052  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction for Temp. (Col. 4), = 28.749  
for Temp. (Col. 4), = 28.808 — 0.059  
Mean at Station, corrected, and at 32°, = 28.743  
Correction for height, feet above Mean Sea-level, = 964  
Mean, reduced to 32°, and Sea-level, = 29.707  
Highest Reading, corrected for Index error, on the 28th, = 29.600  
Lowest Do. Do., on the 3th, = 27.715  
Difference, or Monthly Range, = 1.885

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 24th, = 70.0  
Lowest in Month, corrected for Index errors, on the 11th, = 27.0  
Difference, or Monthly Range, = 43.0  
"Corrected Mean" of all the Highest, (Col. 5), = 53.5  
"Corrected Mean" of all the Lowest, (Col. 6), = 35.0  
Difference, or Mean Daily Range, = 18.5  
\*\* Calculated Mean Temperature of Month, = 44.2  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 24th, = 101.0  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 75.8  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 11th, = 18.0  
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 28.7  
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 44.8  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 41.9  
# Computed Temperature of Dew-Point, = 30.5  
# Do. Elastic Force of Vapour, = 234  
# Do. Weight of Vapour in a Cubic Foot of Air, = 78  
# Relative Humidity, (Saturation = 100), = 78  
RAIN fell on 13 Days; Amount in Inches, = 0.88

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.		1	1	3	7	9	6	1	2		
P.M.	3		3		5	6	11	2			
Mean.	1	1	2	2	6	7	8	2	1	0.87	

0.76

\* 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. 8 and 6 will be entered as the "Calculated Mean Temperature."  
\*\* Observations not taken under the conditions specified in the Directions on the other side, or noted at the Top of each column, must be marked as such by the observer, in each Schedule. See over.

Evaporation 2.78 inches.

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

(Signed) William Bruce  
Gastric fever in our family, measles very prevalent a few cases of scarlet fever, people otherwise healthy. A few cases of red water among cows, one proved fatal, also several cases of mild fever, one case fatal, foot-and-mouth disease prevalent, a large number of young calves has died. Grass is looking well, turnips abundant, straw scarce.



WITH REMARKS ON THE USE OF INSTRUMENTS.

*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.

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

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 should 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 *clarry 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.

**Protection of Thermometers.**—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed 4 feet above grass in an exposed position, free from the influence of the sun, and so placed as to be free from the merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to "protect" the Thermometers, and to allow a complete ventilation in 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, may also be made to open to the south.

**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 and should be affixed to a frame separate from the "*Maximum*." It is recommended that these Thermometers be graduated on the glass stem. The "*Minimum*" Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When 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 loop, and must be

*Verification of Thermometers.*—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers as are *not* graduated on the stem, but merely on

parasus serosely vitulate into Hyemartretidae. Deacidions. 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;—a water-cap 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 gusset 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.

*Reading of the Thermometer*.—Great care must be taken to observe the *top of the meniscus*,—the intersection of the straight

*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, its indicating the greatest and least degrees during the day; the ordinary Thermometer is read at 9 P.M. only, its indicating the greatest degree during the day. 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 concurrence 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 should be taken; and when it is stationary, and always when the wind is feeble, reference may be made 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

*Estimating Wind Force* by such tables as that given in the schedule is, to say the least, unsatisfactory.

*Rain-gauges.*—Many causes conspire to produce anomalies in rain returns. They arise, partly, from unfavorable situations for observation and partly from the defective nature of the instruments used. It is, indeed, difficult to obtain an unexceptionable position for the rain-gauge; but in all cases the gauge must be sunk in the ground till its edges are on a level with the close cut grass around its mouth. The rain-gauge ought to be read daily at 9 A.M., and the readings entered in the returns of the day previous.

*Snow-falls may, for convenience, be registered in the rain-gauges, under the following conditions:—*When a Snow Shower occurs, it should be noted in the "Remarks," and the letter S affixed to the depth of water received in place. The depth of the snow must be measured in some open place where no drift is observed, and registered in addition to, and as a check upon, the indications of the rain-gauge. For wind, rain, and snow, as usual, in every column the observer cannot be so 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 stated from

Observations of the clouds are made at 9 A.M. and at sunset. The clouds are observed by means of a cloud counter, by measuring the condition and currents of the upper and lower stratus of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity" 6. S. W., (for example), will indicate that the strata of clouds travel with *average* velocity toward S. W., and in the column "Direction" 2. W., will indicate that the strata in the lower regions from W., with a *drift* toward the *same* speed of the former. Again, in the second "Cloud,"

By its amount and consistency,—the Council resolution being made at 9 A.M., by observations in this interesting department being made at 9 P.M.—the thermometers placed in the earth, their bulbs being sunk to such depths as 3, 12, and 22 inches; and the signs above ground pronounced from the sun's rays, and fitted with sloping tin collars, prevent rain water being conveyed to the bulbs by the stems, or even through wooden frames. Mention should be made of the geological condition of the soil in which these instruments are placed.

The 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 accordingly recommend that the temperature of the sea be carefully taken by a properly constructed apparatus, from boats, from the sides of piers and rocks round the coast, where it is not influenced by that of river water. At or near the time of high tide, on the 15th, 17th, and 25th of each month, the thermometer to be sunk exactly six feet (one fathom), and after ten minutes have elapsed, drawn up and read. When convenient

**Remarks.**—The “Remarks” column is too narrow, but unfortunately, some of the most valuable observations that can be made are those for which no rules can be given nor hours determined. The use of contractions ought, therefore, to be taken advantage of, and a list of such as are recognised and in use are given at the foot of the column. Besides special and miscellaneous observations, great prominence ought to be given to this column to prevalent diseases, differences in character, 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, penumbral

ing. Additional remarks may be made on the margin.

*Observations* in connection with the periodic return of the birds, possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct special attention of Observers to the registration of such phenomena so 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 in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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

The Council recommend observers, before purchasing new instruments, to communicate with the Meteorological Society, so they consider it desirable that he should have full power to select any instrument which, on being presented for Council approval, does not afford him satisfaction.

(By Order) A. B.

EXETER, November 1872.

## OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS

[illegible][illegible]

Have the goodness also to state any information you may be able to connect relative to our crops of grain, dairy, fowls, 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

$$T_0$$

Bozside  
April 1844 -



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Leuch-lis-lane, County of Aberdeen, in Lat. 57° 10' 50", Long. 2° 45', Distance from Sea 28 miles.  
Height of Cistern of the Barometer above Mean Sea-level 885 feet, above Ground 3 feet. During the MONTH of May 1874.

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, including Thunder and Lightning, began and ended.		Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		9 A.M.		P.M.		9 h. A.M.										
		Barometer. No.	Attached Thermometer.	Barometer. No.	Attached Thermometer.	Max. No.	Min. No.	Max. in Sun's rays No.	Min. on Grass. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	No. of hours in which it fell.	Amount in inches.	Velocity (0-10), and Direction.	Amount (0-10), and Direction.	Velocity (0-10), and Direction.	Amount (0-10), and Direction.	No. 1. inches.	No. 2. inches.	No. 3. inches.						
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°						°
	1	29.300	53	29.360	52	53.0	37.0	82.0	35.0	45.0	40.0	42.0	38.5	2	1	2	5	0.89	50	3	at	5	at	10								1
	2	29.380	45	29.300	51	51.0	32.0	85.0	26.0	44.0	39.0	38.0	36.0	2	5	2	5	1.00	—	8	at	10	at	5								2
	3	29.080	50	29.090	50	45.0	35.0	58.0	32.0	42.0	41.0	40.0	37.0	2	1	2	1.5	0.7	—	10	at	10	at	4								3
	4	29.100	48	29.200	49	42.0	33.0	48.0	32.0	37.0	36.0	38.0	37.0	2	1	2	1.5	0.6	—	10	at	10	at	0								4
	5	29.160	47	29.100	50	47.0	35.0	65.0	34.0	40.0	38.5	38.0	37.0	2	5	2	5	1.0	—	10	at	10	at	2								5
	6	28.970	47	28.900	49	47.0	31.0	81.0	30.0	43.0	38.0	37.0	36.0	2	1	2	5	0.7	—	5	at	6	at	3								6
	7	28.860	48	28.900	48	45.0	32.0	50.0	30.0	40.0	38.0	38.0	37.0	2	5	2	1	0.3	—	10	at	10	at	2								7
	8	28.900	45	28.890	46	45.0	31.0	56.0	29.0	45.0	44.0	35.0	33.0	2	1	2	5	0.2	—	3	at	3	at	7								8
	9	28.900	46	28.940	48	41.0	31.0	65.0	27.0	40.0	37.0	36.0	35.0	2	1	2	5	0.4	—	5	at	10	at	2								9
	10	29.070	46	29.160	48	46.0	33.0	67.0	30.0	41.0	39.0	38.0	36.0	2	5	2	5	1.0	—	10	at	10	at	3								10
	11	29.265	47	29.400	49	46.0	33.0	65.0	27.0	42.0	40.0	37.0	36.0	2	1	2	5	0.5	—	5	at	10	at	2								11
	12	29.470	47	29.530	48	43.0	34.0	50.0	34.0	39.0	38.0	38.0	36.5	2	5	2	5	—	—	10	at	10	at	—								12
	13	29.550	46	29.500	47	45.0	33.0	52.0	32.0	40.0	37.0	37.0	36.0	2	5	2	5	—	—	10	at	10	at	—								13
	14	29.450	47	29.280	47	47.0	37.0	50.0	30.0	44.0	40.5	37.0	36.0	2	5	2	5	7.5	—	10	at	10	at	—								14
	15	29.470	47	29.540	49	47.0	31.0	64.0	30.0	42.0	39.0	39.0	36.0	2	5	2	5	—	—	10	at	2	at	7								15
	16	29.530	46	29.500	50	54.0	27.0	91.0	22.0	45.0	41.0	36.0	35.0	2	5	2	5	—	—	—	—	—	—	14								16
	17	29.470	50	29.450	55	62.0	29.0	95.0	25.0	56.0	48.0	51.0	46.0	2	5	2	5	—	—	—	—	—	—	15								17
	18	29.480	53	29.510	55	56.0	38.0	55.0	30.0	50.0	49.0	45.0	44.0	2	5	2	5	—	—	10	at	10	at	—								18
	19	29.540	54	29.530	56	50.0	40.0	60.0	35.0	45.0	43.5	43.0	41.0	2	5	2	5	—	—	10	at	4	at	4								19
	20	29.540	54	29.440	56	57.0	39.0	103.0	34.0	46.0	43.0	41.0	40.0	2	5	2	5	—	—	10	at	—	11									20
	21	29.340	52	29.230	52	53.0	35.0	80.0	29.0	43.0	42.0	42.0	41.0	2	5	2	5	—	—	10	at	10	at	3								21
	22	29.100	50	29.000	52	46.0	38.0	54.0	37.0	43.0	41.0	42.0	40.0	2	5	2	5	—	—	10	at	10	at	—								22
	23	28.950	53	28.960	58	59.0	38.0	91.0	34.0	51.0	49.0	46.0	45.0	2	5	2	5	—	—	5	at	10	at	4								23
	24	28.950	53	29.020	54	46.0	38.0	47.0	35.0	45.0	44.0	45.0	44.0	2	5	2	5	1.3	—	10	at	10	at	—								24
	25	29.110	51	29.190	51	59.0	39.0	59.0	38.0	42.0	41.0	44.0	43.0	2	5	2	5	—	—	10	at	10	at	—								25
	26	29.200	52	29.140	57	59.0	41.0	70.0	41.0	48.0	47.0	50.0	48.0	2	5	2	5	—	—	10	at	10	at	—								26
	27	29.140	56	29.000	56	60.0	44.0	94.0	41.0	52.0	47.0	50.0	47.0	2	5	2	5	1.1	—	6	at	10	at	6								27
	28	28.870	55	29.000	58	58.0	43.0	92.0	38.0	52.0	47.0	46.0	42.0	2	1	2	1	—	—	5	at	3	at	9								28
	29	29.010	55	28.900	57	61.0	39.0	104.0	34.0	52.0	46.0	39.0	36.0	2	5	2	5	1.6	—	6	at	10	at	7								29
	30	28.770	58	28.800	61	61.0	45.0	77.0	44.0	55.0	52.0	51.0	47.0	2	1	2	1	—	—	10	at	6	at	5								30
	31	28.850	59	28.800	61	60.0	45.0	70.0	44.0	57.0	54.0	57.0	54.0	2	1	2	1	—	—	6	at	10	at	2								31
Sums.		14131	13	133	16	14	14	17	12	10	151	151	151	9	13			196														
		5784	11	5860	70	412	1850	80	930	1660	785	530	3060	215	215																	
Means.		29.187	50.4	29.179	52.3	51.3	36.0	70.0	33.0	45.4	42.5	41.8	39.9	7	7																	
† Total Corrections for Instrumental Errors.		+100		+100																												
† Corrections for Diurnal Range.																																
"Corrected Means."																																
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† for Temp. (Col. 2), = 29.087 — 0.56 = 29.031  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = 29.079 — 0.62 = 29.017  
Mean at Station, corrected, and at 32°, = 29.024  
Correction for height, feet above Mean Sea-level, = 966  
Mean, reduced to 32°, and Sea-level, = 29.990  
Highest Reading, corrected for Index error, on the 13th, = 29.550  
Lowest Do. Do., on the 30th, = 28.770  
Difference, or Monthly Range, = 0.880

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 17th, = 62.0  
Lowest in Month, corrected for Index errors, on the 16th, = 27.0  
Difference, or Monthly Range, = 35.0  
"Corrected Mean" of all the Highest, (Col. 5), = 57.3  
"Corrected Mean" of all the Lowest, (Col. 6), = 36.0  
Difference, or Mean Daily Range, = 15.9  
\*\* Calculated Mean Temperature of Month, = 43.8  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 29th, = 104.0  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 70.0  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 22nd, = 16.0  
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 33.0  
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 43.6  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 41.2  
† Computed Temperature of Dew-Point, = 38.4  
† Do. Elastic Force of Vapour, = 2.32  
† Do. Weight of Vapour in a Cubic Foot of Air, = 81  
† Relative Humidity, (Saturation = 100), = 81  
RAIN fell on 13 Days; Amount in Inches, = 1.96

WIND.		SUMMARY.									
Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	12	1	5	1	1	3	3	4	1		
P.M.	13	1	4	1	2	6	1	3			
Mean.	12	1	5	1	2	4	2	3	1	70	0.49

\* 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 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.

Evaporation 2.85 inches.

Observations made and Return verified by William Bruce  
Bogside, Leuch-lis-lane

(Signed) William Bruce  
The weather during the month has been very dry, the hay crop has therefore the appearance of being under an overcast. The grain crops are looking fine. Turnips have come up fine, but unless rain come soon they cannot stand. Grass plentiful. Pasture fine in one family, one case of which has proved fatal. Poultry in general healthy. A large number of cattle have died in Leuch-lis-lane more than for many years, on one farm four died in one week. Cattle and horses other wise healthy.



# INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS,

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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

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

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

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

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 should then be carried with the cistern uppermost. Before suspending the Barometer for use, it must be ascertained whether the space above the mercury in the tube is a complete vacuum; this is the case when, on inclining the instrument so that the mercury strikes the top of the tube, a *sharp tap* is produced. If this is prevented by air it may be removed to the cistern, and got rid of, by inverting the Barometer (care being taken to prevent the loss of mercury by tightening the ivory peg), and gently tapping it; and if this plan fails, the instrument must be repaired.

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

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

**Protection of Thermometers.**—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, 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 may also be made to open to the south.

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

dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally. The above remarks apply equally to the Thermometers for registering the greatest heat from the sun's rays, and the least from radiation during night. Their bulbs have a black coating, which may easily be made or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "*Maximum*" should be freely exposed to the sun, and the "*Minimum*" should rest on wooden supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by dissipation.

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

**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—89° 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 40½, may or less must be registered 40° 2 or 40° 3, and 40° 7 or 40° 8 respectively. In reading Rutherford's "*Max*," and "*Min*," Thermometers, the indication of that end of the index which is next to the surface of the mercury or alcohol is alone noted. Readings of the Thermometers, especially of the wet and dry bulbs, must be rapidly taken, being so readily affected by heat from the person of the observer.

**Hour of observing Temperature.**—The Hygrometer is read at 9 A.M. and 9 P.M. The self-registering Thermometers are read at 9 P.M. only, as indicating the greatest and least degrees of temperature in the 24 hours preceding. It is not a matter of indifference when the self-registering Thermometers are read; since, in winter at least, the extremes may occur at any hour; and it is necessary to refer their occurrence to their proper meteorological *days*. 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 should be taken; and when it is stationary, and always when the wind is feeble, reference may be made 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 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 may also be 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 instrument 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 at 9 A.M., and the readings entered in the returns of the day previous.

**Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:**—When a Snow shower occurs, it should 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 to 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 "*Remarks*," though their appearances and changes should be noted among the "*Remarks*." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is free from clouds it is entered 0, when half covered by clouds, 5 and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "*Velocity*" 6, S. W.

and Direction," (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "*Cloud*" column, an entry of 2, cu-st, (e.g.) will indicate that the higher regions are covered to the "*amount*" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

**Sunshine.**—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. **Underground Thermometers.**—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and constancy,—the Council recommend that observations in this interesting department be made at 9 A.M. by thermometers placed in the earth, their bulbs being sunk to depths of 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 should 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 boats 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.

**Come.**—Mention whether Schönbrunn's or Molliet's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indications registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 35°, as an *exemplar* entry in the schedule will indicate that the *come* paper is tinted as "3" on the scale, that the *direction* is from the N.W., and that its force is "35°," *i. e.*, that it is *blowing fresh*.

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

**Remarks.**—The "*Remarks*" column is too narrow, but unavoidably so. Some of the most valuable observations that can be taken are those for which no rules can be given nor hours assigned. The use of contractions ought, therefore, to be taken every advantage of, and a list of such as are recognised and in use 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, thunderstorms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on the vicinity of an Observatory, the height of clouds and of the snow-line in winter should be recorded.

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. should 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-margins. Additional remarks may be made on the margin, *Observations* in connection with the periodic return of the seasons, possess not only great scientific value, but are of considerable interest to the Agriculturist. The Council would direct the special attention of Observers to the registration of such phenomena so that the published Summaries may fairly represent the whole of Scotland. Observations ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

The Council recommend that *yearly* observations be taken;—viz., on the 21st days of March, June, September, and December. Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the makers.

The Council recommend observers, before purchasing new instruments, to 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, November 1874.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Grass.	Wheat.	Barley.	Peas.	Beans.	Potatoes.	Turnips.	Rye Grass.
Alder.	20	12	11	12	12	12	12	12
Aspen.	20	12	11	12	12	12	12	12
Beech.	20	12	11	12	12	12	12	12
Birch.	20	12	11	12	12	12	12	12
Elm.	20	12	11	12	12	12	12	12
Larch.	20	12	11	12	12	12	12	12
Linne.	20	12	11	12	12	12	12	12
Oak.	20	12	11	12	12	12	12	12
Sycamore or Plane.	20	12	11	12	12	12	12	12

SHRUBS, ETC.	Apple.	Black Currant.	Cherry.	Gooseberry.	Hawthorn.	Holly.	Laurum.	Lilac.	Mezereum.	Mountain Ash or Rowan.	Red Flowering Currant.	Rhododendron Ponticum.	Whin.
Barberry.	30	5	18	23	30	31	30	30	30	30	30	30	30
Broom.	30	5	18	23	30	31	30	30	30	30	30	30	30
Boortree or Elder.	30	5	18	23	30	31	30	30	30	30	30	30	30
Black Currant.	30	5	18	23	30	31	30	30	30	30	30	30	30
Cherry.	30	5	18	23	30	31	30	30	30	30	30	30	30
Gooseberry.	30	5	18	23	30	31	30	30	30	30	30	30	30
Hawthorn.	30	5	18	23	30	31	30	30	30	30	30	30	30
Holly.	30	5	18	23	30	31	30	30	30	30	30	30	30
Laurum.	30	5	18	23	30	31	30	30	30	30	30	30	30
Lilac.	30	5	18	23	30	31	30	30	30	30	30	30	30
Mezereum.	30	5	18	23	30	31	30	30	30	30	30	30	30
Mountain Ash or Rowan.	30	5	18	23	30	31	30	30	30	30	30	30	30
Red Flowering Currant.	30	5	18	23	30	31	30	30	30	30	30	30	30
Rhododendron Ponticum.	30	5	18	23	30	31	30	30	30	30	30	30	30
Whin.	30	5	18	23	30	31	30	30	30	30	30	30	30

Heavy the goodness also to state any information you may be able to collect relative to the crops of Grain, Hay, Potatoes, Turnips, Fruits, etc., whether any have suffered from blight, disease, etc. Whether Epiphytic, and the Agricultural condition of the district generally.

BOOK POST.

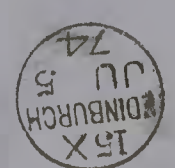
Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.



Bozide  
May 1974





## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Bogside, Leuchel-Caslinie*, County of *Aberdeen*, in Lat.  $57^{\circ}10'30''$ , Long.  $2^{\circ}45'0''$ , Distance from Sea *28* miles.Height of Cistern of the Barometer above Mean Sea-level *885* feet, above Ground *3* feet.During the MONTH of *June* 187*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, including Thunder and Lightning, 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.	Atmospheric.	Barometer.	Atmospheric.	Max.	Min.	Max.	Min.	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.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
		* No.	Thermometer.	No.	Thermometer.	No.	No.	No.	No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	9 h. A.M.	No.	Direction.	No.	Direction.	Hours.	inches.	inches.	inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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BAROMETER, “corrected Mean” at 9 A.M., minus the Correction†† = *29.079*  
for Temp. (Col. 2), = *29.150*... - *0.071* = *29.079*  
“Corrected Mean” of Barometer at 9 P.M., minus the Correction†† = *29.054*  
for Temp. (Col. 4), = *29.137*... - *0.083* = *29.054*  
Mean at Station, corrected, and at 32°, = *29.067*  
Correction for height, feet above Mean Sea-level, = *949*  
Mean, reduced to 32°, and Sea-level, = *30.016*  
Highest Reading, corrected for Index error, on the 15<sup>th</sup>, = *29.840*  
Lowest Do. Do., on the 30<sup>th</sup>, = *28.830*  
Difference, or Monthly Range, = *1.010*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 14<sup>th</sup>, = *73.0*  
Lowest in Month, corrected for Index errors, on the 12<sup>th</sup>, = *35.0*  
Difference, or Monthly Range, = *38.0*  
“Corrected Mean” of all the Highest, (Col. 5), = *61.6*  
“Corrected Mean” of all the Lowest, (Col. 6), = *42.0*  
Difference, or Mean Daily Range, = *19.6*  
\*\* Calculated Mean Temperature of Month, = *51.8*

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 17<sup>th</sup>, = *114.0*  
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun, = *88.4*  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 6<sup>th</sup>, = *30.0*  
“Corrected Mean,” (Col. 8), of Black Bulb, Min. on grass, = *38.4*  
Difference of above Means or Range (“exposed”), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = *52.2*  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = *49.3*  
†† Computed Temperature of Dew-Point, = *45.9*  
†† Do. Elastic Force of Vapour, = *310*  
†† Do. Weight of Vapour in a Cubic Foot of Air, = *78*  
†† Relative Humidity, (Saturation = 100), = *78*  
RAIN fell on 9 Days; Amount in Inches, = *1.88*

WIND.		SUMMARY.				
Direction.		N	NE	E	SE	S
A.M.	7	3	4	3	7	2
P.M.	10	2	1	2	7	4
Mean.	8	0	3	2	3	2

0.73

Observations made and Return verified by *William Bruce*  
*Bogside, Leuchel-Caslinie*

(Signed) *William Bruce*  
The weather during the month was very dry and warm, till the last week when there was a copious fall of rain which greatly revived the vegetation. The hay crops will be far below an average level. The grain crops will also be light unless there be frequent rains the turnips have come up fine except the last sowing which has been very stop. Potatoes have a fine appearance. Grass is plentiful. There are cases of measles, and scarlet fever. Rattle in general healthy, a large number of deaths among young cattle from fever-tail, a few cases of Red water among cows, excepting the above cattle and horses healthy.







# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Leuchel-Cushnie, County of Aberdeen, in Lat. 57° 10' 50", Long. 2° 45' 0" W, Distance from Sea 28 miles.  
Height of Cistern of the Barometer above Mean Sea-level 882 feet, above Ground 3 feet. During the MONTH of July 1874.  
The Hours of Observation are of Greenwich Time.

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS under Ground.			SEA.	OZONE.	GENERAL REMARKS.	Days of Month.	
		9 h. A.M.		9 h. P.M.		Protected in Shade & Test above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.							
		Barometer.	Atmospheric Thermometer.	Barometer.	Atmospheric 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.	12 inches.	22 inches.					
		* No.		No.		No.	No.	No.	No.																						
	1	28.920	63	28.960	64	70.0	51.0	110.0	49.0	63.0	61.0	58.0	56.5	J	5	J	5	12.270	10	10 at	10 at	6							r.	1	
	2	28.970	62	28.770	64	64.0	54.0	77.0	54.0	58.0	55.0	59.0	57.0	J	5	J	1.5	54.840	07	8 at	4 at	4							r. t.	2	
	3	28.770	62	28.770	61	64.0	51.0	97.0	50.0	59.0	54.0	52.0	51.0	J	1	J	1.5	83.730	06	4 at	8 at	8							r. t. l.	3	
	4	28.800	62	28.870	61	58.0	44.0	75.0	42.0	52.0	50.0	52.0	51.0	J	1.5	J	1.5	16.710		8 at	10 at	5							r.	4	
	5	29.090	60	29.300	62	58.0	46.0	80.0	40.0	56.0	52.0	54.0	48.0	J	1.5	J	1.5	54.910	06	5 at	6 at	8							r.	5	
	6	29.370	59	29.300	60	61.0	42.0	95.0	40.0	55.0	50.0	49.0	47.0	J	5	J	5	12.715		8 at	9 at	6									6
	7	29.330	60	29.200	60	63.0	45.0	82.0	48.0	59.0	54.0	54.0	51.0	J	5	J	5	71.240		10 at	10 at	2									7
	8	29.150	61	29.250	65	69.0	50.0	107.0	48.0	65.0	58.0	57.0	55.0	J	5	J	1	42.940		10 at	4 at	14									8
	9	29.200	63	29.360	67	70.0	50.0	106.0	44.0	60.0	57.0	61.0	57.0	J	1	C		56.120		8 at	10 at	8									9
	10	29.380	65	29.360	66	69.0	48.0	113.0	43.0	65.0	59.0	54.0	53.0	C		C		61.050		5 at	8 at	12									10
	11	29.340	64	29.300	62	58.0	49.0	72.0	47.0	55.0	52.0	51.0	50.5	J	5	J	5	63.500	26	10 at	10 at								r.	11	
	12	29.270	62	29.290	62	60.0	46.0	107.0	45.0	56.0	53.0	55.0	53.0	J	5	J	5	65.700	05	10 at	6 at	5							r.	12	
	13	29.300	62	29.200	63	71.5	44.0	120.0	41.0	65.0	59.0	56.0	57.0	J	5	J	5	69.930	06	5 at	10 at	7							r. t.	13	
	14	29.100	64	29.130	65	64.0	53.0	112.0	52.0	64.0	62.0	57.0	55.0	J	5	J	5	85.320	12	5 at	5 at	10							r. t. l.	14	
	15	29.300	64	29.420	65	65.0	49.0	105.0	48.0	61.0	57.0	56.0	55.0	J	5	J	5	96.670	07	5 at	10 at	5							r.	15	
	16	29.455	63	29.420	64	67.0	50.0	106.0	48.0	58.0	56.0	53.0	53.5	C		J		50.2930		10 at	5 at	4							r.	16	
	17	29.400	63	29.420	68	74.0	48.0	100.0	45.0	63.0	60.0	62.0	60.0	J	5	C		06.040		8 at	2 at	10									17
	18	29.450	68	29.430	71	79.0	53.0	109.0	43.0	73.0	66.0	63.0	60.0	J	5	6		114.70				16									18
	19	29.360	69	29.220	70	74.0	55.0	118.0	46.0	72.0	61.0	68.0	60.0	J	1	J	5	182.30	34			3 at	16								19
	20	29.140	67	29.060	67	68.0	54.5	95.0	52.0	60.0	59.0	57.0	56.0	C		J	5	228.80	41	8 at	10 at	4							r. t. l.	20	
	21	28.990	65	28.890	66	65.0	51.0	107.0	48.0	55.0	54.0	59.0	57.0	J	5	J	5	233.30	25	9 at	8 at	0							r. t.	21	
	22	28.920	64	28.940	64	60.0	49.0	87.0	45.0	57.0	55.0	52.0	51.0	J	5	C		34.010		10 at	5 at	3							r. t. l.	22	
	23	28.940	62	28.950	63	66.0	43.0	104.0	35.0	63.0	58.0	57.0	55.0	C		J	5	41.690	19	5 at	10 at	5							r. t. l.	23	
	24	29.000	63	29.100	63	60.0	50.0	82.0	47.0	54.0	53.0	55.0	53.5	J	5	J	5	59.960	11	10 at	10 at	3							r. t.	24	
	25	29.080	61	29.000	60	61.0	47.0	96.0	45.0	61.0	56.0	52.0	52.0	J	5	J	5	67.780		10 at	5 at	2									25
	26	28.850	60	28.770	60	57.0	44.0	63.0	36.0	54.5	53.0	54.0	54.0	J	1	J	5	91.710	15	10 at	10 at								r.	26	
	27	28.800	60	28.880	61	65.0	47.0	95.0	40.0	58.0	54.0	49.0	48.0	J	5	J	5	99.070	02	6 at	3 at	8							r. t.	27	
	28	28.880	60	28.900	62	64.0	41.0	97.0	33.0	58.0	57.0	53.0	52.0	C	5	J	5	97.760	10	10 at	2 at	3							r. t. l.	28	
	29	28.900	61	28.900	64	69.0	44.0	116.0	36.0	65.0	59.0	57.0	55.0	J	5	J	5	09.710		3 at	5 at	12							r. t.	29	
	30	28.970	61	29.000	63	66.0	49.0	104.0	43.0	57.0	51.0	53.0	49.0	J	5	J	5	27.580		3 at	5 at	11									30
	31	29.010	61	29.770	62	61.0	45.0	69.0	40.0	56.0	52.0	58.0	56.0	J	1	J	1.5	50.640	05	10 at	10 at	2							r.	31	
Sums.		3325	9	3130	115	1605	252	3006	1300	3055	1820	1840	1180	180	175			267													
Means.		29.107	62.9	29.101	63.7	65.2	48.1	97.0	44.2	59.9	55.1	53.9	53.8	58	55																
Total Corrections for Instrumental Errors.		-100		-100																											
Corrections for Diurnal Range.																															
Corrected Means.																															
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

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

TABLE FOR ESTIMATING FORCE OF WIND.					
Estimated Force, 0-6.	Common Designation.	Estimated Force 0-6.	Common Designation.	Estimated Force, 0-6.	Common Designation.
0-3	Calm	1-5	Light breeze	4	Blowing hard
3-1	Very light air	5-8	Fresh breeze	5	Blowing a gale
	Light air		Very fresh	6	Violent gale

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† for Temp. (Col. 2), = 28.918  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = 28.911  
Mean at Station, corrected, and at 32°, = 78.915  
Correction for height, feet above Mean Sea-level, = 939  
Mean, reduced to 32°, and Sea-level, = 29.854  
Highest Reading, corrected for Index error, on the 16th, = 29.455  
Lowest Do. Do., on the 23rd, = 28.770  
Difference, or Monthly Range, = 0.685

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 18th, = 79.0  
Lowest in Month, corrected for Index errors, on the 28th, = 41.0  
Difference, or Monthly Range, = 38.0  
"Corrected Mean" of all the Highest, (Col. 5), = 65.2  
"Corrected Mean" of all the Lowest, (Col. 6), = 48.1  
Difference, or Mean Daily Range, = 17.1  
\*\* Calculated Mean Temperature of Month, = 56.7

S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 13th, = 113.0  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 97.0  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 28th, = 33.0  
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 44.2  
Difference of above Means or Range ("exposed"), = 11.8

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 57.9  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 55.0  
Computed Temperature of Dew-Point, = 52.4  
Do. Elastic Force of Vapour, = 394  
Do. Weight of Vapour in a Cubic Foot of Air, ... = 82  
Relative Humidity, (Saturation = 100), = 82  
RAIN fell on 18 Days; Amount in Inches, = 2.47

WIND.		SUMMARY.									
Direction.		N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.
A.M.	4		1			13	4	3	2	4	
P.M.	3					12	4	5	2	5	
Mean.		3	0	1	0	13	4	4	2	4	5.8

\* 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. 9 and 11 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.

Evaporation 3.22 inches

Observations made and Return verified by William Bruce  
Bogside, Leuchel-Cushnie.

(Signed) William Bruce  
The weather has been fine during the month, rain frequent and mild and warm. Crops of all kinds have improved much. Turnips & potatoes have an excellent appearance. Hay & grain crops will be under an average. Gastric fever in two families people in general healthy, Cattle thriving.



WITH REMARKS ON THE USE OF INSTRUMENTS.

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*.

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

When a Barometer having adjustable surfaces has been removed from its fastenings, the ivory peg must be screwed so as to form a tight plug to the diaphragm. Then *scrape* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it should 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 rap* 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.

**Protection of Thermometers.**—The Council of the Society recommend that Self-registering Thermometers and Hygrometers be enclosed in a Box, painted white outside and inside, and fixed 4 feet above ground in an exposed position, free from merely local influences. The laths forming the sides and doors of the Boxes are arranged so as at once to protect the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-rails at the centre of the Box, and face the open end of the box. To accommodate a duplicate set of instruments, which is most desirable, the box is made double, the two sets being placed side by side, and the doors opening in opposite directions.

*Verification of Thermometers.*—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers as are *not* graduated on the stem, but merely on

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,"

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-

To avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or *column* of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read— $39^{\circ}.9$ ,  $40^{\circ}.0$ , or  $40^{\circ}.1$ ; or again,  $40^{\circ}.4$ ,  $40^{\circ}.5$ , or  $40^{\circ}.6$ , according as it indicates a little under, an exact coincidence with, or a little over  $40^{\circ}$ , or  $40^{\circ}.5$  respectively. So also  $40^{\circ}.3$ , and  $40^{\circ}.2$ , more or less must be registered  $40^{\circ}.2$  or  $40^{\circ}.3$ , and  $40^{\circ}.7$  or  $40^{\circ}.8$  respectively. In reading Rutherford's "*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.

The Council would recommend that every observatory be furnished with a *Hemispherical-Cup Anemometer*—a self-registering instrument which shows the amount of Wind that passes it at any 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, Lord's *Anemometer* may also be recommended; and Lord's *Directional Indicator* is also recommended; and the direction of smokes, &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.

*Snow-falls* may, for convenience, be registered in the rain-gauges under the following conditions:—When a Snow-shower occurs, it should 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 in every column, the observer cannot be 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 atmosphere ought to be estimated from

Observations of the clouds are made at 9 A.M. and at sunset, thus illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column "Velocity 6, S. W.", (for example,) will indicate that the "and Direction,"

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

*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

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.

*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.

In this column to prevalent diseases, differences in character of 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, and the direction of the wind, as well as such notes on the violence of wind attaining their maximum, as may be observed in 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 should be recorded.

<sup>c</sup> *Observations* in connection with the periodic return of the seasons<sup>1</sup>, 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 so 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 observers, before purchasing new instruments, to communicate with the Meteorological Secretary, and they consider it desirable that he should have full power to reject any instrument which, on being presented for comparison, does not afford him satisfaction.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	Alder, . . . . .	Beech, . . . . .	Birch, . . . . .	Elm, . . . . .	Larch, . . . . .	Lime, . . . . .	Oak, . . . . .	Sycamore or Plane,
In Flower.								
In Leaf buds								
First appear.								
In Leaf.								
Dressed of leaves.								
Of mentioning variety.	Bartley, . . . . .	Bare or Bigg, . . . . .	Oats, . . . . .	Wheat, . . . . .	Beans, . . . . .	Pease, . . . . .	Potatoes, . . . . .	Turnips, . . . . .
OROPS.								Rye Grass, . . . . .
Seeding or above ground.								
Planting.								
Appearing								
In Ear								
First Out								

[illegible]

Have the goodness also to state any information you may be able to collect relative to the crops or grain, rhy, rice, etc., whether plentiful, or in perfection, and the Agricultural condition of the district generally.

BOOK POST.

Mr ALEXANDER BUCHAN,

*Secretary of the Meteorological Society of Scotland*

EDINBURGH.

Boysides  
July 1896



# SCOTTISH METEOROLOGICAL SOCIETY.

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

Height of Cistern of the Barometer above Mean Sea-level 885 feet, above Ground 3 feet.

During the MONTH of August 1874

The Hours of Observation are of Greenwich Time.

[illegible]

<b>BAROMETER,</b> "corrected Mean" at 9 A.M., <i>minus</i> the Correction $\uparrow \uparrow$ for Temp. (Col. 2), = <del>28.882</del> - .078	= <u>28.804</u>
"Corrected Mean" of Barometer at 9 P.M., <i>minus</i> the Correction $\uparrow \uparrow$ for Temp. (Col. 4), = <del>28.893</del> - .082	= <u>28.811</u>
<b>Mean at Station, corrected, and at 32°,</b> .....	= <u>28.808</u>
Correction for height, feet above Mean Sea-level,.....	= <u>948</u>
<b>Mean, reduced to 32°, and Sea-level,</b> .....	= <u>29.756</u>
Highest Reading, corrected for Index error, on the 10 <sup>th</sup> ,.....	= <u>29.720</u>
Lowest Do. Do., on the 5 <sup>th</sup> ,.....	= <u>28.500</u>
Difference, or <b>Monthly Range,</b> .....	= <u>1.220</u>

**S.-R. THERMOMETER**, (in shade, etc.). **Highest in Month**, (corrected for Index Errors), on the 23<sup>rd</sup> th, ..... = 73.0

**Lowest in Month**, corrected for Index errors, on the 30<sup>th</sup> th, ..... = 35.0

Difference, or **Monthly Range**, ..... = 38.0

"Corrected **Mean**" of all the **Highest**, (Col. 5), ..... = 61.0

"Corrected **Mean**" of all the **Lowest**, (Col. 6), ..... = 43.9

Difference, or **Mean Daily Range**, ..... = 17.1

\* Calculated **Mean Temperature** of Month, ..... = 52.5

**S.-R. THERMOMETER**, (Black Bulb in Sun, **Highest**, (corrected for Index Errors), on the 22<sup>nd</sup> th, ..... = 105.0

"Corrected **Mean**" of all the **Black Bulb, Max. in Sun**, ..... = 85.6

**Lowest at Night**, Black Bulb, (corrected for Index errors), on the 30<sup>th</sup> th, ... = 27.0

"Corrected **Mean**," (Col. 8), of **Black Bulb, Min.** on grass, ..... = 38.1

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

<b>HYGROMETER, Mean</b> (corrected) A.M. and P.M. Reading of <b>Dry Bulb</b> , (Cols. 9 and 11), .....	=	53.2
<b>Mean</b> (corrected) A.M. and P.M. Reading of <b>Wet Bulb</b> , (Cols. 10 and 12), .....	=	50.8
‡ Computed <b>Temperature of Dew-Point</b> , .....	=	48.4
‡ Do. <b>Elastic Force of Vapour</b> , .....	=	34.0
‡ Do. <b>Weight of Vapour in a Cubic Foot of Air</b> , ...	=	
‡ <b>Relative Humidity</b> , (Saturation = 100), .....	=	84
<b>RAIN</b> fell on <b>20</b> Days; Amount in Inches, .....	=	9-64

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	1	13	2	2				
P.M.	1		1	1	2	3	20	2	1			
Mean.	2	0	1	1	2	5	16	2	2		74	

Evaporation 2.64 inches

Observations made and  
Return verified by { William Brace  
Bogside, Leochel-Cushnie.

(Signed) William Bruce

The weather during the month was very wet, a very bad hay season, the hay crop was far better than at one time was expected, but it was much damaged before it could be got in. The grain crops have a good appearance in this district, but harvest will be general on the end of the first week in September. Turneps and potatoes have an excellent appearance, no appearance of mildew among the potatoes as yet. People healthy, except gastric fever in two families. Cattle healthy.







## SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Leochel-Cushnie, County of Argyll, in Lat. 57°10'30", Long. 2°45'00", Distance from Sea 28 miles.  
Height of Cistern of the Barometer above Mean Sea-level 885 feet, above Ground 3 feet.

The Hours of Observation are of Greenwich Time.

During the MONTH of September 1874

ELECTRICITY.	Days of Month.	BAROMETER.				SELF-REGISTERING THERMOMETERS.				HYGROMETER.				WIND.				RAIN.		CLOUDS.				THERMOMETERS under Ground.				SEA.	OZONE.		GENERAL REMARKS.		Days of Month.			
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.		9 h. P.M.			No. of inches.	Temperature at 1 fathom, and Depth.				0-10.	9 A.M. 9 P.M.	
		Barometer. No.	Attached Thermometer.	Barometer. No.	Attached Thermometer.	Max. No.	Min. No.	Max. No.	Min. No.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.			Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No. of inches.	No. of inches.	No. of inches.	No. of inches.				No. of inches.	No. of inches.			No. of inches.	No. of inches.
		* No.																																		
1	28.540	58	28.730	59	61.0	45.0	66.0	38.0	56.0	56.0	51.0	48.0	S	2	W	5	07320	0.08	10m	2at	5												r. b. l.	1		
2	28.700	56	28.800	58	60.0	46.5	72.0	43.0	54.0	51.5	50.0	47.0	W	1.5	W	1	33830	0.05	6at	5at	6												r. l.	2		
3	28.790	56	28.750	58	59.0	46.0	72.0	39.0	52.0	49.0	49.0	46.0	W	1	W	1.5	69710	—	8at	2at	10												r.	3		
4	28.700	56	28.860	59	56.0	42.0	66.0	35.0	52.0	49.0	49.0	47.0	W	5	W	2	22590	0.24	10at	10m	4												r.	4		
5	28.980	55	29.100	55	53.0	40.0	78.0	35.0	43.0	41.0	43.0	42.0	W	5	W	5	80460	0.12	10at	10m	2												f. r.	5		
6	29.130	51	29.130	55	55.0	35.0	72.0	29.0	48.0	45.0	46.0	44.0	W	5	SE	5	84660	0.02	5at	10at	6												r.	6		
7	29.120	55	29.020	55	54.0	40.0	57.0	34.0	50.0	49.0	51.0	50.0	S	5	SE	5	86470	—	10at	10at	—														7	
8	29.000	55	28.850	57	63.0	47.0	98.0	44.0	56.0	53.0	51.0	48.0	W	5	W	1	93410	0.18	10at	10at	8														8	
9	28.600	55	28.460	56	55.0	42.0	55.0	35.0	50.5	50.0	47.0	46.0	S	5	W	5	07030	0.05	10at	2at	2													r. l.	9	
10	28.400	52	28.430	55	52.0	38.0	72.0	32.0	49.0	47.0	43.0	41.0	S	5	W	5	16750	0.10	10at	10at	—													r. l.	10	
11	28.600	52	28.540	56	55.0	42.0	77.0	38.0	49.0	46.0	50.0	48.0	W	5	E	5	31920	0.10	10at	10at	1														11	
12	28.830	56	29.130	57	55.0	43.0	75.0	39.0	58.0	56.0	45.0	43.0	W	1	W	1	77380	0.11	5m	10m	4													r. a.	12	
13	29.340	53	29.370	56	55.0	38.0	82.0	34.0	46.5	43.0	50.0	47.0	W	1	W	5	09820	—	3at	10at	11													a.	13	
14	29.220	53	28.970	56	56.0	40.0	66.0	35.0	51.0	48.0	56.0	53.0	W	1	S	3	57230	0.30	10at	10at	2													r. g.	14	
15	28.860	53	29.100	57	61.0	43.0	83.0	35.0	61.0	59.0	46.0	45.0	W	1	W	5	32080	—	3at	2at	8														15	
16	29.220	52	29.140	54	53.0	35.0	70.0	27.0	48.0	45.0	46.0	44.0	W	5	W	5	43310	—	10at	10at	4													so. ha.	16	
17	29.020	51	28.700	54	56.0	32.0	87.0	25.0	49.0	45.0	48.0	47.0	S	5	S	1.5	57180	0.07	—	10m	8													r.	17	
18	29.750	54	29.000	56	55.0	43.0	77.0	35.0	57.0	47.0	45.0	44.0	W	2	W	5	29900	0.12	7at	3at	5													r.	18	
19	28.900	54	28.850	57	56.0	40.0	60.0	33.0	51.0	49.0	56.0	54.0	W	5	W	2	45740	—	10at	10at	3													r.	19	
20	28.850	57	28.930	58	58.0	51.0	66.0	34.0	56.0	54.0	55.0	53.0	S	1	W	5	47990	—	10at	7at	2														20	
21	28.830	59	28.770	58	55.0	42.0	61.0	41.0	54.0	53.0	52.0	52.0	S	5	SE	1	87125	0.52	10at	10m	—													h. r.	21	
22	28.800	57	28.880	57	56.0	44.0	75.0	37.0	52.0	51.0	52.0	51.0	S	1.5	W	3	07765	0.03	8at	10at	5													r.	22	
23	29.000	55	29.120	58	56.0	47.0	75.0	44.0	53.0	51.5	51.0	49.0	W	2	W	1	22870	—	8at	10at	6														23	
24	29.200	55	29.140	57	57.0	41.0	75.0	35.0	52.0	50.0	50.0	48.0	W	5	W	5	34050	—	10at	10at	2														24	
25	29.130	55	29.200	57	56.0	47.0	74.0	43.0	53.0	51.0	50.0	48.0	W	5	W	5	70760	0.10	10at	10m	—														r.	25
26	29.300	55	29.220	55	55.0	41.0	72.0	33.0	49.0	46.0	45.0	43.0	C	—	W	5	98780	—	9at	10at	4														26	
27	29.100	55	29.000	57	58.0	42.0	85.0	37.0	49.0	47.0	53.0	51.0	W	5	W	5	06660	—	10at	10at	5														27	
28	28.860	55	28.600	57	60.0	46.0	74.0	39.0	55.0	54.0	55.0	53.0	W	1	W	2.5	32900	0.08	10at	10at	—														28	
29	28.530	56	28.500	56	55.0	43.0	70.0	39.0	57.0	56.0	45.0	53.0	W	1	W	2.5	52660	0.32	3at	10m	3													r.	29	
30	28.700	57	28.600	53	53.0	40.0	60.0	35.0	45.0	42.0	46.0	43.0	W	1	W	1	00650	—	3at	—	10														30	
31																																				31
Sums.		157	13	149	19	13	10	12	16	14	14	11	13				5																			
Means.		29.050	137	29.110	193	169	615	910	1820	500	240	2760	2260				259																			
† Total Corrections for Instrumental Errors.		-100		-100																																
† Corrections for Diurnal Range.																																				
"Corrected Means."																																				
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30					

NOTATION USED IN GENERAL REMARKS.											
a.	denotes aurora.	m.	denotes meteor.								
ci.	" cirrus.	ms.	" 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.								
st.	" dew.	s.	" sleet.								
f.	" fog.	sc.	" snow.								
fr.	" frost.	so. ha.	" solar halo.								
h. fr.	" hoar-frost.	sq.	" squall.								
h.	" haze.	squ.	" squalls.								
h. d.	" heavy dew.	t.	" thunder.								
h.	" hail.	t. s.	" thunder storm.								
l.	" lightning.	w.	" wind.								
l. cl.	" light clouds.	E.	" east of wind.								
l. cu.	" light cumulus.										
l. co.	" lunar corona.										
lu. ha.	" lunar halo.										

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† = 28.734  
for Temp. (Col. 2), = 28.802 - 0.068 = 28.734  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† = 28.731  
for Temp. (Col. 4), = 28.803 - 0.072 = 28.731  
Mean at Station, corrected, and at 32°, = 28.733  
Correction for height, feet above Mean Sea-level, = 952  
Mean, reduced to 32°, and Sea-level, = 29.685  
Highest Reading, corrected for Index error, on the 13 th, = 29.370  
Lowest Do. Do., on the 10 th, = 28.400  
Difference, or Monthly Range, = 0.970

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 13 th, = 63.0  
Lowest in Month, corrected for Index errors, on the 17 th, = 32.0  
Difference, or Monthly Range, = 31.0  
"Corrected Mean" of all the Highest, (Col. 5), = 56.5  
"Corrected Mean" of all the Lowest, (Col. 6), = 42.1  
Difference, or Mean Daily Range, = 14.2  
\*\* Calculated Mean Temperature of Month, = 49.2  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 8 th, = 88.0  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = 88.0  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 17 th, = 25.0  
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = 36.0  
Difference of above Means or Range ("exposed"), = 52.0

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 50.5  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 48.5  
† Computed Temperature of Dew-Point, = 46.4  
† Do. Elastic Force of Vapour, = 316  
† Do. Weight of Vapour in a Cubic Foot of Air, = 86  
† Relative Humidity, (Saturation = 100), = 86  
RAIN fell on 8 Days; Amount in Inches, = 2.59

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.
A.M.						8	15	3	3	1
P.M.						1	3	2	10	12
Mean.		0	0	1	1	5	12	7	3	1

Observations made and Return verified by William Bruce  
Bogside, Leochel-Cushnie

(Signed) William Bruce  
The weather on the whole has been good for harvest work, and the crop has been gathered in, in good order, and in this district the crop is above an average, the yield is good and the quality first class. Turnips and potatoes are both a good crop, but a good many of the potatoes are diseased. No disease in the district, people in general are healthy. Cattle are also healthy.



# INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS,

WITH REMARKS ON THE USE OF INSTRUMENTS.

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

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

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

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

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

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

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

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

**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 and should be affixed to a frame separate from the "Maximum." It is recommended that these Thermometers be graduated on the glass stem. The "Minimum" Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the column of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper lobe, and must be,

dislodged from thence by heating the part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These instruments should be hung horizontally. The above remarks apply equally to the Thermometers for registering the greatest height from the sun's rays, and the least from radiation during night. Their bulbs have a black coating, which may easily be made, or mended, by the application of a mixture of lamp black and printer's ink. They are placed in shallow blackened boxes, whose sides protect the bulbs from the wind. The "Maximum" should be freely exposed to the sun, and the "Minimum" should rest on open supports a few inches from the surface of the grass, in an open situation. Snow must not be allowed to cover either of these Thermometers; nor the sun's heat to affect the Minimum Thermometer by distillation.

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

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; a little 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 pushin 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.

**Reading of the Thermometer.**—Great care must be taken to avoid the effects of refraction, by bringing the eye exactly opposite the tip of the index or column of mercury. The reading ought to be taken to tenths of a degree, and noted in decimals. Thus the Thermometer will be read—39.3, 40.0, 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°, or 40¾°, respectively. So also 40¼°, 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 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 date. 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 should be taken; and when it is stationary, and always when the wind is feeble, reference may be made 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 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 may also be 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 at 9 A.M., and the readings entered in the returns of the day previous.

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

**Clouds.**—Convenient abbreviations for Luke Howard's nomenclature of clouds will be found on the other side. The amount of cloud in the atmosphere ought to be estimated from

the greater or less observation of the sky 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 should be noted among the "Remarks." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is free from clouds it is entered 0, when half covered by clouds, 5 and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner:—In the column "Velocity 6, S. W."

and Direction, "— (for example,) will indicate that the upper strata of clouds travel with *extreme* velocity from S.W., and those in the lower regions from W., with one-third the (*extreme*) speed of the former. Again, in the second "Cloud" column, an entry of "—, (e.g.) will indicate that the higher regions are covered to the "amount" of 4-tenths with *stratus* clouds; and that the sky is further obscured to the extent of 2-tenths by lower clouds of the *cumulo-stratus* kind.

**Shadows.**—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. **Underground Thermometers.**—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and constancy,—the Council recommend that observations in this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to depths of 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 should 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 boats, 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 Schonbein's or Moffat's papers are used. The paper is affixed by a pin to a board in the thermometer box, and the indications registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 35°, as an ozone entry in the schedule, will indicate that the ozone paper is tinted as "c" on the scale, that the wind is from the N.W., and that its force on the scale 0—6 is "4," i.e., that it is *blowing fresh*.

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

**Remarks.**—The "Remarks" column is too narrow, but unavoidable. 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 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, aurore boreales, remarkable depressions and elevations of the barometer, thunder storms, and remarkable falls of snow, hail, or rain, the hour of storms of wind attaining their maximum, as well as such notes on the vicinity of an Observatory, the height of clouds and of the snow-line in winter should be recorded.

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. should 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 so 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 *every day* observations be taken;—viz., on the 21st days of March, June, September, and December. Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the makers.

The Council recommend observers, before purchasing new instruments, to 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, November 1877.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	In flower.	First appearance.	In leaf.	Disseminated leaves.	CROPS.	Sowing or above ground.	Planting or above ground.	First Out.
Alder.					Barley.			
Aspen.					Bare or Blight.			
Beech.					Oats.			
Birch.					Wheat.			
Elm.					Beans.			
Larch.					Peas.			
Lime.					Potatoes.			
Oak.					Turnips.			
Sycamore or Plane.					Lye Grass.			

SHRUBS, ETC.	First in blossom.	First in blossom.	First in blossom.	First in blossom.	First in blossom.	First in blossom.	First in blossom.	First in blossom.
Barberry.								
Bourne or Elder.								
Broom.								
Hazel.								
Hawthorn.								
Holly.								
Laburnum.								
Lilac.								
Mezerion.								
Mountain Ash or Rowan.								
Red Flowering Currant.								
Rhododendron Ponticum.								
Whin.								

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

To

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.

BOOK POST.

13. 9. 1874  
14. 10. 1874



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside Loch-Cushnie, County of Aberdeen, in Lat. 57°10'50", Long. 2°45'0" W, Distance from Sea 28 miles.

Height of Cistern of the Barometer above Mean Sea-level 882 feet, above Ground 3 feet.

During the MONTH of October 1874

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.				SUNSHINE. Hours.	TEMPERATURE of WIND. No. of Fathoms.	SEA. Temperature and Direction.	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, including Thunder and Lightning, began and ended.	Days of Month.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		9 h. A.M.		9 h. P.M.		Protected in Shade, 4 feet above Ground.		Exposed Black Bulbs.		9 h. A.M.		9 h. P.M.		9 h. A.M.		9 h. P.M.		No. of hours in which it fell.	Amount in inches.	9 A.M.		P.M.		9 h. A.M.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
		Barometer. * No.	Attach- ed Ther- mometer	Barometer. No.	Attach- ed Ther- mometer	Max. No.	Min. No.	Max. in Shade.	Min. on Grass.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.			Readings of the H. Cup Anemometer. No. —	Velocity (0—4) and Direction.	Amount (0—10) and Species.	Velocity (0—4) and Direction.	Amount (0—10) and Species.	No. 3 inches.	12 inches.	No. 22 inches.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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<b>BAROMETER,</b> "corrected Mean" at 9 A.M., minus the Correction††)	=	28.654
for Temp. (Col. 2), = 28.704 - .052		
<b>"Corrected Mean" of Barometer at 9 P.M., minus the Correction††)</b>	=	28.688
for Temp. (Col. 4), = 28.748 - .060		
<b>Mean at Station, corrected, and at 32°,.....</b>	=	28.671
Correction for height, feet above Mean Sea-level,.....	=	967
<b>Mean, reduced to 32°, and Sea-level,.....</b>	=	29.638
Highest Reading, corrected for Index error, on the 30 th,.....	=	29.615
Lowest Do. Do., on the 21 th,.....	=	27.700
Difference, or <b>Monthly Range</b> ,.....	=	1.915

<b>S.-R. THERMOMETER</b> , (in shade, etc.), <b>Highest in Month</b> , (corrected for Index Errors), on the <u>12</u> th, <u>18</u> .....	=	<u>55.0</u>
<b>Lowest in Month</b> , corrected for Index errors, on the <u>3</u> th, .....	=	<u>28.0</u>
Difference, or <b>Monthly Range</b> , .....	=	<u>27.0</u>
"Corrected <b>Mean</b> " of all the <b>Highest</b> , (Col. 5), .....	=	<u>52.8</u>
"Corrected <b>Mean</b> " of all the <b>Lowest</b> , (Col. 6), .....	=	<u>55.6</u>
Difference, or <b>Mean Daily Range</b> , .....	=	<u>14.8</u>
** Calculated <b>Mean Temperature</b> of Month, .....	=	<u>43.0</u>
 <b>S.-R. THERMOMETER, Black Bulb in Sun, Highest</b> , (corrected for Index Errors), on the <u>28</u> th, .....		
"Corrected <b>Mean</b> ," (Col. 7), of <b>Black Bulb, Max. in Sun</b> , .....	=	<u>85.0</u>
<b>Lowest at Night</b> , Black Bulb, (corrected for Index errors), on the <u>31</u> th, ...	=	<u>62.2</u>
"Corrected <b>Mean</b> ," (Col. 8), of <b>Black Bulb, Min.</b> on grass, .....	=	<u>15.0</u>
Difference of above Means or Range ("exposed"), .....	=	<u>26.2</u>

<b>HYGROMETER, Mean</b> (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), .....	=	43.0
<b>Mean</b> (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), .....	=	41.2
†† Computed <b>Temperature of Dew-Point</b> , .....	=	39.0
†† Do. <b>Elastic Force of Vapour</b> , .....	=	.238
†† Do. <b>Weight of Vapour in a Cubic Foot of Air</b> , ...	=	
†† <b>Relative Humidity</b> , (Saturation = 100), .....	=	86
<b>RAIN</b> fell on 17 Days; Amount in Inches, .....	=	33.8

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	5	9	13	1	2		
P.M.					7	3	13	3	5		
Mean.	0	0	0	1	6	6	13	2	3	0.93	0.86

† 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 Maker's Name and Initials of the Maker may be here given.

† The heading corrections for both capacity and index errors.

† The Diurnal Range for Scotland is as yet unknown.

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

† The *Hygrometrical Deductions* are calculated from Glaisher's Hygrometrical Tables, Second Edition (1860).

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

† Any other remarks that may be desired in the Director's Column 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*.

Evaporation 1.29 inches.

Observations made and  
Return verified by { William Bruce  
Bogside, Lucchet-Cushnie.

(Signed) William Bruce

(Signed) H. W. Mann, Justice

The weather during the month has been excellent except the 21st when there was an huracan of wind & rain & sleet which did much damage to property, turning over many stacks and trees. The storm was at its height about 10 a. m. Potatoes lifting is pushed east the crop excellent, with little disease. On many farms stubble ploughing is finished, which is seldom the case in the end of October. Gastric fever in two families, no other disease in the district & no pile in general healthy, Cattle & throne &.

93 39



WITH REMARKS ON THE USE OF INSTRUMENTS.

*Self-Registering Thermometers*—Professors Phillips' and Negretti and Zambra's Patent "*Maximium*" Thermometers are recommended; printed directions for their use may be obtained with each instrument. The "*Minimum*" Thermometer of Rutherford is recommended and should be affixed to a frame separate from the "*Maximium*." It is recommended that these thermometers be graduated on the glass stem. The "*Minimum*" 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 restored 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 loop, and must be

*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 Council recommended that *term day* observations be taken; viz., on the 21st days of March, June, September, and December. Full directions for the use of the instruments mentioned above have been printed, and may be had along with them from the makers.

The Council recommend observers, before purchasing new instruments, to communicate with the Meteorological Society; 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.

EDINBURGH, November 1873.

## OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

[illegible]

W. A. C.

A circular black ink postmark from Aberdeen, dated 74. The text 'ABERDEEN' is curved along the top, 'H' is in the center, 'NO 5' is curved along the bottom, and '74' is at the very bottom. To the right of the circle is a red '10' stamp, partially obscured by a black horizontal line.

Engelhardt  
Oct. 1871



# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at *Wayside Lochet-Cushnie*, County of *Aberdeen*, in Lat. *57° 10' 50"*, Long. *2° 45' 00"*, Distance from Sea *28* miles.  
Height of Cistern of the Barometer above Mean Sea-level *885* feet, above Ground *3* feet. During the MONTH of *November* 1874.

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, including Thunder and Lightning, 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	Min. on Grass.	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 Species.	Amount (0-10), and Species.	Velocity (0-10), and Species.	Amount (0-10), and Species.	No. _____ 3 inches.	No. _____ 12 inches.					No. _____ 22 inches.
		inches.	°	inches.	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°					°
	1	29.440	47	29.410	49	53	25	70	14	31	30	35	34	C	—	C	—	21360	.05	—	—	—	8							1	
	2	29.270	48	29.180	49	44	30	46	16	46	46	44	44	SE	5	J	5	24060	.12	10 at	10 at	10 at	—							2	
	3	29.500	50	28.930	51	50	41	55	34	44	42	44	43	S	5	W	5	56130	.03	10 at	10 at	10 at	—							3	
	4	29.010	49	29.000	53	54	38	53	28	50	48	50	47	SW	1	W	1.5	71580	—	10 at	10 at	10 at	—							4	
	5	29.050	50	29.140	53	52	41	55	33	50	48	43	42	SW	5	W	5	09750	.02	10 at	10 at	10 at	—							5	
	6	29.300	49	29.200	49	49	32	60	23	39	37	42	40	W	5	W	5	29150	—	—	—	—	8							6	
	7	29.300	48	29.380	49	47	37	58	25	41	39	44	41	W	5	W	5	06790	—	—	—	3 at	8							7	
	8	29.200	49	29.350	53	53	41	60	36	51	48	54	52	W	2	W	1.5	47060	—	10 at	—	3 at	8							8	
	9	29.270	58	28.940	54	56	41	62	36	49	46	43	41	SW	1	W	3	33980	.10	10 at	—	10 at	—							9	
	10	29.160	47	29.220	45	43	28	45	23	35	33	30	29	SW	1	W	3	24320	.06	—	—	10 at	6							10	
	11	29.200	42	29.140	41	31	26	35	22	29	28	30	30	SW	1.5	W	2	92110	.40	10 at	—	6 at	4							11	
	12	29.200	47	29.115	43	34	27	40	22	35	33	34	33	SW	1.5	W	1	66620	.25	10 at	—	10 at	3							12	
	13	29.110	40	29.200	43	37	37	46	21	35	33	37	35	SW	1	W	1	27960	—	10 at	—	10 at	3							13	
	14	29.200	43	29.020	47	46	34	65	30	41	39	45	44	W	5	W	5	78355	.06	10 at	—	10 at	—							14	
	15	28.850	45	28.700	46	47	35	67	27	42	39	37	36	W	2	W	1	31640	—	—	—	6 at	7							15	
	16	28.680	45	28.560	45	39	33	50	24	35	34	36	35	W	5	W	1.5	83780	.19	—	—	10 at	5							16	
	17	28.800	43	28.900	44	38	32	44	26	35	34	37	35	W	5	W	5	45970	.02	4 at	—	8 at	4							17	
	18	28.820	43	28.720	45	42	33	50	25	36	33	39	37	W	5	W	1	94960	—	10 at	—	6 at	3							18	
	19	28.660	43	28.680	44	41	34	51	24	37	35	39	37	W	3	W	1	02450	.15	10 at	—	7 at	4							19	
	20	29.000	43	29.200	45	42	34	53	23	39	38	35	35	W	5	C	—	36710	—	10 at	—	10 at	3							20	
	21	29.300	44	29.280	45	39	28	42	19	34	33	32	32	W	3	W	5	31970	—	10 at	—	10 at	1							21	
	22	29.200	42	29.200	43	40	27	50	17	32	32	32	31.5	W	5	W	5	41880	—	11 at	—	5 at	3							22	
	23	29.260	42	29.270	42	33	28	38	19	31	30	33	32	W	5	C	—	49080	.02	10 at	—	10 at	2							23	
	24	29.200	41	29.120	42	41	29	52	25	37	36	35	34	SW	5	C	—	48180	.03	10 at	—	10 at	1							24	
	25	28.900	43	28.800	43	39	32	45	27	39	38	39	38	W	1	W	1.5	50610	.27	10 at	—	10 at	—							25	
	26	28.860	43	28.800	43	38	33	41	30	36	35	38	37	W	5	W	1.5	52260	—	10 at	—	10 at	1							26	
	27	28.790	40	28.780	40	37	31	37	24	34	33	33	32	W	1.5	W	5	71210	—	10 at	—	10 at	—							27	
	28	28.730	40	28.560	40	35	31	36	30	34	33	36	35.5	W	5	W	1	76810	.32	10 at	—	10 at	—							28	
	29	28.240	40	28.060	40	36	32	37	26	36	35	35	34	W	2	W	3	76620	.55	10 at	—	10 at	—							29	
	30	28.200	40	28.370	40	35	33	36	32	33	33	37	35	W	1	W	1	50180	.21	10 at	—	10 at	—							30	
	31																													31	
Sums.		118	11	129	11	14	12	10	13	13	15	13	12.1	18		7		2.6													
		0200	145	2140	166	70	83	147	9	161	246	201	247	210	250		305		3.85												
Means.		29.007	44.8	28.971	45.5	42.3	32.8	49.3	25.4	38.2	36.7	38.2	37.0	0.81		1.02															
† Total Corrections for Instrumental Errors.		-100		-100																											
† Corrections for Diurnal Range.																															
"Corrected Means."																															
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

NOTATION USED IN GENERAL REMARKS.					
a.	denotes aurora.	m.	denotes meteor.		
ci.	" cirrus.	ms.	" 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.	" strat.		
f.	" fog.	sc.	" scud.		
fr.	" frost.	s.	" sleet.		
h-fr.	" hard-frost.	s.	" snow.		
h.	" haze.	sol.h.	" solar halo.		
h. d.	" heavy dew.	sq.	" squall.		
hl.	" hail.	sgs.	" squalls.		
l.	" lightning.	t.	" thunder.		
h. cl.	" light clouds.	t. s.	" thunder storm.		
h. sh.	" light showers.	w.	" wind.		
lu. co.	" lunar corona.	gc.	" gale of wind.		
h. ha.	" hoar-frost.				

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

## NOTATION USED IN GENERAL REMARKS.

a.	denotes aurora.	m.	denotes meteor.
ci.	" cirrus.	ma.	" meteor.
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.	" sleet.
f.	" fog.	sc.	" squall.
fr.	" frost.	s.	" snow.
h-fr.	" hoar-frost.	so. h.	" solar halo.
h.	" haze.	sq.	" squall.
h. d.	" heavy dew.	sqs.	" squalls.
hl.	" hail.	t.	" thunder.
l.	" light clouds.	t. s.	" thunder storm.
li. cl.	" light showers.	w.	" wind.
lu. co.	" lunar corona.	g.	" gale of wind.
lu. lu.	" "		

## TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, "corrected Mean" at 9 A.M., minus the Correction†† for Temp. (Col. 2), = *28.865*  
"Corrected Mean" of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = *28.827*  
Mean at Station, corrected, and at 32°, = *28.846*  
Correction for height, feet above Mean Sea-level, = *978*  
Mean, reduced to 32°, and Sea-level, = *29.824*  
Highest Reading, corrected for Index error, on the / th, = *29.440*  
Lowest Do. Do., on the 29 th, = *28.060*  
Difference, or Monthly Range, = *1-380*

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 7 th, = *56.0*  
Lowest in Month, corrected for Index errors, on the / th, = *25.0*  
Difference, or Monthly Range, = *31.0*  
"Corrected Mean" of all the Highest, (Col. 5), = *42.3*  
"Corrected Mean" of all the Lowest, (Col. 6), = *32.8*  
Difference, or Mean Daily Range, = *9.5*  
\*\* Calculated Mean Temperature of Month, = *27.6*  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the / th, = *70.0*  
"Corrected Mean," (Col. 7), of Black Bulb, Max. in Sun, = *49.3*  
Lowest at Night, Black Bulb, (corrected for Index errors), on the / th, = *14.0*  
"Corrected Mean," (Col. 8), of Black Bulb, Min. on grass, = *25.4*  
Difference of above Means or Range ("exposed"), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = *38.2*  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = *36.8*  
† Computed Temperature of Dew-Point, = *34.8*  
† Do. Elastic Force of Vapour, = *.203*  
† Do. Weight of Vapour in a Cubic Foot of Air, = *88*  
† Relative Humidity, (Saturation = 100), = *88*  
RAIN fell on /8 Days; Amount in Inches, = *3.65*

WIND.	SUMMARY.									
	Direction.	N	NE	E	SE	S	SW	W	NW	Mean Force.
A.M.	/	/	/	/	/	6	4	11	4	1
P.M.	/	/	/	/	/	5	5	7	6	4
Mean.	/	/	/	/	/	5	5	9	5	2

*0.85*

Observations made and Return verified by *W. Bruce*  
*Wayside Lochet-Cushnie*

(Signed) *William Bruce*

The weather has been excellent for the season. Farm labour well advanced. Grain turning out well. Turnips excellent. No disease in the district. A very severe cold prevalent, excepting which people healthy. Cattle thriving.

*878*







# SCOTTISH METEOROLOGICAL SOCIETY.

Observations taken at Bogside, Loch-Cushnie County of Aburdeen, in Lat. 57° 10' 50", Long. 2° 45' 0", Distance from Sea 28 miles.  
Height of Cistern of the Barometer above Mean Sea-level 885 feet, above Ground 3 feet. During the MONTH of December 1874.  
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, including Thunder and Lightning, 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.	Atmospheric.	Barometer.	Atmospheric.	Max.	Min.	Max.	Min.	Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.	Direction.	Force.	Direction.	Force.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	Velocity (0-10), and Direction.	Amount (0-10), and Species.	No.	8 inches.	12 inches.	No.	22 inches.					
		* No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.					No.
	1	28.570	40	28.700	40	36	26	37	23	30	29	31	27	N	2	N	1.5	86410	30	10 st	10 st	3					su.	1			
	2	28.965	37	29.200	36	31	27	36	21	29	25	28	27	N	1	N	1.5	11530	—	5 st	—	4					su.	2			
	3	28.920	36	29.030	39	48	25	52	19	36	34	34	33	S	1	N	—	554850	—	10 st	8 st	2						3			
	4	28.700	39	28.600	40	44	31	48	26	40	37	41	39	N	1.5	N	—	599830	—	10 st	2 st	3						4			
	5	28.570	41	28.400	42	41	32	44	28	37	36	34	33	N	5	N	—	556420	0.4	—	8 st	4					n.	5			
	6	28.380	40	28.370	40	35	27	45	20	31	30	32	31	S	5	N	—	567240	—	6 st	—	6						6			
	7	28.460	38	28.800	40	33	26	36	20	31	31	32	31	N	1	N	2	77760	—	3 st	—	5						7			
	8	28.800	38	28.320	38	32	23	33	12	25	24	33	32	S	5	N	—	513940	—	10 st	10 st	—					su.	8			
	9	28.460	38	28.700	38	32	27	34	21	31	31	29	29	N	1	N	1	11890	15	4 st	5 st	4					su.	9			
	10	28.800	36	28.600	37	29	21	34	15	27	25	26	25	E	5	S	—	515130	0.7	—	5 st	7					su. cl. hl.	10			
	11	28.000	35	28.130	38	34	28	34	22	31	31	34	33	N	2	E	2	70890	4.2	10 u	10 u	—						11			
	12	28.500	38	28.700	38	33	28	34	30	32	31	31	31	N	1.5	N	—	597850	0.9	10 st	10 st	—					su.	12			
	13	28.900	38	29.070	38	32	24	33	20	31	30	32	31	N	5	N	—	501610	—	10 u	10 st	—					su.	13			
	14	29.230	39	29.225	38	33	24	40	20	32	31	24	24	N	5	N	—	534010	—	10 st	—	5						14			
	15	29.160	36	28.870	36	28	20	35	11	22	21	24	23	N	5	S	—	554350	3.2	—	10 st	6					su.	15			
	16	29.070	36	29.330	38	31	22	35	13	29	29	26	25	N	5	N	—	556780	0.4	10 st	8 st	4					su.	16			
	17	29.470	38	29.400	38	29	22	43	24	28	27	26	25	N	5	N	—	505860	—	10 st	10 st	5					su.	17			
	18	28.940	38	29.900	39	41	24	50	20	38	36	37	34	N	2	N	1	43430	1.0	10 st	5 st	3					n.	18			
	19	28.980	37	28.830	37	36	25	40	22	28	27.5	28	27	N	1.5	N	1.5	19860	5.2	3 st	10 u	2					su.	19			
	20	28.670	38	28.660	38	33	29	35	27	31	30.5	31	31	N	3	N	1.5	12270	3.8	5 st	10 st	3					su.	20			
	21	28.630	37	28.850	38	32	29	35	22	32	31.5	25	25	N	1.5	E	—	567610	4.0	—	10 st	2					su.	21			
	22	28.980	36	29.030	37	30	19	32	9	25	24	31	30	E	5	N	—	572220	0.3	10 st	10 st	—					su.	22			
	23	29.000	38	28.800	37	32	16	36	6	28	28	28	27	N	5	N	—	573520	—	10 st	3 ci	6					su.	23			
	24	28.700	37	28.700	38	31	21	33	14	28	27	29	28	N	5	N	—	581350	—	10 st	10 st	—						24			
	25	28.800	38	28.860	38	32	22	47	16	25	24	23	22	N	5	N	—	591585	—	—	—	6						25			
	26	29.000	38	29.110	38	35	21	45	16	32	31	29	28	N	5	N	—	515450	—	10 st	3 st	3						26			
	27	29.190	37	29.270	37	32	25	36	24	31	30	30	29	N	1.5	N	—	592910	0.8	—	10 st	2						27			
	28	29.270	39	29.300	38	32	23	37	19	30	29	31	30	N	5	N	—	571780	1.2	2 st	—	2					su.	28			
	29	29.330	37	29.500	37	31	18	46	14	28	28	25	24	N	1	N	—	576230	2.8	10 st	—	5					su.	29			
	30	29.500	35	29.500	36	29	21	35	19	25	24	25	24	N	5	N	—	580470	2.0	10 st	10 st	3					su.	30			
	31	29.370	36	29.300	35	26	14	37	4	26	25	17	17	N	5	N	—	584040	—	10 st	—	2					su.	31			
Sums.		15 11	29	15 6	19	11	14	13	11	12	12 1	13	13		11	13		354													
Means.		28.879	37.5	28.873	38.0	33.3	23.9	38.6	18.6	30.0	28.9	29.2	28.2	1.0	—	—	—														
† Total Corrections for Instrumental Errors.		-100		-100																											
† Corrections for Diurnal Range.																															
“Corrected Means.”																															
No. of Column.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

NOTATION USED IN GENERAL REMARKS.

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

TABLE FOR ESTIMATING FORCE OF WIND.

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

BAROMETER, “corrected Mean” at 9 A.M., minus the Correction†† for Temp. (Col. 2), = 28.756  
Corrected Mean” of Barometer at 9 P.M., minus the Correction†† for Temp. (Col. 4), = 28.748  
Mean at Station, corrected, and at 32°, = 28.752  
Correction for height, feet above Mean Sea-level, = 1.000  
Mean, reduced to 32°, and Sea-level, = 29.752  
Highest Reading, corrected for Index error, on the 29 th, = 29.500  
Lowest Do. Do., on the 11 th, = 28.000  
Difference, or Monthly Range, = 1.500

S.-R. THERMOMETER, (in shade, etc.), Highest in Month, (corrected for Index Errors), on the 3 th, = 48.0  
Lowest in Month, corrected for Index errors, on the 31 th, = 14.0  
Difference, or Monthly Range, = 34.0  
“Corrected Mean” of all the Highest, (Col. 5), = 33.3  
“Corrected Mean” of all the Lowest, (Col. 6), = 23.9  
Difference, or Mean Daily Range, = 9.4  
\*\* Calculated Mean Temperature of Month, = 28.6  
S.-R. THERMOMETER, Black Bulb in Sun, Highest, (corrected for Index Errors), on the 3 th, = 52.0  
“Corrected Mean,” (Col. 7), of Black Bulb, Max. in Sun, = 38.6  
Lowest at Night, Black Bulb, (corrected for Index errors), on the 11 th, = 4.0  
“Corrected Mean,” (Col. 8), of Black Bulb, Min. on grass, = 18.6  
Difference of above Means or Range (“exposed”), =

HYGROMETER, Mean (corrected) A.M. and P.M. Reading of Dry Bulb, (Cols. 9 and 11), = 29.6  
Mean (corrected) A.M. and P.M. Reading of Wet Bulb, (Cols. 10 and 12), = 28.5  
† Computed Temperature of Dew-Point, = 25.9  
† Do. Elastic Force of Vapour, = 1.35  
† Do. Weight of Vapour in a Cubic Foot of Air, =  
† Relative Humidity, (Saturation = 100), = 82  
RAIN fell on 17 Days; Amount in Inches, = 3.54

WIND. SUMMARY.

Direction.	N	NE	E	SE	S	SW	W	NW	Calm or Variable.	Mean Force.	Mean Velocity in miles per day.
A.M.	4	1	2		3	6	6				
P.M.	7	2			2	10	3				
Mean.	5	1	2	0	3	4	12	4			

Evaporation 1.09 inches.

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

(Signed) William Bruce  
The weather during the month has been of a very wintering nature, more so than for a number of years past. Frost very intense, snow will be scarce, turnips an excellent crop and standing out well. No disease in the district except diphtheria in one family which proved fatal in 4 or 5 cases. People generally healthy. Cattle healthy a good deal of distemper among horses, such as gravel and cut throat.



INSTRUCTIONS FOR TAKING METEOROLOGICAL OBSERVATIONS.

WITH REMARKS ON THE USE OF INSTRUMENTS.

ONE of the objects of immediate importance that the "Scottish Meteorological Society" has proposed to itself, is to secure a perfect uniformity in the system of observation pursued at all its Stations. A certain degree of uniformity is absolutely necessary to justify the publication of Monthly Results from different observations; and it is found that differences between the Returns from any two Stations, so very considerable as to render them quite incompatible, may arise from dissimilarity in the position or shelter of instruments, different hours of observation, or even from the use of differently constructed instruments. It is therefore hoped, that those 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 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 will be made with scrupulous accuracy; as a slight error here will vitiate the readings from the *remains*.

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 *care* up the mercury to within a quarter of an inch of the top of the tube, and take down the instrument; it should 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.

It 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 inside, and fixed 4 feet above grass in an exposed position, free from merely local influences. The lid is forming the sides and doors of the Boxes are arranged so as to open to "protect" the Thermometers, and to allow a complete ventilation of the interior. The instruments are suspended on cross-laths, in the centre of the Box, and face the door opening to the north. To accommodate a duplicate set of instruments, which is most desirable, doors may also be made to open to the south.

**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 and should be affixed to a frame separate from the "Maximum." It is recommended that these Thermometers be graduated on the glass stem. The "Minimum" Thermometer is liable to two derangements, both of which must be guarded against, and may be easily remedied by an observer. When the *column* of spirit breaks, it may be re-united by striking the instrument repeatedly against the palm of the hand; when part of the spirit distils by high temperature, it will be found in the upper lobe, and must be

dislodged from thence by heating that part over a lamp; the alcohol will evaporate and again condense in contact with the body of the liquid. These 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 Minimum Thermometer by distillation.

**Verification of Thermometers.**—No instrument ought to be used for Meteorological purposes till it has been carefully tested by comparison with a *Standard Thermometer*. When such Thermometers as are not graduated on the stem, but merely on an attached scale, undergo repairs, they are very liable to be moved from their position on the Scale, and ought never afterwards to be used without being *re-tested*. The self-registering, and especially the "Minimum" Thermometers, ought frequently to be compared with the dry bulb of the Hygrometer. The freezing-point of each Thermometer (marked by a scratch on the tube) ought to be tested once a year, in snow or melting ice. The Hygrometer consists of two Thermometers usually, but not necessarily, mounted on one frame. As apparently slight deviations from the approved *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; a water-cap 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.

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

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

**Wind.**—A wind-vane ought to be elevated 12 feet at least above surrounding objects. When it oscillates incessantly, the mean direction should be taken; and when it is stationary, 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 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 may also be 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 at 9 A.M., and the readings entered in the returns of the day previous.

**Snow-falls may, for convenience, be registered in the rain columns, under the following conditions:**—When a Snow shower occurs, it should 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 appearances and changes should be noted among the "Remarks." The amount of cloud is entered from a scale of 0 to 10; thus, when the sky overhead is free from clouds it is entered 0, when half covered by clouds, 5 and so on.

Observations of the clouds are made at 9 A.M. and at sunset, as illustrating the condition and currents of the upper and lower regions of the atmosphere. The entries in the schedule are to be made in the following manner;—In the column "Velocity 6, S. W."

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

**Shadows.**—The number of hours in which objects in the sun's rays cast shadows, should be entered in the proper column. **Underground Thermometers.**—As the germination and health of crops and plants greatly depend on the temperature of the soil,—its amount and constancy,—the Council recommend that observations in this interesting department be made at 9 A.M., by thermometers placed in the earth, their bulbs being sunk to depths of 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 should 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 boats 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.

**Crops.**—Mention whether Schönlein's or Moffat's pages are used. The paper is fixed by a pin to a board in the thermometer box, and the indications registered at 9 A.M. and 9 P.M. It is desired that these indications be registered in connection with the force and direction of the wind at the time of observation, in the following manner:—thus 54°, as an ozone entry in the schedule, will indicate that the ozone paper is tinted 54° 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 must 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 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 should be recorded.

By the use of abbreviations, the state of the weather at 9 A.M. and 9 P.M. should 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 the 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 so that the published Summaries may fairly represent the whole of Scotland. Observation ought to be confined to individual trees and shrubs; to particular species of birds; and, in the case of crops, to specified sorts reared from year to year on a selected piece of ground or farm.

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

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 recommend observers, before purchasing new instruments, to 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, November 1874.

OBSERVATIONS IN CONNECTION WITH THE PERIODICAL RETURN OF THE SEASONS.

FOREST TREES.	CHOPS.	SOILING or PLANTING.	APPEARING above Ground.	IN EAR or FLOWERS.	First Out or Matted.
Alder, . . . . .	Barley, . . . . .	Bare or Bigg, . . . . .	Oats, . . . . .	Wheat, . . . . .	Beans, . . . . .
Beech, . . . . .	Peas, . . . . .	Potatoes, . . . . .	Turnips, . . . . .	Rye Grass, . . . . .	Sycamore or Plane, . . . . .
Elm, . . . . .					
Birch, . . . . .					
Apple, . . . . .					
Black Currant, . . . . .					
Cherry, . . . . .					
Grap, . . . . .					
Grossberry, . . . . .					
Holly, . . . . .					
Laburnum, . . . . .					
Lilac, . . . . .					
Mezerion, . . . . .					
Mountain Ash or Rowan, . . . . .					
Red Flowering Currant, . . . . .					
Rhododendron Ponticum, . . . . .					
Whin, . . . . .					

SHRUBS, ETC.	FRUITS.	First in Blossom.	First in Fruit Ripen generally.	First in Blossom.	First in Fruit Ripen generally.
Barberry, . . . . .	Apple, . . . . .	Choke, . . . . .	House-Swallow, . . . . .	Lapwing, . . . . .	Sand-Martin, . . . . .
Boutree or Elder, . . . . .	Black Currant, . . . . .	Cuckoo, . . . . .	Goutie, . . . . .	House-Swallow, . . . . .	Swallow, . . . . .
Broom, . . . . .	Cherry, . . . . .	Grass, . . . . .	Grass, . . . . .	Grass, . . . . .	Grass, . . . . .
Hawthorn, . . . . .	Grossberry, . . . . .	Plough, . . . . .	Plough, . . . . .	Plough, . . . . .	Plough, . . . . .
Holly, . . . . .	Peach, . . . . .	Stalling, . . . . .	Stalling, . . . . .	Stalling, . . . . .	Stalling, . . . . .
Laburnum, . . . . .	Pear, . . . . .	Swan, . . . . .	Swan, . . . . .	Swan, . . . . .	Swan, . . . . .
Lilac, . . . . .	Plum, . . . . .	Strawberry, . . . . .	Strawberry, . . . . .	Strawberry, . . . . .	Strawberry, . . . . .
Mezerion, . . . . .					
Mountain Ash or Rowan, . . . . .					
Red Flowering Currant, . . . . .					
Rhododendron Ponticum, . . . . .					
Whin, . . . . .					

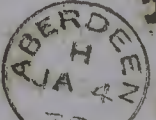
Have the goodness also to state any information you may be able to collect relative to the Crops of Grain, Hay, Potatoes, Turnips, Fruits, etc., whether plentiful or in perfection; whether any have suffered from blight, disease, etc. Whether Epizootic disease prevails among cattle; and the Agricultural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

BOOK POST.

Mr ALEXANDER BUCHAN,

Secretary of the Meteorological Society of Scotland,

EDINBURGH.



Boyside  
Dec 1874