Abstract of Paper on Silver Thaw at the Ben Nevis Observatory.

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The phenomenon of silver thaw,—that is, rain falling when the temperature is below the freezing-point and congealing when it falls,—is of somewhat common occurrence at the Ben Nevis Observatory. A prolonged fall of silver thaw occasions considerable inconvenience to the observers; the rain freezes on their coats, gloves, and even on their faces, while everything outside becomes covered several inches thick with solid ice. But the most serious effect is the choking of the louvres of the Stevenson screen where the thermometers are, necessitating frequent changing of the screens.

In the six years, 1885-1890 inclusive, 198 cases of silver thaw were observed, lasting in the aggregate 873 hours, or a mean duration of $4\frac{1}{2}$ hours for each case. In December, January, and February the average duration of each case was six hours, whereas during the other months of the year it was not more than three hours. For the latter half of 1890 Mr AITKEN's dust-counter was in use at the Observatory, and during these six months the observations show that the number of dust particles is very small when silver thaw occurs.

The subjoined table gives the number of cases of silver thaw in each month, the hours they lasted, and their average duration for the six years, 1885 to 1890 inclusive:—

Month.	Cases.	Hours.	Mean duration. Hours.
January, . .	34	199	5·9
February, . .	28	149	5·3
March, . .	27	93	3·4
April, . .	11	53	4·8
May, . .	11	20	1·8
June, . .	8	27	3·4
July, . .	0	0	0·0
August, . .	3	7	2·3
September, .	4	10	2·5
October, . .	12	38	3·2
November, .	29	96	3·3
December, .	30	181	6·0
Year, . .	198	873	4·4

Three-fourths of the whole cases occur in the five months, November to March; none have been observed in July.

* See *Journal of Scottish Meteorological Society*, vol. ix. p. 115.

An examination of the daily weather charts of the 198 days on which silver thaw occurred, showed that on 137 days the distribution of pressure was cyclonic, and on 61 days anti-cyclonic; but the mean duration of the phenomenon on cyclonic days was only 3·2 hours and on anti-cyclonic 7·6 hours. Also, the longest continued case under cyclonic conditions was 11 hours on 23rd December 1890, but under anti-cyclonic conditions it lasted for 41 consecutive hours on 3rd and 4th January 1889. The distribution of pressure is substantially the same in all cases. There is a cyclone with its centre off the N.W. coast of Norway, and an anti-cyclone to the south of Ben Nevis, with its centre in the British Isles or in Northern France, or even still further to the south. Of the 198 cases only 3 took place in a type of pressure-distribution differing from the above; in them the cyclone was still to the west of Norway, but the anti-cyclone lay over the Gulf of Bothnia. No cases occurred when the barometer was higher to the north than to the south of Ben Nevis, nor when the central part of an anti-cyclone covered Ben Nevis.

The lowest temperature at which silver thaw occurred was 18°. It is of rare occurrence below 27°, and at only 34 out of the 873 hours during which it has been observed was the temperature below 27°. Most of the cases occur just before a thaw.

As might be expected from the distribution of pressure, the winds were mostly westerly. The average velocity of the wind was about 20 miles an hour, and rarely rose to a gale; in fully 90 per cent. of the cases the wind was below 30 miles an hour.

The rainfall, which constitutes the phenomenon, is always heavy, being an average of 0·032 inch per hour in cyclonic cases and 0·019 in anti-cyclonic. The record at Fort-William on the same days shows that this heavy fall is confined to the hill-top; on the average of the year, the rainfall of Ben Nevis is not quite double that of Fort-William, but on these days it was occasionally seventeen times greater.

A comparison of the temperature observations at Fort-William with those on Ben Nevis on the days of silver thaw showed nothing very definite. The least difference was 2°·9 on the 20th December 1886, and the greatest 18°·2 on 14th August 1885, but the average was about 17°, or close to the normal difference of temperature. On the average of the 12 longest continued cases of cyclonic silver thaw, of which the mean duration was 7 hours, the temperature on Ben Nevis began to rise 15 hours before it commenced, continued rising while it lasted, and thereafter fell for six hours, after which it rose again. The barometer fell steadily till the silver thaw began, rose during its continuance and for 9 hours subsequently, when it began to fall again, this latter fall coinciding with a distinct backing of the wind and rise of temperature, indicating the approach of a new depression. In the 12 longest continued anti-cyclonic cases, temperature rose for 18 hours before, continued rising during the silver thaw and for 3 hours after, and then fell steadily. The barometer rose till the thaw began, but fell steadily during and after it.

An examination of the records of Gales kept at all the Scottish lighthouses, shows that 73 per cent. of the cyclonic and 63 per cent. of the anti-cyclonic cases were

followed or preceded by storms on our northern and north-western coasts. It has been shown that silver thaw is not, as a rule, associated with strong winds on Ben Nevis. It therefore would appear that the barometric gradient at the level of Ben Nevis (4407 feet) must differ from that at sea-level under these circumstances. In many cases the gale set in simultaneously with the beginning of the silver thaw on Ben Nevis. It was also evident, from the daily weather charts, that when silver thaw occurred on Ben Nevis while an anti-cyclone lay over England, the weather in the British Isles got steadily worse in the immediate future.