

Official, No. 34.

Part I

M.O. 34

CONTRIBUTIONS
TO OUR
KNOWLEDGE OF THE METEOROLOGY
OF THE
ARCTIC REGIONS.

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Published by the Authority of the Meteorological Council.  
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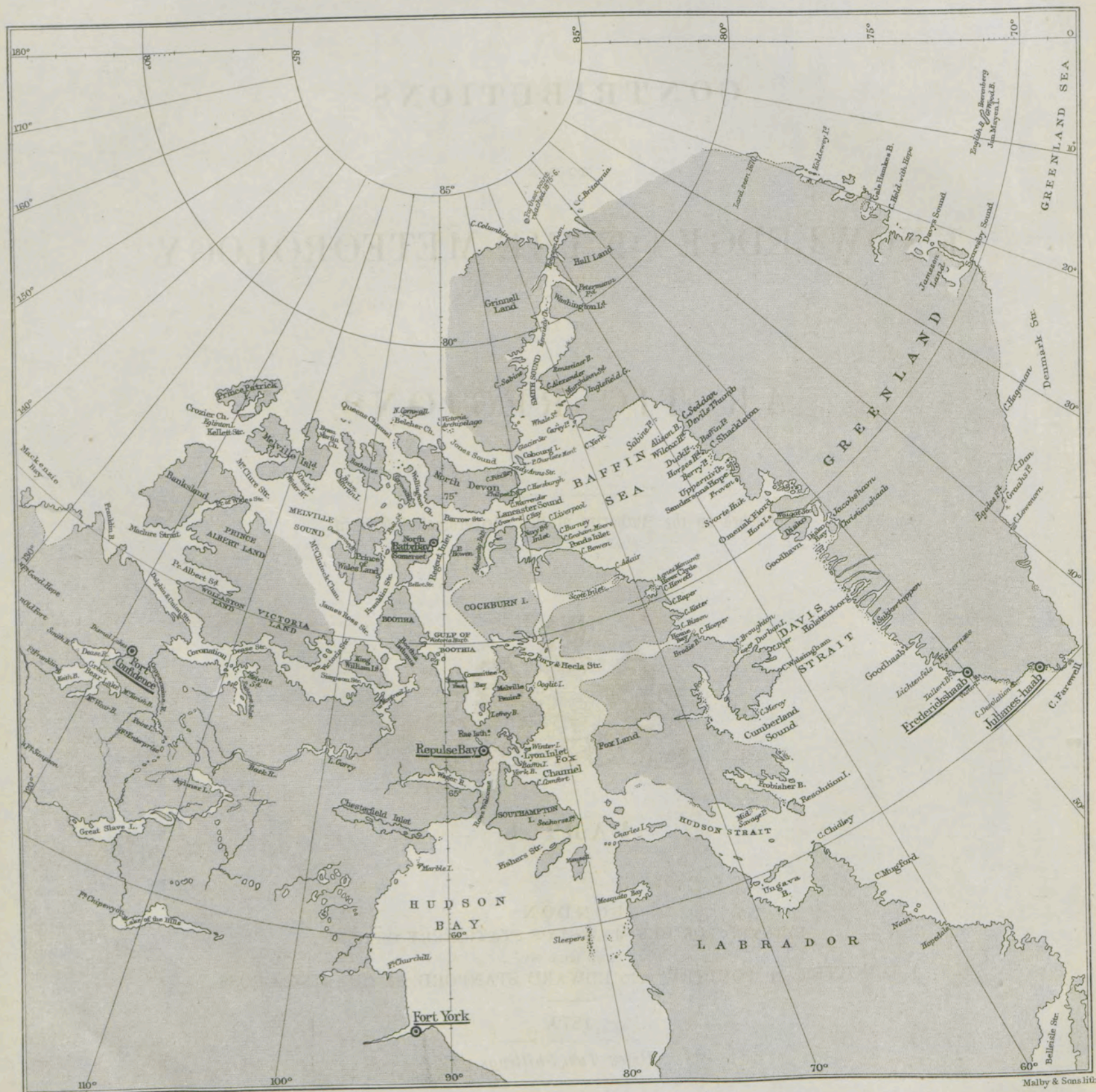
PART I.

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
AND SOLD BY
J. D. POTTER, 31, POULTRY; AND EDWARD STANFORD, 55, CHARING CROSS.

1879.

Price Two Shillings.

CHART OF THE PART OF ARCTIC AMERICA
SHOWING THE STATIONS FOR WHICH DATA ARE GIVEN IN THE PRESENT PAPER.



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PREFACE.

THE work now submitted to the public has been undertaken with the view of collecting together the information as to the climate of the Polar Regions, especially of the portion in the vicinity of the American Continent, contained in the log books and journals of the various British Arctic Expeditions up to the year 1874.

It may be remembered that in 1873 the Office published, under the title of "Contributions to the Meteorology of the Antarctic Regions," a discussion of the observations taken on board H.M. Ships "Erebus" and "Terror" in 1839-43.

The need for a similar summary of the existing information relating to the Arctic Regions made itself strongly felt in 1874, when an application was made to the Office to contribute materials for the Arctic Manual, which was then in course of preparation was published by the Admiralty in 1875.

The Meteorological Council have therefore approved the proposal that the records of the observations taken by British Expeditions, many of which are preserved in their Office, should be collected and discussed as far as possible in a uniform manner, so as to afford some idea of the conditions of climate, &c. actually proved to have been experienced in these rarely visited regions.

An examination of the records soon showed that it would not be feasible to treat all the observations on precisely the same plan, the form of the journals, &c. kept in different Expeditions varying very considerably, and it finally seemed best to commence with a discussion of certain registers kept at land stations or on board ships in winter quarters.

The following papers form the first instalment of the investigation, and refer to land stations, and it is proposed that Parts II. and III. should respectively contain the results obtained from ships frozen up and from ships at sea within the region embraced by the investigation.

The discussion has been entirely conducted by Mr. Richard Strachan.

March, 1879.

ROBERT H. SCOTT.

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CONTRIBUTIONS

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No. I.

Results of Meteorological Observations made at York Factory.

The observations, the results of which are given in this paper, were made by John Rae, M.D., at York Factory, during the six months, November 1845 to April 1846 inclusive, regularly at the hours 6 a.m., 8, 10, Noon, 2 p.m., 4, 6, and 9, Sundays excepted. York Factory is situated on the western shore of Hudson's Bay, in latitude 57° 0' N., and longitude 92° 26' W.

The following description applies to the country around the Factory and the adjacent coast:—

" Between the 56th and 58th parallels the western shores of Hudson's Bay are extremely flat, and the depth of water decreases very gradually on approaching them. Dr. Richardson states that in 7 fathoms of water the tops of the trees are just visible from a ship's deck. Large boulder-stones are scattered over the beach, and sometimes form shoals as far as 5 miles from shore. These are, of course, troublesome and dangerous to boats. Hayes and Nelson Rivers enter Hudson's Bay about the central portion of this quarter. They are separated on reaching the coast merely by a low alluvial point of land, on which York Factory is stationed. A low and uniformly swampy aspect characterizes the surrounding country and the banks of Hayes River at least for 50 miles inland. The upper soil presents a thin stratum of half-decayed mosses, immediately under which we find a thick bed of tenacious and somewhat slaty bluish clay containing boulder stones. Forests, consisting chiefly of spruces, larches, and poplars, occur, but the individual trees, except under local circumstances of a favourable nature, are of small size.

" The subsoil is generally frozen, and as it consequently retains a great deal of the surface water, swamps of sphagna and other mosses are always being formed; but the bright summer days, though long, are few, and as vegetation thus decays but slowly, little peat occurs. During a favourable season the ground thaws to the depth of about 4 feet; but there still remains, it is said, a frozen bed of 10 or 11 feet, beneath which we find loose sand. As the earth is not thus permanently frozen in the interior countries of North America, the ungenial condition of the soil about York Factory ought probably to be attributed to the neighbourhood of the sea, which is too much encumbered with ice during winter to mitigate the severity of those naturally frost-bound regions, and being laden along shore with numerous icebergs and other

insulated masses, even to the middle of August, must of course diminish the intensity of the summer heat.

"The boulder stones just mentioned show that there occur in the district of Hayes River several *primitive* rocks, such as red granite, hornblende rock, gneiss, and syenite; of the *transition* class, grauwacke; and of the *secondary* class, red sandstone,—belonging probably to the new red sandstone formation, in which is included the *rothliegende* and *bunter* sandstone. Two kinds of limestone likewise occur in this district."—James Wilson, F.R.S.E., in "*Northern Coasts of America*," a volume of the Edinburgh Cabinet Library.

The following remarks apply to the year 1746, in winter-quarters, Hayes River:—

"As November set in with keen frosts, so they continued through the whole of that month, without any other alteration than freezing with more or less severity, as the wind changed. When the wind was westerly or southerly, the cold was very supportable, but as it changed to the north-west or north it became immediately excessively keen, and often attended with a sort of snow, no larger than so many grains of sand, which drifted with the wind in clouds, from every plain or flat place that lay exposed to it."—From "*A Voyage to Hudson's Bay by the 'Dobbs' and 'California' in the years 1746-7*," by Henry Ellis.

The same narrative gives the following account of Hudson's Bay, west shore:—

"The air of this country is never, or at least is very seldom, clear. In the spring and fall of the year there are heavy wet fogs; and in the winter, the air is full of an infinite number of icy spicula, that are visible to the naked eye, especially if the wind be northerly or easterly, and the frost severe; and the reason of it is this,—wherever the water is clear of ice in the winter, there arises a very thick vapour, commonly called frost smoke; this vapour freezing is driven by the wind in the form we see it. All the beginning of the winter Port Nelson river was unfroze in the stream; this lying to the northward of us, the wind blowing from that point constantly brought with it showers of these icy particles, which disappeared when it was froze.

"Hence also frequent mock suns and halos about the moon and sun, very luminous and beautifully tinged with all the various colours of the rainbow, are very common. Six of these parhelia, or mock suns, I have seen at one time, which to us was very surprising. The true sun also rises and sets there with a large cone of yellow light, perpendicular to it; and no sooner does it disappear than the aurora borealis spreads a thousand different lights and colours over the whole concave of the sky, with so resplendent a beauty that even the full moon does not efface their lustre."

The barometer used by Dr. Rae was made by Newman. Its neutral point was 30.302 inches, its capacity correction $\frac{1}{54}$, and capillarity correction $+.042$. It was suspended with its cistern 35 feet above the mean half-tide level of the sea. The means of the observations have been corrected and reduced to 32° F., at the mean sea level. On April 17th the register contains the following entry: "Barometer got out of order, some of the mercury having escaped on account of the contraction of the wooden plug of the cistern. Mercury was put in to supply the deficiency, and the leak cemented with india-rubber varnish, some filaments of silk being first applied. Query, has there been

too little or too much mercury added?" It is impossible to answer this question otherwise than by stating that the subsequent readings seem to follow on in accordance with those immediately preceding, and the probability seems to be that the instrument was not thrown much out of adjustment.

The thermometers were tested at the freezing point of water and at the freezing point of mercury; the latter "by immersing their bulbs in a tumbler of mercury whilst freezing." The readings are given in the register, and from their means the following corrections have been deduced:—

Corrections, for thermometer by	-	-	at - 32°	at + 32°
Newman, camphine, 263	-	-	- 0°·8	- 0°·5
Thomas Jones, red spirit, B	-	-	- 2·0	+ 0·2

From these values proportional corrections have been calculated for the intermediate degrees, and have been applied to the thermometrical means.

The wind's true direction was recorded, and its force given as estimated by Beaufort's scale, 0 to 12. Beaufort's notation was also used for recording the state of the weather. Finally, a very careful record was kept of auroræ, which is reproduced in the notes appended to this paper.

The results of the observations are given in Table I.

The mean pressure was lowest in November, with winds from N.W. of force 2·5, and mostly overcast weather.

The mean pressure was highest in February, with winds from N.N.W. of force 1·8, very low temperature, and weather generally clear.

The figures show that the minimum temperature of these winter months occurs about 8 a.m., and the maximum about 2 p.m. The greatest strength of wind seems to occur about the time of maximum temperature.

The depth of the snow which fell was noted in the register, and amounted in November to 9·5 inches; December, 1·75; January, 20·5; February, 4; March, 35; April, 15. It will be seen that the least snow fell when the direction of the wind was most westerly.

The winds of March were the strongest, those of December the weakest, the latter month having a low mean temperature and clear weather for the most part.

In Table II. we have a summary of extreme temperatures, from which we see that the lowest thermometer readings occur with a still clear atmosphere.

The barometrical observations give for diurnal range the results exhibited in Table III.

From this table it appears that the pressure decreased from 6 a.m. to Noon, rose till 6 p.m. and then fell again. If the mean values are plotted on a large scale, and the curve interpolated for the missing hours as accurately as is possible there will be found a maximum about 4 a.m., a minimum about 1 p.m., a maximum about 6 p.m., and a minimum about 11 p.m.; and the fall between 4 a.m. and 1 p.m. is about .012, the rise from 1 p.m. to 6 p.m. about .007, the fall from 6 p.m. to 11 p.m. about .005, and the rise from 11 p.m. to 4 a.m. about .010. Of course these values are merely approximative.

Table IV. gives a summary of the winds referred to Sixteen Points.

TABLE I.

RESULTS OF METEOROLOGICAL OBSERVATIONS at YORK FACTORY.

Date and Hour.		Barometer.	Temperature of Air.	Resultant Wind.		Weather Notations.								
				Direction.	Force.	b.	c.	o.	m.	f.	r.	s.		
1845.		Inches.												
Nov.	6 a.m.	-	-	29.828	10.1	N. 50 W.	2.3	4	4	15	1	—	—	3
23	8 "	-	-	.822	9.5	N. 47 W.	2.2	5	7	11	2	—	—	3
days.	10 "	-	-	.821	11.5	N. 46 W.	2.4	5	6	12	4	—	—	2
	Noon	-	-	.822	12.5	N. 46 W.	2.5	6	5	12	3	—	—	5
	2 p.m.	-	-	.824	13.0	N. 44 W.	3.0	6	3	14	4	—	—	5
	4 "	-	-	.841	12.1	N. 47 W.	2.5	7	5	11	4	—	—	4
	6 "	-	-	.843	11.3	N. 46 W.	2.8	9	4	10	1	—	—	5
	9 "	-	-	.833	10.6	N. 47 W.	2.6	8	3	12	—	—	—	3
Dec.	6 a.m.	-	-	29.905	-14.8	N. 87 W.	2.1	10	6	11	6	—	—	—
27	8 "	-	-	.898	-14.7	N. 74 W.	1.6	9	7	11	9	—	—	1
days.	10 "	-	-	.894	-12.9	N. 72 W.	1.6	11	8	8	7	—	—	3
	Noon	-	-	.883	-9.7	N. 74 W.	1.3	11	9	7	8	—	—	3
	2 p.m.	-	-	.874	-8.6	N. 72 W.	1.8	10	8	9	5	—	—	5
	4 "	-	-	.873	-9.6	N. 74 W.	1.6	9	8	10	6	—	—	4
	6 "	-	-	.875	-9.9	N. 69 W.	1.6	12	8	7	6	—	—	3
	9 "	-	-	.870	-11.5	N. 59 W.	1.7	12	6	9	5	—	—	4
1846.														
Jan.	6 a.m.	-	-	29.851	-2.0	N. 64 W.	1.7	9	3	15	5	—	—	9
27	8 "	-	-	.846	-2.3	N. 64 W.	1.9	8	4	15	4	—	1	6
days.	10 "	-	-	.845	-0.3	N. 52 W.	2.1	8	6	13	4	—	—	4
	Noon	-	-	.844	+1.7	N. 49 W.	2.1	7	6	14	4	—	—	5
	2 p.m.	-	-	.852	+2.1	N. 48 W.	1.9	10	4	13	5	—	—	5
	4 "	-	-	.860	+1.1	N. 49 W.	1.8	8	5	14	6	—	—	5
	6 "	-	-	.857	-0.3	N. 57 W.	2.1	10	1	16	3	—	—	7
	9 "	-	-	.854	-0.8	N. 49 W.	2.0	10	3	14	4	—	—	6
Feb.	6 a.m.	-	-	30.044	-23.2	N. 40 W.	1.9	10	7	7	8	—	—	3
24	8 "	-	-	.038	-23.2	N. 35 W.	1.6	8	8	8	5	—	—	6
days.	10 "	-	-	.039	-18.5	N. 31 W.	2.0	11	8	5	3	—	—	6
	Noon	-	-	.041	-14.5	N. 33 W.	1.8	11	9	4	5	—	—	3
	2 p.m.	-	-	.040	-12.9	N. 21 W.	2.1	11	8	5	5	—	—	4
	4 "	-	-	.044	-15.3	N. 17 W.	1.7	11	8	5	7	—	—	3
	6 "	-	-	.051	-18.1	N. 12 W.	1.6	10	6	8	6	—	—	3
	9 "	-	-	.049	-20.2	N. 28 W.	1.8	15	4	5	4	—	—	3
Mar.	6 a.m.	-	-	29.907	0.4	N. 26 W.	2.4	5	5	16	5	—	—	6
26	8 "	-	-	.910	2.9	N. 26 W.	2.4	5	7	14	6	—	—	9
days.	10 "	-	-	.909	8.4	N. 27 W.	2.5	7	6	13	5	—	—	7
	Noon	-	-	.904	11.8	N. 27 W.	2.8	7	8	11	9	—	—	4
	2 p.m.	-	-	.900	13.1	N. 32 W.	2.8	9	9	8	5	—	—	4
	4 "	-	-	.899	12.7	N. 29 W.	3.2	7	10	9	6	—	—	4
	6 "	-	-	.904	9.8	N. 16 W.	2.9	7	6	13	6	—	—	5
	9 "	-	-	.901	6.5	N. 14 W.	2.9	9	9	8	3	—	—	4
April	6 a.m.	-	-	.971	4.7	N. 5 E.	1.7	9	7	10	6	1	—	4
26	8 "	-	-	.965	11.1	N. 4 E.	1.6	9	5	12	3	1	2	5
days.	10 "	-	-	.963	16.3	N. 3 W.	2.0	9	4	13	—	1	1	6
	Noon	-	-	.952	17.2	N. 1 W.	2.0	7	8	11	3	—	—	6
	2 p.m.	-	-	.947	18.6	N. 2 W.	2.5	9	6	11	3	—	—	6
	4 "	-	-	.944	17.8	N. 5 E.	2.4	8	9	9	2	—	—	6
	6 "	-	-	.941	16.4	N. 9 E.	2.0	7	8	11	1	1	—	5
	9 "	-	-	.944	12.0	N. 3 W.	2.0	5	5	16	4	1	—	4

TABLE II.

EXTREMES of TEMPERATURE, with accompanying PRESSURE, WIND, and WEATHER, at YORK FACTORY, 1846-7.

Date and Hour.	Temp. Max.	Pressure.	Wind and Force.	Weather.	Date and Hour.	Temp. Min.	Pressure.	Wind and Force.	Weather.
November 15, 2 p.m.	35.1	Inches. 29.15	W. 4	b c	November 22, 6 p.m.	-2.9	inches. 29.71	N.N.W. 9	o
December 6, 6 p.m.	15.2	.22	W. by S. 7	o s	December 11, 6 a.m.	-36.4	30.12	W.b.S. 3	b
January 24, 10 a.m.	23.2	.09	N.W. 7	o	January 31, 10 a.m.	-31.8	.14	Calm	b
February 3, Noon	7.4	.67	W. 1	o	February 10, 6 a.m.	-43.1	.24	S. 1	b
March 10, 2 p.m.	36.3	.68	S.S.W. 5	b c	March 5, 6 a.m.	-29.6	.06	S.S.W. 1	b m
April 30, 2 p.m.	45.8	30.10	S.W. 1	b c m	April 17, 6 a.m.	-22.3	29.75	N. 4	b

TABLE III.

DIURNAL RANGE of the BAROMETER at YORK FACTORY.

Month.	6 to 8 a.m.	8 to 10.	10 to 12.	12 to 2 p.m.	2 to 4.	4 to 6.	6 to 9.
November	- .006	- .001	+ .001	+ .002	+ .017	+ .002	- .010
December	- .007	- .004	- .011	+ .001	- .001	+ .002	- .005
January	- .005	- .001	- .001	+ .008	+ .008	- .003	- .003
February	- .006	+ .001	+ .002	- .001	+ .004	+ .007	- .002
March	+ .003	- .001	- .005	- .004	- .001	+ .005	- .003
April	- .006	- .002	- .011	- .005	- .003	- .003	+ .003
Mean of all	- .0045	- .0013	- .0042	+ .0002	+ .0040	+ .0017	- .0033

TABLE IV.

SUMMARY of WINDS at YORK FACTORY, referred to sixteen points, with MEAN FORCE (scale 0 to 12).

Month, 1845-6.	Totals.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.		S.S.E.	
		O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.
November - - - -	184	15	4.2	1	2.0	11	2.1	10	2.4	10	2.3	5	4.0	6	3.3	—	—
December - - - -	216	13	4.5	1	2.0	2	2.0	—	—	5	1.0	3	3.0	3	3.3	3	2.7
January - - - -	216	28	4.8	3	4.7	5	2.0	1	1.0	5	1.4	—	—	2	1.5	3	1.7
February - - - -	192	16	6.1	10	3.7	10	3.7	2	1.5	8	1.4	—	—	—	—	—	—
March - - - -	208	35	6.3	14	4.1	3	3.7	5	3.4	9	2.1	6	1.5	—	—	4	2.2
April - - - -	208	46	5.3	20	4.7	24	3.0	11	2.5	15	5.1	—	—	6	6.0	1	4.0

(continued.)

Month, 1845-6.	S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.		Calms.
	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	
November - - - -	—	—	—	—	11	4.5	5	4.4	31	4.0	14	4.4	35	5.3	29	5.2	1
December - - - -	7	3.0	4	1.5	19	1.7	33	2.6	66	2.5	10	1.5	20	3.3	25	4.4	2
January - - - -	8	2.0	8	1.5	22	2.7	9	2.9	59	2.8	14	2.9	16	3.8	25	5.5	8
February - - - -	10	2.2	5	3.0	9	1.7	6	2.2	37	2.1	4	3.0	22	2.5	35	4.5	18
March - - - -	30	2.9	6	3.2	2	3.0	3	4.0	11	4.1	5	5.2	25	7.3	39	6.2	11
April - - - -	6	3.5	8	4.1	3	3.3	17	4.2	4	4.0	6	4.3	15	4.7	18	5.1	8

REMARKS by DR. RAE.

1845.—NOVEMBER.

- 4th, 7.50 p.m. - Faint streaks of aurora made their appearance in the E., shooting up towards the zenith to an altitude of about 50°. It changed its shape and situation rapidly, and disappeared at 8.30 p.m.
- 8th, 9 p.m. - A faint streak of aurora visible, extending from the horizon to about 30° towards the zenith, bearing E.byS.
- 16th, 8.30 p.m. - Some faint streaks of aurora visible; due N., altitude about 52°.
- 24th, 2 p.m. - A beautiful halo round the Sun, with two brilliant mock suns. Diameter of the halo about 36°. At a distance of 12° from the halo there is a fainter ring, having all the colours of the rainbow.
- 24th, 9 p.m. - A bright broad band of aurora extending across the zenith to within 10° of the horizon in a W.N.W. and E.S.E. direction, changing its form with great rapidity.
- 26th, 9.30 p.m. - A very faint band of aurora extending across the zenith in a S.E. and N.W. direction, its motion slow, showing no variety of colours, at the extremities within 15° of the horizon.
- At 11 p.m. the aurora more brilliant, and still in the same direction, its motions are more rapid.

- 27th, 8 a.m. - Three mock suns visible at 15° distance from the true.
- „ 6 p.m. - A very faint aurora visible, centre due N.; altitude 12°.
- 27th, 9 p.m. - Two bands of aurora extending in a N.W. and S.E. direction, the one across the zenith, the other at an altitude of 80° N. The colours are faint.
- 28th - From 9.30 p.m. until 11 p.m. the aurora was very brilliant, assuming all forms, and shifting about very rapidly: sometimes in a broad band across the zenith E. and W., now to the S., and again to the N., then spreading itself over almost the whole heavens: sometimes turning in large circles, or coiling itself along like the movements of a snake. The movements appeared to begin and be most active in the E. At 9 p.m. a faint aurora visible, one limb E.N.E., the other N.byW., altitude of the centre 20°, movements slow.
- 29th, 9 p.m. - A very faint aurora visible, centre N.N.E., about 15° from the horizon.

DECEMBER.

- 1st, 6 p.m. - A faint streak of aurora due N.; altitude of centre 8°; En. extremity most brilliant at 9 p.m.
- 2nd, 1.15 p.m. - A halo round the Sun at 20° distance. Still visible at 2 p.m. At 8 p.m., a faint aurora visible; centre due N., altitude 14°; En. extremity most brilliant.
- 3rd, 7.30 p.m. - An aurora visible at an altitude of 15° S.W. It gradually spread over the heavens, and at 8 p.m. was very beautiful, moving about with great rapidity. At 9 p.m. still bright and extensive.
- 4th, 8.45 p.m. - A faint aurora visible; centre N., altitude 52°.
- 8th, 9 p.m. - Lunar halo.
- 9th, 2 p.m. - Solar halo. At 4 p.m. corona around the moon. At 6 p.m. a lunar halo with two paraselenæ, halo 40° diameter.
- 10th, 6 p.m. - A faint lunar halo. 9 p.m. ditto.
- 11th, 8 p.m. - A faint arch of aurora visible; centre N., altitude 18°.
- 12th, 6 a.m. - Reddish tinge of the sky near the horizon to the E.
- 13th, 9.30 p.m. - A lunar halo with three paraselenæ, halo 40° in diameter. A strange halo in the heavens, the centre in zenith, and the circumference passing through the moon; diameter 70°. Halo still visible at 11.20 p.m. A bright meteor seen shooting N.N.E., tail about 1½° long. At 9 p.m. a lunar halo with paraselenæ.
- 16th, 8.30 p.m. - A few flashes of aurora visible in different parts of the heavens to the Nd.
- 19th, Noon - Halo round the Sun, with parhelia, diameter of halo about 30°. At 2 p.m. halo, &c. continue. At 9 p.m. a bright aurora visible; centre of arch N.byE.
- 22nd, 9.30 a.m. - A halo round Sun, diameter 36°, with parhelia. At 10° outside the halo there is another circle having all the colours of the rainbow at the sides, but very faint at its upper limb. At noon halo, parhelia, &c.; outer circle as before. At 2 p.m. halo, &c. continue.
- 23rd, 9 p.m. - Aurora visible; centre of arch due N., altitude 33°.
- 29th, 9.20 p.m. - A fine arch of aurora extending across the heavens; centre N., altitude 56°.
- 30th, 6 a.m. - Faint streaks of aurora.

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- 6th, 8 a.m. - Sky red all round the horizon. At 8 p.m. a bright arch of aurora; centre of the arch N., altitude 60°; breadth 12°. The extremities of the arch within about 10° of the horizon. At 8.30 it extended across the zenith, and shortly afterwards spread all over the heavens, being most brilliant to the Ed.

- 7th, 4 p.m. - Sky red round the horizon. At 6 p.m. a lunar halo. At 7.45 p.m. an auroral arch; centre N., altitude 12° . Movements slow. A few streaks of aurora in various places in the heavens.
- 15th, Noon - Halo with parhelia. At 9 p.m. lunar halo with paraselenæ.
- 16th, 10 a.m. - Halo with parhelia. At noon ditto; a double halo, diameters 20° and 36° .
- 17th, 10 a.m. - Halo with parhelia. At 6.25 p.m. aurora in patches over the heavens, with an arch at an altitude of 31° , centre N.
- 20th, 8.50 p.m. - A faint arch of aurora, centre N., altitude 22° . At 11.30 p.m. the aurora more bright; movements slow; centre of arch N.byE., altitude 18° .
- 21st, 6 p.m. - A faint arch of aurora visible; centre N.; altitude 12° . At 9 p.m. aurora more to the E., in the form of a quadrangle, covering a space of 22° horizontally and 13° perpendicularly.
- 24th, 8 p.m. - Two arches of aurora; centre N., altitudes 20° and 32° . At 10.30 p.m. the aurora spread all over the northern part of the hemisphere as high as the zenith and E. and W.
- 25th - - Aurora visible in the form of an arch at first, afterwards in patches in the northern hemisphere.
- 29th, 10.30 p.m. - Aurora visible in the form of an arch; centre S.W., altitude 54° ; faint.
- 30th, Noon - Parhelia. Ditto at 2 p.m. At 9.10 p.m. arch of aurora faint; centre N.N.E., altitude 24° , a broad faint-coloured beam shooting up from the N.W. extremity of the arch. At 9.35 p.m. the aurora shifted over across the zenith until the centre of arch was S.W., altitude 35° , the E. extremity the most bright, the extent of arch varying from 130° to 160° .
- 31st, 10 a.m. - Halo. Ditto at noon.

FEBRUARY.

- 6th, 10 a.m. - Halo with parhelia.
- 7th, 5 p.m. - Fine lunar halo and paraselenæ with faint prismatic colours, diameter 42° .
- 8th - - Halo round the sun, prismatic colour. Faint streaks of aurora, although clear moonlight.
- 12th, 10 a.m. - Halo with parhelia. At noon a double halo with beautiful parhelia. The outer halo having the prismatic colours, distant from the inner circle 20° . At 6.30 p.m. a faint arch of aurora; centre N., altitude 14° . At 9 p.m. a lunar halo.
- 13th, 6.15 p.m. - Aurora very bright. Centre of arch N.N.E.; altitude 36° gradually rising to the zenith. At 7.10 extent on horizon 146° . At 11.40 p.m. there is still (although clear moonlight) a fine arch of aurora; centre N.N.E., altitude 25° , extent 125° .
- 14th, 9 p.m. - An arch of aurora faint; altitude 57° , centre S.S.W., extent 170° .
- 15th, 7.30 p.m. - An arch of aurora across the zenith E.byS. and W.byN. It was much in the form of the clouds called "*mares' tails*." The sky was so much overcast that not a star could be seen, whilst the aurora was distinctly visible. At 8.20 p.m. the aurora had shifted more to the northward.
- 16th, 7.5 p.m. - An arch of aurora, centre N.N.E., altitude 21° , extent 135° . At 9 p.m. altitude 40° , centre N.E.byE., extent 145° .
- 17th, 10 a.m. - Halo round the sun. Ditto at noon. At 10.30 p.m., a number of detached rays shooting up towards the zenith from a mass of aurora situated N.E.byN., altitude 20° ; colour faint white.
- 19th, 4 p.m. - Parhelia. At 10.30 p.m. a double arch of aurora; altitudes 57° and 40° , centre N., extent 150° . Some detached masses moving rapidly from E. to W., and streaks in various places pointing up to the zenith. At 11.5 p.m., arch 57° , a faint arch across the zenith E. and W., western extremity brightest. At 11.10 p.m. aurora again as above.
- 20th, 6.15 p.m. - A very faint aurora; centre of arch N.byE., altitude 26° , extent 118° . At 7 p.m. arch bright; altitude 51° , centre N., extent 148° . At 9 p.m. aurora continues. At 10.45 p.m. centre of arch N., altitude 36° , extent 143° . At 1.10 a.m. an arch of aurora across the zenith E. and W.

- 24th, 6.30 p.m. - Auroral arch, centre N., altitude 19° , extent 78° . At 9.50 p.m. arch; centre N., altitude 16° , extent 75° . At 10.30 auroral arch, very faint; centre N., altitude 20° , extent 70° .
- 25th, 6.20 p.m. - A narrow strip of aurora extending across the zenith N.N.W. and S.S.E., extent 86° . At 6.25 aurora disappeared. Since 6.35 there has been an aurora, but it shifted its situation so frequently and assumed so many forms that I have not attempted to describe them. The arch was generally at a great altitude, frequently across the zenith N.N.W. and S.S.E. At 9 p.m. it was very faint.
- 26th - - Since 6.30 p.m. the aurora has been visible, sometimes E. and W. across the zenith, again 10° , 15° , or 20° S. or N. of it. At 9 p.m. it had assumed the form of a fine arch; centre N.byE., altitude 24° , extent 96° .
- 27th, 6.35 p.m. - An auroral arch, very faint; centre N.byE., altitude 11° , extent 76° . At 9 p.m. arch as before, only a little more bright. It had been nearly stationary since its appearance.

MARCH.

- 3rd, 6 p.m. - Halo round the moon. Ditto at 9 p.m.
- 4th, 8 a.m. - Double solar halo with parhelia. At 10 a.m. a solar halo. Ditto at noon. Ditto at 2 p.m. At 9 p.m. corona round the moon.
- 10th, 9 p.m. - A lunar halo, with faint prismatic colours on the upper part of the circle, with paraselenæ.
- 12th, 9 p.m. - In three faint arches of aurora; centres N.byE.; extent on the horizon 180° , altitude of lowest arch 31° , the upper one across the zenith.
- 13th - - Aurora visible from 6.45 till 9 p.m., varying in altitude from 18° to the zenith, centre N.N.E. An arch, centre S., altitude 21° , extent 115° .
- 14th, 7.5 p.m. - A very brilliant aurora, extending over nearly the whole of the northern hemisphere varying its form every moment, sometimes coiling itself along in serpentine folds, at other times extending into arches. At 7.40 there were some dark clouds due N., radiating from the lowest part towards the zenith. The aurora in alternate streaks with these clouds had a very strange appearance. At 8.10 p.m. the aurora assumed the form of a mackerel sky. This I never noticed before.
- 16th - - At 9.5 p.m. some fine arches of aurora of a dull white colour; one across the zenith E.N.E. and W.S.W., another whose centre is S.S.W., altitude 45° , and extent about 196° . There are other arches between these, and a few very faint shades nearer the horizon to the southward. At 9.30 p.m. an arch, centre S.byW., altitude 27° , extent 174° , joining at the eastern extremity with a large mass of brilliant aurora in rapid motion. At 10 p.m. the aurora spread itself out so as to cover nearly half of the heavens, in the form of large wreaths, having a lake colour at the lower edges, the remainder being of a greenish white. 10.15 a.m. the brightest portion of aurora was W.byN., altitude 15° .
- 17th, 8.15 p.m. - An arch of aurora of a greenish white colour, extending across the zenith N.W. and S.E. At 9.18 p.m. centre of the arch S.S.W., altitude 42° , extent 105° .
- 22nd, 8.30 p.m. - A faint aurora; altitude 13° , centre N.N.E.
- 23rd, 8 a.m. - Halo round the sun with parhelia. At 10.35 p.m. an arch of aurora visible; centre N. by E., altitude 28° , extent 125° ; it has the appearance of cirrus clouds interspersed with stratus. There is a faint arch across the zenith E.byN. and W.byS., little or no motion. At 10.45 p.m. the arch across the zenith has become more bright, and spread out into three bands.
- 24th, 10 a.m. - Halo round the sun. Ditto at noon. At 9.5 p.m. a *shade* of aurora; N., altitude 10° , resembling in appearance a portion of the milky way.

- 30th, 6 p.m. - Parhelia. At 9 p.m. corona round the moon, with paraselenæ. At 9.15 p.m. a very faint arch of aurora; centre N.N.E., altitude 33° , extent 65° .
- 31st, 8 a.m. - Halo with parhelia. At 7.50 p.m. two faint arches of aurora; centres N.byE., altitudes 10° and 16° . At 9 p.m. the aurora had disappeared.

APRIL.

- 1st, Noon - Halo round the sun. Ditto at 2 p.m. At 9 p.m. halo round the moon.
- 4th, 9 p.m. - Two or three bright-looking masses to the southward having the appearance of aurora. At 10.10. p.m. a column of aurora extending from near the horizon E.byN. in a S.W. direction, about 15° S. of the zenith. At 10.35 p.m. an arch across the zenith E. and W.
- 5th - A number of arches of aurora to the northward; centre N.; brightest at western extremities.
- 6th, 6 p.m. - Halo round the sun. At 9.10 p.m. four very faint and irregular arches of aurora; centres N. and N.N.E., altitudes from 42° to the zenith, motion slow.
- 8th, 9 p.m. - Halo round the moon.
- 9th, 6 a.m. - Parhelia. At 8 a.m. halo with parhelia. At 9 p.m. a very faint aurora resembling the via lactea; centre of arch N., altitude 62° , extent 120° . At 9.35 p.m. aurora across the zenith in the form of an irregular arch, E. and W.
- 10th, 10.35 p.m. Very cloudy, but a few patches of blue sky. Some masses of aurora W.byN., altitude about 18° , colour a faint greenish yellow, motions rapid. It was situated beyond the lowest stratum of clouds. At 10.45 the denser clouds having passed to the eastward, they were succeeded by cirrus and cirro-stratus, among which the aurora moved about in a very strange manner, darting from one cloud to another with great rapidity and in all directions, principally between the bearings S.S.W. and W.N.W.
- 14th, 9 p.m. - A patch of aurora N.N.E., altitude 10° .
- 16th - From 7.10 p.m. until 9 p.m. there was an aurora to the southward, varying from two to five arches, centres S.byW., altitude distance from 10° to the zenith, extent 175° , colour yellow with a reddish tinge at the lower edge. At 9.25 p.m. aurora very faint to the southward; a fine arch to the northward; centre N.N.E., altitude 13° , extent 76° .
- 18th, 5 p.m. - Halo with parhelia. At 8.50 arch of aurora to the northward. At 9.35 p.m. centre of the arch N.byE., altitude 16° , extent 136° ; some detached masses across the zenith. At 9.50 aurora faint, but brightest to the westward.
- 21st, 8.50 p.m. - Three arches of aurora, the centre one across the zenith E.byS. and W.byN. The others 6° on either side. At 10.35 p.m. four arches of aurora, centres S., altitudes from 16° to the zenith. Some large masses to the northward.
- 22nd, 10.25 p.m. A mass of aurora N.N.E., altitude 14° , extent horizontally 12° . It had a striated appearance like *mares' tails*.

MAY.

- 3rd - From 8.30 to 10 p.m. several arches of aurora N., S., and across the zenith, of an orange colour.
- 4th, 9 p.m. - Two arches of aurora, the one N. the other S. Motion so rapid and irregular as not to be easily noted; orange colour. The arch to the northward is sometimes in the zenith and a minute or two afterwards at an altitude of 35° .

No. II.

Results of Meteorological Observations made at Fort Confidence.

These results have been deduced from observations made at Fort Confidence, Great Bear Lake, in lat. $66^\circ 40' N.$, long. $119^\circ W.$, by John Rae, M.D., and embrace the period from October 2nd, 1850, to June 6th, 1851. A note in the register states, "thermometer tested by freezing mercury minus 36° ." This gives a correction of -1.8 at that point. Assuming that the instrument was correct at 32° , the following corrections have been applied below that temperature: At 20° , -0.3 ; 10° , -0.6 ; 0 , -0.9 ; -10° , -1.2 ; -20° , -1.5 ; -30° , -1.8 ; -40° , -2.1 ; -50° , -2.3 .

Dr. Rae, who kindly lent the register, states that the *true* direction of the wind was recorded. The easterly wind was the most prevalent, but especially so from October to December. Calms and light variable winds characterise the winter, December to April inclusive, with occasional strong winds raising the formidable snow drifts. The mean daily range of temperature was very small in November, December, and January, and very large in February, March, and April. The monthly range of temperature was 51° in October and 74° in April. The climate is arctic and continental, subject to sudden and great changes of temperature; the highest reading was 47° in May and the lowest -72° in January, one of the lowest temperatures on record. The conditions favourable to very low temperature are, as usual, clear sky and calm or light wind.

The directions and forces of the wind have been resolved into their components on rectangular ordinates; and the sums of the forces of the components N., S., E., and W., are given for the several hours of observation in each month. This principle of reducing the wind observations has been adopted, in accordance with the views of Dr. A. von Oettingen, of Dorpat, as "the only one which is scientifically justifiable." To obtain the atmospheric translation during a month, the resultant of these components would have to be calculated.

Additional data respecting the climate of Fort Confidence will be found on pages 324 to 391, in a volume intitled "*Magnetic and Meteorological Observations at Lake Athabasca and Fort Simpson, by Captain J. H. Lefroy, R.A., and at Fort Confidence by Sir John Richardson, C.B., M.D.*,"—printed by order of Her Majesty's Government in 1855. Sir John Richardson's observations embrace the period 1848 October to 1849 April, and were taken almost hourly between 6 a.m. and 9 p.m.

TABLE I.

RESULTS OF METEOROLOGICAL OBSERVATIONS, FORT CONFIDENCE, 1850-1.

Month and Hour.	Tempera- ture of Air.	Sums of Wind components.				Weather Notations.							
		N.	S.	E.	W.	b.	c.	o.	m.	f.	r.	s.	q.
1850.													
October 9 a.m. -	15.4	14.5	13.0	74.9	1.0	6	11	13	6	—	—	7	—
2nd to 1 p.m. -	21.1	22.7	26.4	93.5	1.4	9	12	9	—	—	—	5	—
31st. 9 „ -	11.9	19.0	17.5	79.0	7.0	7	9	14	3	—	—	5	—
Nov. 9 a.m. -	5.2	13.1	16.8	66.1	12.7	7	9	14	8	—	—	1	1
1 p.m. -	8.1	23.8	20.8	69.3	13.7	7	9	14	6	—	—	4	1
9 „ -	6.3	11.5	26.0	69.1	22.4	5	7	18	5	—	—	7	—
Dec. 9 a.m. -	-21.3	24.8	3.5	38.5	13.8	13	12	6	5	—	—	1	—
1 p.m. -	-19.8	20.1	3.1	43.2	8.2	16	9	6	3	—	—	3	—
9 „ -	-21.5	10.6	6.3	47.0	11.7	16	4	11	2	—	—	5	—
1851.													
January 9 a.m. -	-31.9	13.9	15.9	29.4	26.2	10	13	8	7	—	—	6	—
1 p.m. -	-30.3	20.0	13.2	36.5	25.6	8	15	8	10	—	—	8	—
9 „ -	-32.6	21.8	12.2	14.2	11.1	14	6	11	2	—	—	9	—
Feb. 9 a.m. -	-38.3	18.1	11.3	22.4	33.8	13	12	3	9	—	—	1	—
1 p.m. -	-28.7	16.4	11.3	23.8	35.3	15	9	4	6	—	—	2	—
9 „ -	-36.6	16.6	14.9	21.3	25.2	17	4	7	5	—	—	4	—
March. 9 a.m. -	-20.0	12.9	14.2	55.4	9.4	12	11	8	4	—	—	7	1
1 p.m. -	-6.2	14.0	15.5	52.1	11.6	15	10	6	4	—	—	1	—
9 „ -	-16.4	16.1	5.8	42.8	10.2	16	8	7	1	—	—	4	—
April. 9 a.m. -	7.3	31.0	21.1	30.2	16.5	17	9	4	2	—	—	2	—
1 p.m. -	17.9	37.1	31.3	27.3	27.1	15	11	4	1	—	—	2	—
9 „ -	7.6	28.8	31.1	30.7	25.2	14	5	11	2	—	—	3	—
May. 9 a.m. -	28.1	34.5	32.4	64.5	22.6	14	14	3	—	—	—	—	—
1 p.m. -	33.6	42.9	36.0	61.3	23.9	12	14	5	—	—	—	3	—
9 „ -	23.6	33.8	23.2	63.8	7.4	11	14	6	—	—	—	1	—
June 1st 9 a.m. -	44.0	2.8	9.2	13.2	6.8	1	4	1	—	—	1	—	—
to 6th. 1 p.m. -	46.8	2.8	9.2	10.2	5.8	1	3	2	—	—	2	—	—
9 „ -	40.2	2.8	9.8	9.8	2.8	1	3	2	—	—	2	—	—

TABLE II.

EXTREMES OF TEMPERATURE with accompanying WIND and WEATHER at FORT CONFIDENCE, 1850-1.

Date and Hour.	Maximum.	Wind.	Weather.	Date and Hour.	Minimum.	Wind.	Weather.
Oct. 2nd, 1 p.m.	39.5	N.W. 4	c	Oct. 25th, 9 p.m.	-11.8	Calm	b c
Nov. 5th, 1 "	25.9	N.E. 2	b c m	Nov. 30th, 9 "	-31.3	W. 4	b
Dec. 28th, 9 a.m.	10.7	N.byW. 3	o m	Dec. 12th, 9 "	-49.8	V. 1	b
Jan. 6th, 1 p.m.	1.1	S.E. 6	o	Jan. 21st, 9 a.m.	-72.0	E. 1	b m
Feb. 15th, 9 a.m.	11.1	W.S.W. 7	c	Feb. 23rd, 9 "	-58.0	E. 3	b
Mar. 12th, 1 p.m.	14.5	W. 3	o	Mar. 1st, 9 "	-49.3	Calm	b
April 18th, 1 "	45.5	S.S.E. 6	b c	April 9th, 9 "	-28.7	Calm	b
May 15th, 1 "	47.0	S. 6	b c	May 9th, 9 "	+ 5.2	E. 5	c

TABLE III.

WINDS at FORT CONFIDENCE, referred to sixteen points, with MEAN FORCE.

Month.	Total Observations.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.		S.S.E.	
		O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.
October - - - -	90	2	5	4	2.5	7	3.4	6	2.7	29	4.3	16	3.7	11	3.6	2	2.5
November - - - -	90	2	3	1	1	5	2.2	11	4.1	24	3.2	14	3.9	3	3	7	4.6
December - - - -	93	1	3	4	2.7	11	2.9	10	2.8	25	2.2	5	3.8	—	—	1	3
January - - - -	93	4	2.2	1	6	3	2.7	2	1.5	22	1.9	3	3.7	3	6.3	3	3
February - - - -	84	4	2.2	2	2	3	3	4	2.2	18	1.6	3	2.3	4	4.7	2	3
March - - - -	93	—	—	1	4	9	3.7	7	4.6	29	2	16	1.9	3	2	—	—
April - - - -	90	7	2.9	2	1.5	4	3	3	2.3	6	2.5	6	3.8	7	4.3	8	5
May - - - -	93	6	4.3	3	5	12	5.2	3	6.7	15	5.1	2	4	16	3.4	—	—
June - - - -	18	—	—	—	—	—	—	—	—	3	2.3	—	—	6	6.2	—	—

(continued.)

Month.	S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.		Variables.		Calms.
	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	
October - - - -	—	—	—	—	1	4	—	—	—	—	—	—	3	2.3	2	2.5	—	—	7
November - - - -	1	4	1	3	—	—	—	—	7	3.7	2	6.5	1	8	1	7	4	2	6
December - - - -	1	1	1	1	—	—	2	2.5	4	2.5	2	5	2	3.5	2	5.5	4	1	18
January - - - -	4	2.2	1	2	3	2	—	—	7	2.9	5	6.2	2	1	6	3.7	3	1	21
February - - - -	—	—	—	—	2	3.5	6	4.2	5	4.2	5	7	3	4.3	2	2.5	1	1	20
March - - - -	1	2	—	—	2	3	1	2	4	2.7	3	3.7	2	2	1	5	3	2.3	11
April - - - -	1	6	—	—	2	5.5	—	—	6	2.7	2	6	9	3.8	5	6.4	3	1	19
May - - - -	7	4.4	—	—	5	4.4	1	3	7	3	—	—	8	2.6	—	—	3	1.3	5
June - - - -	1	2	—	—	—	—	—	—	2	3.5	—	—	3	4	—	—	—	—	3

REMARKS by DR. RAE.

1850.—OCTOBER.

- 3rd, 7.15 to 8.30 p.m. } Semi-arch of aurora moving rapidly, at S.E. extremity close to horizon, orange and red wave from E. to W.; extent from S.E.byS. to S.S.W., altitude 7°.
- 5th - - Eider duck seen.
- 6th, 8 p.m. - Patches of aurora to the E. and S.E., about 5° to 15° above horizon, and at 9.30 some very faint bands across the zenith S.E. and N.W.
- 7th - - Auroral arches broken, from near horizon, from S.S.E. to N.W., extent 75°, brightest to E., faint, changing situation slowly, visible from dusk till after 10 p.m., then very beautiful display of curtains and serpentine bands to the S.W., from S.E. to N.W., colours green, pink, and yellow, motions very rapid, wave principally from W. to E.; about 11.45 passed over zenith to N.W., and became more faint; aurora low.
- 8th, 7 to 10 p.m. Fine aurora, commencing in the S. crossing over to N., forming into all kinds of shapes; current W. to E.
- 9th, 9 p.m. - Very faint auroral light in different parts of the heavens.
- 10th, 9.30 p.m. - Faint beams of aurora to Nd. shooting up from near horizon towards zenith.
- 12th - - Very pale arch of aurora from N. to N.E.; altitude 35° highest part.
- 14th, 7.30 to 10 p.m. Arch of aurora behind clouds to the S.; altitude 12°, faint and steady.
- 15th, 9.45 p.m. - Very pale patch of aurora to N.W.; altitude 35°.
- 25th - - About 4 inches of snow last night.
- 6.30 to 10.30 p.m. Aurora in various parts of the heavens; few or no undulations.
- 27th, 6 till 10.30 p.m. } Aurora in patches from S.E.byS. to N.W.; little emotion seen. A gale of wind most of the night from S.W.
- 28th, 6 to 11 p.m. Much pale aurora moving about rapidly in curtains; waves moving both E. and W.; form so changeable as to be beyond description.

NOVEMBER.

- 6th - - Two inches of snow last night.
- 7th, 7.40 to 10 p.m. } Masses of aurora behind clouds to S.W. round to S. and E.; altitude 15°; some faint vertical rays to the N.
- 10th, 9 a.m. - Faint ray of aurora to N.E.
- 13th, 4 to 10 p.m. Faint vertical rays of aurora in different parts of northern hemisphere; occasionally disappearing.
- 15th, 5 p.m. - A belt of aurora across the zenith N.N.W. to S.S.E., yellowish, steady for some time then shifting a little Sd.; disappeared at 7 p.m. all but a few rays Nd. Halo round moon, blue, red, and yellow.
- 19th, 9.15 to 10.50 p.m. Some vertical rays of aurora to N., and some very fine aurora to the E.
- 21st, between 7.30 & 9 p.m. Some faint streaks of aurora to S.E., extending to the zenith from altitude 25°.
- 24th - - Deer shot.
- 26th - - A little snow fell during the night.
- 30th - - At 9.20 p.m. a faint arch of aurora from W.N.W. to S.E., altitude 10°; at 9.45 it rose gradually to zenith and had a rapid wave motion from W. to E., and fine lake colour, which continued till 10.46 when it settled down to its first position and appearance.

DECEMBER.

- 1st, 9 to 10 p.m. Very slight auroral light in different parts of the sky.
- 2nd, 5 p.m. - Aurora very faint near N. horizon. At 7.30 it formed a pale arch across the zenith from N.N.W. to S.S.E.; at 8.50 it formed a wide arch from N.byW. to S.S.E., altitude 9°, S.W.

- 3rd, 4.30 p.m. - Some very faint streaks of aurora N.N.E. near horizon; about 40 m. afterwards it formed an arch over the zenith from N.byW. to S.S.E., and gradually shifted to the southward when it became stationary till 9.30, at an altitude of 11° or 12° above horizon.
- 4th, 5 to 6 a.m. Slight aurora to the N. 5 p.m., very faint aurora to the N. near horizon; after 20 m. arch across zenith from N.N.W. to S.S.E. gradually shifted down to S. and became stationary about 7.10 within 10° of horizon; was back again N. of zenith and over it at 10.30 in a broad irregular band.
- 8th, 5 to 6 a.m. Pale arch of aurora over zenith from S.E. to N.E., afterwards a number of vertical rays in various parts of the sky.
- 10th, 8.50 p.m. - Faint aurora near horizon, N.; 9.10 to 9.35 shifted over zenith in form of arch to the S., where it remained stationary at an altitude of 12° at centre, extent from S.S.E. to N.W.
- 11th, 6.10 to 7 a.m. } Serpentine bands of aurora in rapid motion to the S. and S.W., later across zenith in several short bands.
- 13th, 6.30 to 8 p.m. Very faint aurora to N. near horizon, in rays.
- 16th, between 6 & 7 a.m. } Curious cloud-like aurora to Sd., and several vertical rays of light in various parts of the sky.
- 21st - - A little snow last night.
- 22nd, 1 p.m. - About an inch of snow.
- 23rd, 7 to 7.30 p.m. The sky was partially clear, and there was some faint aurora to Nd.; altitude 50°.
- 24th, 9 p.m. - About 6 inches of snow.
- 25th - - A heavy gale from N.N.W. all night with thick snow and drift. 5.15 p.m., an arch of pale aurora to Sd. from N.byW. to S.S.E.; altitude 8°. About 7 it moved across zenith to the N. and assumed a curtain form without much colour; undulations from W. to E., seen till 1 a.m. then observations discontinued.
- 26th, between 3.50 & 9.30 p.m. Some very faint patches of aurora to N. and E.
- 27th - - At 5.45 a.m. a number of vertical rays of aurora all round the heavens as high as the zenith, which became brighter and assumed a curtain or serpentine form about 6.30, and continued so till daybreak.
- 28th, 6.30 to 10 p.m. Some patches of faint aurora to the N.N.E. and N.W.; altitude about 30°.
- 30th, 4.30 p.m. - A faint aurora to the N., which gradually became brighter and appeared to S.S.E. also, after which it formed an irregular band across zenith, then settled down to Sd. into an uneven arch, the centre bearing about S.W. and altitude 15°; last seen 10.25 p.m.
- 31st, 6.15 a.m. - Aurora in vertical rays to S.E. and N.N.W.
Scarcely a fish to be got from the nets in the latter part of this month; query, caused by the Ely. winds?

1851.—JANUARY.

- 1st, 9.30 to Midnt. Very faint aurora in rays and patches to N. and N.E.
- 2nd, 8.30 to 9.45 p.m. A very faint arch of aurora to S.S.W. and some masses of auroral light in E.
- 3rd, between 6 & 7 a.m. Some pale rays of aurora in various parts of the sky.
- 4th, between 6 & 7 a.m. Some faint rays of aurora.
- 7th, 9.30 p.m. - Irregular arch of aurora over zenith from N.N.W. to S.S.E.
- 16th, 6.45 p.m. - Some faint rays of aurora to E.N.E.
- 18th, 6 a.m. - Auroral vertical rays to N. and N.E.
- 18th, 7.35 to 9.30 p.m. Some faint rays of aurora to the N. and E.
- 22nd, 6.20 a.m. - Some faint vertical rays of aurora to E. and E.S.E. From 7.50 to 9.30 p.m., arch of aurora to Sd.; extent 130°, centre of arch S.S.W., altitude 18°. At 11 p.m., band of aurora across zenith from N.N.W. to S.S.E.; serpentines, orange colour, in rapid motion; waves from N.W. to S.E., same as the wind, appeared to be near.

- 27th, 8 to 9 p.m. Faint auroral light to N.E.
 29th - - I observe that the breath makes an audible rustling sound when the temperature has fallen below -45° .
 31st, at 4 p.m. - Cloud to the Wd., very much resembling vertical rays of aurora.

FEBRUARY.

- 1st, about 6 a.m. Some vertical rays of aurora to N.E. which disappeared with daylight. From 7.15 to 10.30 p.m. a faint aurora to the N., then to the E., where it rose in the form of an irregular arch to the zenith; direction N.byW. and S.byE.
 4th, from 6.45 to 9.30 p.m. Some faint auroral rays to the E., pointing towards the zenith.
 5th, 5.30 p.m. - A very faint auroral light to N. and N.N.E. for about an hour.
 6th, from 5.50 } Arch of pale aurora, extending from N.byW. to S.E., sometimes over zenith, generally to the N.E. of it.
 7th - - Aurora much as last night, only more stationary.
 8th, from 6 to 8 p.m. Band of aurora across zenith and some vertical rays to E.N.E.
 9th - - Arch over zenith from N.byW. to S.E.; stationary from 6.30 to 7.25 p.m., when it disappeared leaving only a faint light to the N. Bright moonlight.
 18th, from 7.50 } A number of vertical rays of aurora extending along the S. and round to W., about 5° above the horizon; pale colour.
 19th, between 9 & 10 p.m. A faint auroral light to N.N.E. near the horizon.
 21st, about 10 p.m. A faint auroral light to N.N.E.
 23rd, at 7.15 p.m. Arch of aurora to N., altitude 10° , bearing of crown N.N.E. At 9 p.m. had gradually shifted to S. of the zenith, then rose; some vertical rays to N.W. and E.
 24th, at 7 p.m. - Arch of aurora to S.W., faint steady light; altitude varying slowly from 15° to 45° ; some masses of faint light near zenith and to S.E.
 25th, 8.45 a.m. - A faint aurora in various parts of the sky, the principal being a semi-arch rising from the horizon in S.E. and extending obliquely upwards towards W., until it became invisible, bearing S.byW.
 26th, from 8.15 } Some vertical rays of aurora to N., extending from horizon to 16° altitude, and at the latter time a band of pale light extended from near the horizon in S.E. obliquely upwards to the Wd.
 27th - - Large halo round sun with parhelia. At 6.50 p.m., band of aurora over zenith from N.byW. to E.; till past 9 p.m. in nearly the same situation, spreading out occasionally and dividing into two or three parts.

MARCH.

- 1st, 6.50 p.m. - Some vertical rays of aurora to N., extending from horizon to latitude 25° . At 7.25, an irregular arch of pale aurora to Sd.; centre S.W., altitude 10° . At 8.15, over zenith from N.N.W. to S.E., and in same position at 10.20 p.m.
 2nd, 6.45 p.m. - A narrow band of aurora across zenith from S.E. to N.N.W., which gradually shifted downwards to S. At 9.15, formed an irregular arch altitude, 16° , centre bearing about S.W.
 7th, 7 to 9 p.m. Arch of pale aurora from S.S.E. to N.N.W.; altitude in centre 14° , nearly stationary. At 9, sky became cloudy.
 9th, 7.15 p.m. - Some faint vertical rays of aurora in various parts of the sky; 10 minutes afterwards to the S.W., extending from N.N.W. to S.S.E., altitude 12° ; the arch gradually rose until near the zenith, when it divided into two or three bands, brightest in E., the current being from W. to E.; ceased at 10.25 p.m.
 11th, from 7.10 to 8.50 p.m. Some masses of faint coloured aurora to N., N.E., and E.
 13th - - About $1\frac{1}{2}$ inches of snow.

- 22nd, from 8.35 to 9.30 p.m. Arch of aurora to S.W., extending in an irregular form from S.E. to W.N.W.; altitude at centre 18° . Still visible at 9.30.
 24th, 8.30 to 9.45 p.m. Arch of aurora from S.S.E. to N.W.; altitude of centre to S.W. 16° ; pale colour, little motion.
 25th, 8.10 to 10.5 p.m. A broad band of aurora over zenith from S.S.E. to N.W., forming a bend to N.E. at its vertex.
 27th - - Very faint aurora to S.E., extending from the horizon obliquely towards W. to altitude of 14° , formed by a series of vertical rays; first visible at 9.8 p.m.
 28th, 8.10 p.m. - Some faint patches of aurora in different parts of the heavens, principally near the zenith and near the S.E. horizon. It gradually spread over the sky in irregular masses and bands some of which crossed the zenith from S.E. with a curve to N. Still visible at 10 p.m.
 29th, 8.15 p.m. - An arch of pale aurora, extending from S.E. to W.; altitude of middle 6° . It gradually increased in size and rose towards the zenith, when it became irregular in form and rapid in its movements, the waves flowing from W. towards the E.
 31st - - From 9 p.m., there was some faint aurora in various parts of the sky, and a band over zenith to S.E. turning towards the east of north. Still visible at 10 p.m.

APRIL.

- 1st, between 8.45 & 10 p.m. Some very faint auroral light in various parts of the heavens.
 7th, between 8.45 & 9.30 p.m. Some masses of pale aurora to S.W. and W., about 8° above horizon.
 9th, 9.45 p.m. - A narrow streak of pale aurora to E.S.E., extending from horizon half way to zenith.
 11th - - Circle round moon, diameter 54° ; another passing through moon's centre in zenith, diameter 110° ; seen at 9.45 p.m., continued till 10.30, when there was a serpentine band of aurora in E., altitude 35° .
 18th - - Much water on the ice, and many parts of ground bare of snow.
 19th - - Much water on ice.
 22nd, 1 a.m. - Fine display of aurora, corona borealis near zenith, bright to Sd.
 28th - - Thawed a little to-day.

MAY.

- 2nd, about 10 p.m. Faint appearance of aurora with vertical rays pointing to the zenith; direction from N. to S. It soon disappeared.
 6th - - A halo round the sun with parhelia on each side of the sun.
 9th - - A large flock of snow birds was seen to-day.
 15th - - Two gulls flew past this evening along the channel.
 16th - - A goose flew past the house at 9 p.m., and several ducks and gulls were seen at the narrows towards the Wd.
 20th - - A large flock of cranes flew past the house to-day on their way to the north.
 26th - - The laughing geese made their appearance to-day.
 27th - - Fell a little rain and sleet about 2 p.m. White or snow geese first seen to-day.

JUNE.

- 6th - - Thick fog this morning.

No. III.

Meteorology of Frederikshaab, Greenland.

THE observations upon which this paper is based, extend from 1856 September to 1860 September, thus covering four years, with the omission of one month, and were made by Mr. F. T. Barfoed at Frederikshaab, West Greenland, in latitude 62° N., longitude $49^{\circ} 24'$ W., the height above the sea not being stated. The register in the Meteorological Office is a copy made in October 1860, by Dr. Slessor, of the steam yacht "Fox," Captain (now Sir Allen) Young, and a note on the cover written by Captain J. E. Davis, R.N., who was the navigating officer, states: "This register (with the exception of the Beaufort Notations of the force of wind and of the weather,) is a literal copy of Mr. Barfoed's, and I add a comparison with our aneroid No. 22,517, which agrees with marine barometer, Negretti A. 57. Mr. Barfoed's barometer was registered at noon, but the attached thermometer was not registered; the thermometer was registered at 7 a.m., 1 and 6 p.m., scale Reaumur. I do not think that either the direction or the force of the wind can be greatly depended on, as at the place of observation they must have been influenced by the surrounding high hills."

The scale of the barometer was divided into inches, lines, and tenths of lines, old Paris measure. The means of the barometric observations, and of the thermometric observations have been converted into English inches and Fahrenheit degrees respectively, so as to present them in the usual English measures. No corrections whatever have been applied. The errors of the thermometers are altogether unknown. As the comparisons of the barometer with the aneroid, nine readings, are not consistent, an approximation to the error of the barometer has been made as follows:—

	"Fox's" barometer.	Mr. Barfoed's.
1860, October 13, Noon -	29.126 inches, 51°	328.2 lines.
" " " 8 p.m. -	29.126 " 56°	328.5 "
Means -	29.126 " $55^{\circ}.5$	328.35
Scale correction "Fox's" -	+0.013	
	29.139	
Conversion of Barfoed's -	29.162	

Correction to Barfoed's barometer —0.023 in.

This value includes the correction for height above the sea, and assumes that the instruments were at the same common temperature. It has not been deemed advisable to apply this correction to the results here given, since it cannot hold good for all temperatures, and there are no means of reducing the readings to the temperature at which the above correction has been determined, owing to the absence of attached thermometer readings, but it will serve to indicate to some extent the dependence which may be placed upon the instrument.

Table I. contains the results of the barometer observations, with correlative data, from which it will be seen that the highest readings occurred generally with northerly winds and fine weather, and the lowest with southerly winds and foul weather.

Table II. contains the mean monthly temperature with the highest and lowest observed, and the accompanying weather, from which it will be seen that the highest temperature occurred generally with southerly winds, the S.E. winds especially giving high thermometric readings, and the lowest with northerly winds and clear weather.

Table III. contains monthly summaries of the wind directions. There are very few entries of winds from E., S., W., and N.W., probably owing to the conformation of the country surrounding the station.

Table IV. contains monthly summaries of the weather, from which it is apparent that mist and fog are most prevalent in the summer months.

It will scarcely be worth while to discuss these tables in detail, as they offer little of interest to the general reader, while the meteorologist and physicist will be able to interpret the figures for themselves.

Tables V., VI., and VII. contain the general results for the four years. A study of them indicates the following information:—

The barometer is lowest in February, and highest in May, and during the months of December, January, and February it averages about four-tenths of an inch less than during the months of May, June, July; the range of the column is largest in the winter, and smallest in the summer.

The coldest month is January, the warmest July. The monthly range of temperature is about 30° during the warmer part of the year, May to October, and reaches sometimes 60° during the other six months, or the colder portion.

This large monthly range in winter is due to the warmth brought by the occasional S.E. wind, known as the West Greenland *Föhn*, while the clearness of the air occasions great terrestrial radiation during this cold part of the year. The S.E. winds blow more frequently in the colder than in the warmer months. They are generally gales. Nevertheless, calms are also more frequent in the cold than in the warm months.

The sky is clearest in March and October. Aqueous precipitation is most frequent in January, least in August, but there is then the most fog and mist.

Table VIII. contains results of observations made on board H.M.S. "Bulldog," Captain (now Vice-Admiral) Sir F. L. M'Clintock.

Table IX. contains results of observations made on board the "Fox," Captain (now Sir) Allen Young.

On both these occasions the observations were made with verified instruments, and they have been properly corrected and reduced. The results are presented in such a form as to show the diurnal range of each of the meteorological elements, and so that they may be readily incorporated with similar observations made at the same place in any other years. They have also some use as a test of the value of the results from Mr. Barfoed's instruments.

Captain N. Hoffmeyer, director of the Danish Meteorological Institute, has written a memoir entitled "*Le Foehn du Groenland*," which has been published in the Danish Geographical Society's Journal, 1877. A translation in abstract has also appeared in "*Nature*," 1877, August 9th.

The explanation which it affords of this peculiar wind may be briefly condensed as follows:—

"One of the chief peculiarities of the meteorology of the Arctic regions, and particularly of West Greenland, is the great variability of the temperature in the cold part of the year. Sudden changes from the severest cold to fresh weather and *vice versa*, often occur several times in the same month." These sudden rises of temperature almost always stand in connexion with a veering of the wind to S.E. and E. The temperature rises with the wind blowing from the high land in the interior of Greenland, which is covered with eternal snow and ice. Every continent in high latitudes must necessarily, from the radiation of heat, be colder in its interior than at the coast, where the sea makes the latitude milder.

"Greenland lies between regions where, especially in winter, the temperature is exceedingly different. To the W. and S.W. there occurs at this season of the year in Labrador, the Hudson's Bay territories, and the Arctic Archipelago so great a fall of temperature, that the mean temperature of January sinks from about -5° F. to -30° F.; to the E. and S.E., on the contrary, the Gulf Stream, even in mid-winter, maintains the temperature in the Atlantic at from 0° to 9° F., so that the superincumbent air can scarcely be supposed in general to be cooled under the freezing point. Lying between such opposite varieties of temperature, the climate of Greenland must necessarily be in a high degree dependent on the prevailing direction of the wind at every particular period; all winds from S.byW. to N.E. may bring comparative cold, but E. and S.E. winds, on the contrary, heat, and this ought specially to hold good of the S.E. wind, both because it comes from the warmest part of the neighbouring Atlantic Ocean, and also because it has the shortest way to travel over the ice deserts of the interior to reach the western coast. The character of the winter in Greenland will therefore depend on whether the S. or the E. wind has prevailed during the course of it."

The S.E. wind in Greenland appears always to be very dry; the snow melts away from the low country without any running water being visible. As the S.E. wind from the ocean rises over the high land, its air expands. The expansion is accompanied by a consumption of heat, so that the air is cooled about 1° F. for every 200 feet it rises, provided the cooling does not lower the temperature below the degree at which the air can contain its watery vapour; but if the dew point be reached, the vapour passes into cloud, rain, or snow, the latent heat is set free, and the cooling proceeds much more slowly, at the rate of about a half degree F. for every 200 feet.

When this wind descends towards the western Fiords, its air is compressed, and consequently heated. Its temperature will rise, and moisture assume more and more

the state of vapour. The heating during the descent will be 1° F. for every 200 feet. Leaving out of consideration the cooling by radiation and contact with mountain masses, the S.E. wind will be lowered about half a degree for every 200 feet ascent, and raised one degree for every 200 feet descent, having more moisture in the ascent than in the descent.

In connection with this subject it may be of interest to quote the following passages from Sir John Richardson's work on the "Polar Regions."

"Baron Wrangell, in treating of the winds of the Kolyma district in Arctic Siberia, says that the N. wind is seldom fresh or of long continuance; it is more frequent in summer, when it brings cold, than in winter, when it often brings mist and milder weather. The N.E. wind, or more often the E.N.E. wind, is seldom of long continuance or violent. It usually clears the atmosphere from mist, and causes the thermometer to rise in summer and to fall in winter. The S.E. wind drives away mist, and may be regarded as the prevailing wind in autumn and winter. There is a remarkable phenomenon called the *teploi weter* (the warm wind), which occurs sometimes in the middle of winter; it begins suddenly when the sky is quite clear, with the wind blowing from the S.E. by S. or S.E. by E., and causes the temperature to rise from -24° , or even -47° to $+32^{\circ}$ or $+35^{\circ}$ F., the barometer having in the preceding eight hours sunk four-tenths of an inch.

"The S.S.E. winds do not influence either the barometer or thermometer. S. winds seldom blow with much force. The S.W. wind influences the temperature in summer little, but in winter it is the most piercing of all winds and is called by the natives *schalonik*. The W. and N.W. winds prevail on the general average of the year; in winter the S.E. prevails, in summer the N.W.; this latter wind blowing often in summer also; it is a cold wind in summer, and in winter brings snow and bad weather."

"In Arctic America, the phenomenon of warm winds (*teploi weter* of Wrangell), also occurs, and makes the month in which they happen, whether December, January, or February, warmer than the other two."

TABLE I.—MEAN of BAROMETER READINGS at NOON, the highest and lowest with the accompanying WIND and WEATHER, at FREDERIKSHAAB.

—	Mean.	Max.	Day.	Temp.	Wind.	Weather.	Min.	Day.	Temp.	Wind.	Weather.
1856.											
September	- 29° 744	30° 215	23rd	41° 9	S.W.	b o	29° 131	12th	46° 0	N.	o f
October	- 29° 531	30° 143	2nd	39° 7	S.W.	b c	29° 220	13th	27° 5	N.	f
November	- 29° 762	30° 463	8th	34° 7	S.W.	o	28° 927	22nd	18° 5	N.E.	b v
December	- 29° 575	30° 197	24th	25° 3	N.	b v	28° 687	16th	36° 5	S.W.	o s
1857.											
January	- 29° 575	30° 552	22nd	27° 5	S.W.	o	28° 563	13th	38° 8	S.W.	o s
February	- 29° 371	30° 019	1st	7° 3	N.E.	2 b v	28° 918	21st	9° 5	N.	b v
March	- 29° 468	30° 019	24th	41° 0	N.	2 b v	28° 865	8th	26° 8	S.W.	o s
April -	- 29° 859	30° 472	15th	38° 8	N.	9 b v	29° 326	26th	38° 8	S.W.	o
May -	- 29° 770	30° 286	1st	36° 5	S.W.	o s	28° 873	28th	41° 5	N.	b c s
June -	- 29° 913	30° 818	30th	45° 7	N.	b c	29° 264	17th	46° 2	S.W.	b c f
July -	- 29° 664	29° 975	1st	45° 5	V.	o f	29° 220	27th	43° 0	V.	8 o r
August	- 29° 726	30° 108	7th	59° 0	N.W.	b v	29° 309	16th	43° 5	V.	o
September	- 29° 637	30° 046	8th	41° 7	S.W.	b v	29° 184	21st	37° 0	N.	o r s
October	- 29° 646	30° 081	16th	37° 4	N.	b v	29° 042	21st	41° 0	S.E.	9 r o
November	- 29° 628	30° 197	24th	32° 0	S.E.	o	29° 167	26th	25° 7	S.	o s
December	- 29° 344	29° 850	10th	25° 3	S.E.	o s	28° 616	26th	32° 0	V.	o s
1858.											
January	- 29° 344	30° 374	30th	6° 1	C.	b v	28° 332	5th	33° 1	S.	o s
February	- 29° 282	29° 975	27th	15° 1	N.E.	o	28° 793	9th	14° 2	N.E.	9 b c q
March	- 29° 779	30° 374	4th	34° 3	C.	o r s	28° 953	10th	43° 3	S.E.	11 o r q
April -	- 29° 762	30° 286	27th	29° 8	N.	b v	29° 113	17th	43° 3	V.	b v
May -	- 29° 992	30° 419	14th	42° 1	C.	b v	29° 495	2nd	41° 2	S.W.	8 o r s q
June -	- 29° 770	30° 046	4th	38° 3	N.	o r s	29° 397	21st	39° 9	N.	b c f
July -	- 29° 824	30° 197	17th	46° 9	S.W.	b v	29° 184	8th	45° 7	V.	r
August	- 29° 691	30° 463	10th	46° 0	N.	b c f	29° 131	24th	50° 5	S.W.	9 o f q
September	- 29° 637	30° 072	27th	36° 5	N.	o	29° 309	4th	36° 7	N.	2 b v
October	- 29° 708	30° 064	15th	31° 6	S.W.	o	29° 238	20th	30° 9	N.	b c
November	- 29° 628	30° 108	3rd	19° 6	N.	b v	29° 060	30th	16° 3	S.E.	b
December	- 29° 309	29° 939	28th	9° 5	C.	b c s	28° 536	11th	40° 1	S.E.	11 o
1859.											
January	- 29° 442	30° 108	7th	11° 8	N.	8 o s	28° 776	8th	25° 3	S.	o
February	- 29° 362	30° 090	4th	16° 3	N.E.	8 b c	28° 873	12th	11° 8	N.	8 b c s
March	- 29° 726	30° 001	25th	20° 8	N.E.	8 b c q	29° 131	3rd	18° 5	N.E.	b v
April -	- 29° 913	30° 348	27th	40° 1	N.	b v	29° 255	6th	30° 9	C.	b v
May -	- 29° 646	30° 197	22nd	34° 3	N.	—	29° 184	3rd	43° 3	V.	b c r h
June -	- 29° 797	30° 108	5th	37° 0	N.	o	29° 273	17th	38° 8	N.W.	o r
July -	- 29° 708	30° 552	14th	41° 0	S.W.	o r	29° 291	13th	41° 0	S.W.	o r
August	- 29° 682	30° 108	23rd	41° 0	N.	o f	29° 309	19th	43° 7	S.	b c
September	- 29° 628	30° 152	15th	54° 5	S.E.	10 o r	29° 131	13th	45° 5	S.W.	o r
October	- 29° 779	30° 197	25th	38° 8	S.W.	b c	28° 776	6th	34° 3	N.	7 b c q
November	- 29° 540	29° 930	8th	29° 8	E.	b c	28° 216	14th	25° 3	S.E.	12 b c s
December	- 29° 753	30° 401	15th	28° 9	V.	b c s	29° 087	22nd	23° 0	C.	o
1860.											
January	- 29° 335	29° 824	24th	9° 5	N.E.	b	28° 580	12th	14° 0	S.W.	o m
February	- 29° 468	30° 241	17th	25° 3	N.	8 o s	28° 554	20th	58° 8	S.W.	o r s
March	- 29° 637	30° 206	22nd	27° 5	N.	b v	29° 184	5th	36° 5	S.E.	b c
April -	- 29° 726	30° 357	20th	46° 9	S.E.	f m	28° 865	3rd	36° 5	S.E.	9 o r
May -	- 30° 081	30° 357	21st	45° 5	N.	b v	29° 753	17th	38° 8	N.	b c
June -	- 29° 921	30° 197	21st	50° 0	N.	b v	29° 184	29th	46° 6	S.W.	o r
July -	- 29° 637	Only seven days, 1st to 7th.									
August	-	No observations.									
September	- 29° 619	24 days, 7th to 30th.									
October	- 29° 824	Only 9 days, 1st to 9th.									

TABLE II.—MEANS of TEMPERATURE of AIR, and observed highest and lowest with accompanying WIND and WEATHER, at FREDERIKSHAAB.

	7 a.m.	1 p.m.	6 p.m.	Max.	Date.	Wind.	Weather.	Min.	Date.	Wind.	Weather.
1856.					d. h.				d. h.		
September	39°8	43°0	39°6	53°8	18th, 1 p.m.	S.E.	o	33°1	30th, 7 a.m.	N. 8	b c q
October	27°4	32°9	29°6	43°3	22nd, 1 "	S.W. 7	b c q	9°5	31st, 7 "	N. 2	b v
November	33°6	36°2	34°0	50°0	13th, 1 "	S.W.	o f	14°0	20th, 6 p.m.	N.	b v
December	23°9	26°0	23°9	59°0	1st, 7 a.m.	S.E. 5	b c q	1°8	29th, 6 "	N.E. 2	b v
1857.											
January	19°6	20°9	18°4	38°8	13th, 1 p.m.	S.W.	o s	1°8	15th, 7 a.m.	N.E. 1	b v
February	6°6	11°4	7°0	27°5	3rd, 1 "	S.W. 2	o s	15°3	19th, 7 "	N. 1	b c
March	19°1	24°7	22°0	41°0	24th, 1 "	N. 2	b v	6°8	2nd, 7 "	N. 4	b v
April	28°4	33°1	29°5	42°1	30th, 1 "	S.W.	o	9°5	12th, 7 "	E. 1	b v
May	35°0	40°4	36°1	54°3	31st, 1 "	N.	b v	28°6	8th, 7 "	N.	o
June	41°1	46°1	41°8	60°1	26th, 1 "	N. 1	b v	32°0	7th, 7 "	N.	o f
July	42°8	45°5	42°2	60°1	7th, 1 "	N. 2	b c	36°3	30th, 6 p.m.	N.	o s r
August	44°3	47°5	42°7	54°7	31st, 1 "	S.W.	o r	37°6	1st, 6 "	N.W. 7	b v
September	40°0	42°1	39°0	54°5	17th, 1 "	S.E.	o r	27°5	30th, 6 "	N. 8	o
October	26°6	30°7	28°0	41°0	21st, 1 "	S.E. 9	o r	14°0	9th, 7 a.m.	N. 2	b v
November	20°3	23°2	21°8	40°6	22nd, 7 a.m.	S.W.	o s	1°8	19th, 7 "	C.	b v
December	15°7	18°0	15°1	38°3	25th, 1 p.m.	S.E.	b c	4°0	3rd, 7 "	N.	b v
1858.											
January	12°3	14°3	13°2	34°3	20th, 6 p.m.	S.E.	o s r	12°3	29th, 7 a.m.	N.	b v
February	19°1	23°8	19°6	46°0	15th, 1 "	S.E. 9	b c q	4°5	8th, 7 "	N.E.	b v
March	24°9	31°6	27°7	43°3	3rd, 1 "	S.E. 9	o r q	10°6	20th, 6 p.m.	N.	b v
April	30°5	32°7	30°9	43°3	16th, 1 "	N.	b v f	9°5	2nd, 6 "	N.E.	b v
May	33°6	36°8	33°6	47°8	13th, 1 "	C.	b v	23°0	9th, 1 "	N. 8	b c
June	39°3	42°7	39°8	50°0	9th, 7 a.m.	V.	b c	34°3	13th, 7 a.m.	N.	b c f
July	44°4	49°1	43°2	65°1	1st, 1 p.m.	S.E.	b c r	38°8	6th, 7 "	N.	b v
August	41°6	44°7	41°2	52°9	9th, 1 "	V.	b v	32°0	28th, 7 "	V.	s r
September	35°2	38°3	36°0	52°3	17th, 6 "	S.E.	o	27°5	29th, 7 "	N.	b v
October	29°2	32°0	30°1	45°5	16th, 1 "	S.E. 10	b c	9°5	23rd, 6 p.m.	N.	b v
November	25°8	29°2	26°9	50°0	10th, 6 "	S.E.	o	0°5	29th, 7 a.m.	E.	b v
December	16°0	16°7	15°3	41°0	11th, 6 "	S.E. 11	o	0°5	30th, 1 p.m.	N.	b v q
1859.											
January	11°5	14°2	11°5	36°5	6th, 1 p.m.	S.E. 10	o r	13°0	15th, 6 p.m.	N.E.	b v
February	16°0	19°6	16°1	38°8	11th, 1 "	V.	o s	13°0	21st, 7 a.m.	C.	b v
March	13°3	23°9	18°1	39°9	31st, 1 "	S.W.	o s	6°3	17th, 7 "	C.	b c
April	29°0	36°6	30°8	52°9	28th, 1 "	S.E.	b v	16°3	12th, 7 "	N.E.	b v
May	36°5	38°8	35°5	52°9	24th, 7 a.m.	S.W.	—	28°9	7th, 7 "	N.E.	o f
June	39°3	42°5	38°8	54°1	12th, 1 p.m.	S.W.	o r	34°3	17th, 7 "	N.W.	o v
July	41°2	44°7	40°9	61°7	21st, 1 "	S.W.	b c	32°0	19th, 7 "	N.	b v
August	38°0	41°8	38°4	47°8	29th, 1 "	S.	b c	25°3	27th, 7 "	N.	b v
September	37°5	41°1	37°5	59°0	15th, 7 "	S.E. 10	o r	29°8	30th, 6 p.m.	N. 8	b c q
October	29°6	36°8	31°5	51°1	17th, 1 p.m.	S.E.	o	14°0	31st, 6 "	C.	b v
November	21°9	26°4	24°2	38°8	6th, 1 "	S.E.	b c	2°9	19th, 6 "	C.	b c
December	20°8	21°9	22°1	45°5	12th, 6 p.m.	S.E.	o r	1°0	10th, 1 "	C.	b v
1860.											
January	12°5	14°8	13°3	36°5	27th, 1 p.m.	S.E. 7	o	1°8	20th, 7 a.m.	N.E. 9	o
February	20°4	23°0	20°3	41°0	12th, 7 a.m.	S.W. 8	o r s	4°0	24th, 7 "	N.E.	b v
March	14°8	24°4	18°2	36°5	5th, 1 p.m.	S.E.	b c	13°0	2nd, 7 "	N.E.	b v
April	25°5	30°9	26°4	47°8	3rd, 6 "	S.E. 9	o r	10°8	13th, 7 "	N.E.	b v
May	36°4	41°1	36°2	47°8	27th, 1 "	V.	b c	28°6	17th, 7 "	N.	b c
June	42°6	47°4	42°0	59°0	17th, 1 "	S.W.	b v	27°5	26th, 7 "	N.	b v
July	44°7	49°0	44°2	Seven days' observations only.							
August	No observations.										
September	38°5	42°3	38°0	52°5	27th, 1 p.m.	S.W.	b c r	25°3	21st, 7 a.m.	N.	b v
October	28°2	32°3	28°8	Nine days' observations only.							

TABLE III.—MONTHLY SUMMARIES of the WIND'S DIRECTION at FREDERIKSHAAB.

	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variable.	Calm.
1856.										
September	15	—	1	1	—	7	—	—	6	—
October	19	—	2	—	—	7	—	—	3	—
November	3	2	3	4	—	14	—	—	3	—
December	12	4	1	3	—	9	—	—	2	—
1857.										
January	11	1	6	—	1	7	—	—	5	—
February	15	3	4	—	—	3	—	1	2	—
March	18	—	2	—	—	6	2	—	3	—
April	14	—	2	—	—	12	—	—	2	—
May	14	—	—	—	3	5	—	—	7	2
June	19	—	—	—	4	1	—	1	4	1
July	17	—	—	—	—	7	1	—	6	—
August	10	—	—	1	—	9	—	4	5	—
September	12	—	—	2	—	12	—	—	4	—
October	12	—	—	2	1	6	—	—	1	6
November	9	3	—	5	2	6	—	—	1	4
December	7	11	1	5	2	1	—	—	4	—
1858.										
January	11	7	3	4	1	—	—	1	2	2
February	6	9	2	3	1	1	—	—	—	6
March	4	2	1	9	1	2	—	1	1	10
April	13	2	1	2	3	3	—	—	3	3
May	20	—	—	1	—	2	—	—	6	2
June	13	1	—	1	—	7	3	—	3	2
July	6	—	—	3	2	2	4	3	11	—
August	12	—	—	1	1	7	—	2	7	1
September	17	—	—	3	4	5	—	—	1	—
October	13	—	—	4	1	8	—	2	1	2
November	5	5	1	6	—	2	—	—	2	9
December	13	6	1	3	—	—	—	—	—	8
1859.										
January	7	7	—	4	3	2	—	1	3	4
February	3	6	1	3	—	4	—	3	4	4
March	1	13	2	1	1	4	—	—	4	5
April	3	2	—	4	1	2	—	—	2	10
May	12	4	—	1	—	7	—	—	6	1
June	5	—	—	—	—	16	1	7	1	—
July	9	1	—	3	3	11	—	1	3	—
August	21	—	—	—	6	—	—	—	4	—
September	11	3	—	5	1	8	—	—	2	—
October	7	2	—	2	4	8	—	—	1	7
November	4	5	1	6	1	5	—	—	1	7
December	3	9	—	6	1	2	—	—	3	—
1860.										
January	1	14	1	3	—	4	—	2	1	5
February	1	4	1	6	—	9	2	—	6	—
March	3	5	1	5	—	7	—	2	3	5
April	4	7	—	6	—	6	—	—	2	5
May	15	—	—	—	—	6	—	—	3	7
June	10	—	—	—	1	11	2	—	2	4
July	4	—	—	—	—	1	—	—	—	—
August	—	—	—	No observations.						
September	3	1	—	3	—	15	—	1	—	1
October	3	—	—	—	—	3	—	1	—	2

TABLE IV.—MONTHLY SUMMARIES of WEATHER NOTATIONS, at FREDERIKSHAAB.

	b.	c.	o.	m.	f.	r.	s.	q.	Remarks.
1856.									
September	5	8	17	1	7	6	1	5	
October	14	6	11	2	3	—	2	8	
November	4	11	15	—	4	—	3	4	
December	10	6	15	1	—	—	8	5	
1857.									
January	8	6	17	—	—	—	16	15	
February	9	7	12	—	—	—	10	5	
March	13	5	13	1	—	—	16	8	
April	11	3	16	—	1	—	12*	8	* 1 hail.
May	8	10	13	—	5	—	7*	1	* 4 with rain.
June	5	16	9	9	6	5*	—	4	* 1 with snow.
July	2	15	14	3	5	10*	—	6	* 1 with snow.
August	7	10	14	1	1	12	—	1	
September	8	8	14	—	1	11*	—	4	* 1 with snow.
October	12	9	10	—	—	2	11*	5	* 4 with rain.
November	7	12	11	—	—	1	8*	1	* 2 with rain.
December	10	16	5	—	—	—	8	4	
1858.									
January	8	11	12	—	—	—	13*	7	* 2 with rain.
February	8	11	9	—	—	—	4	8	
March	10	7	14	1	—	3	9*	4	* 2 with rain.
April	10	9	11	2	1	3	6*	3	* 1 with rain.
May	12	12	7	4	2	1	2*	10	* 1 with rain.
June	2	20	8	5	2	6*	—	—	* 1 with snow.
July	11	15	5	6	—	7	—	2	
August	5	12	14	10	9	5*	—	6	* 2 with snow and 1 with hail also.
September	9	10	11	1	1	2	5*	7	* 3 hail.
October	7	11	13	—	2	2	9	5	
November	12	7	11	—	1	2	5	5	
December	16	11	4	—	1	—	5	11	
1859.									
January	10	8	13	—	—	1	14*	8	* 1 with rain.
February	2	18	8	—	—	—	9	11	
March	17	8	6	1	—	2	8	6	
April	14	6	10	—	4	—	4	3	
May	2	5	10	2	3	6*	—	1	* 2 with snow, 1 with hail; 14 days' weather omitted.
June	6	13	11	2	—	11	2	6	
July	4	8	19	4	9	9	—	3	
August	4	15	12	10	10	1	—	—	
September	8	10	12	2	—	7	—	2	
October	16	7	8	—	—	4*	1	6	* 1 with rain.
November	11	10	9	—	—	—	6	9	
December	4	14	13	—	—	3	8	5	
1860.									
January	7	15	9	—	—	—	12	5	
February	3	6	20	—	—	1	17*	11	* 2 with rain.
March	10	15	6	—	—	—	14	5	
April	9	13	8	3	1	1	9	11	
May	6	15	10	4	6	1	1	—	
June	5	13	12	3	2	6	1	—	
July	1	2	4	—	—	2	—	—	Seven days' observations only.
August	No observations.					—	—	—	
September	3	7	14	—	—	14*	1	1	* 2 with snow; 24 days' observations only.
October	7	—	2	—	—	—	2	—	Nine days' observations only.

N.B.—Each *bv* has been counted as *b*; *b c* as *c*; *b c f* as *m*; *q* includes forces of wind above 7; the sums of *r* and *s* give days of precipitation of water from the clouds.

TABLE V.—ATMOSPHERIC PRESSURE and TEMPERATURE, at FREDERIKSHAAB.

1856-60. Months.	No. of Years.	Barometer at Noon.				Temperature of the Air.					
						Mean at			Observed.		
		Mean.	Highest.	Lowest.	Range.	7 a.m.	1 p.m.	6 p.m.	Highest.	Lowest.	Range.
		inches.	inches.	inches.	inches.						
January	-	29.424	30.552	28.332	2.220	14.0	16.1	14.1	38.8	-13.0	51.8
February	-	.371	.241	.554	1.687	15.5	19.5	15.8	46.0	-15.3	61.3
March	-	.652	.374	.865	1.509	18.0	26.2	21.5	43.3	-13.0	56.3
April	-	.815	.472	.865	1.607	28.4	33.3	29.4	52.9	-10.8	63.7
May	-	.872	.419	.873	1.546	35.4	39.3	35.4	54.3	23.0	31.3
June	-	.850	.818	29.184	1.634	40.6	44.7	40.6	60.1	27.5	32.6
July	-	.732	.552	.184	1.368	42.8	46.4	42.0	65.1	32.0	33.1
August	-	.700	.463	.131	1.332	41.3	44.7	40.8	54.7	25.3	29.4
September	-	.653	.215	.131	1.084	38.2	41.7	38.0	59.0	25.3	33.7
October	-	.666	.197	28.776	1.421	28.2	33.1	29.8	51.1	9.5	41.6
November	-	.640	.463	.216	2.247	25.4	28.8	26.2	50.0	-1.8	51.8
December	-	.495	.401	.536	1.865	19.1	20.6	19.1	59.0	-4.0	63.0
Year	-	29.656	30.818	28.216	2.602	28.9	32.9	29.4	65.1	-15.3	80.4

TABLE VI.—FREQUENCY of WIND DIRECTIONS, at FREDERIKSHAAB.

1856-60. Months.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Variables.	Calms.	No. of Observations.
January	30	29	10	11	5	13	—	4	11	11	124
February	25	22	8	12	1	17	2	4	12	10	113
March	26	20	6	15	2	19	2	3	11	20	124
April	34	11	3	12	4	23	—	—	9	24	120
May	61	4	—	2	3	20	—	—	22	12	124
June	47	1	—	1	5	35	6	8	10	7	120
July	36	1	—	6	5	21	5	4	22	—	100
August	43	—	—	2	7	16	—	6	16	3	93
September	58	4	1	14	5	47	—	1	13	1	144
October	54	2	2	8	6	32	—	3	9	17	133
November	21	15	5	21	3	27	—	1	7	20	120
December	35	30	3	17	3	12	—	—	9	15	124
Totals	470	139	38	121	49	282	15	34	151	140	1439

TABLE VII.—SUMMARIES of WEATHER at FREDERIKSHAAB.

1856-60. Month.	b.	c.	o.	m.	f.	r.*	s.†	q.	No. of Observations.
January	33	40	51	—	—	1	55 (3)	35	124
February	22	42	49	—	—	1	40 (2)	35	113
March	50	35	39	3	—	5	47 (2)	23	124
April	44	31	45	5	7	4	31 (1)	25	120
May	28	42	40	10	16	8 (3)	10 (5)	12	110
June	18	62	40	19	10	28 (2)	3	10	120
July	18	40	42	13	14	28 (1)	—	11	100
August	16	37	40	21	20	18 (2)	—	7	93
September	33	43	68	4	9	40 (3)	7	19	144
October	56	33	44	2	5	8 (1)	25 (4)	24	133
November	34	40	46	—	—	3	22 (2)	19	120
December	40	47	37	1	—	3	29	25	124
Totals	392	492	541	78	87	147(12)	269(19)	245	1425

* The figures bracketed under *rain*, represent the frequency of snow with the rain.
† The figures bracketed under *snow* represent the frequency of rain with the snow.

TABLE VIII.—RESULTS of OBSERVATIONS made on board H.M.S. "Bulldog," 1860, July 19th, 20th, 21st, in the HARBOUR of FREDERIKSHAAB.

Subjects of Observation.		Hours of Observation.					
		4 a.m.	8 a.m.	Noon.	4 p.m.	8 p.m.	Midnight.
Barometer	Mean	29.567	29.563	29.563	29.553	29.570	573
Temperature of the air	Mean	40.0	40.5	42.0	41.5	39.0	38.5
Sums of wind components	N.	4.2	—	—	1.1	3.3	3.4
	S.	4.2	8.6	7.6	4.3	2.9	3.9
	E.	4.2	1.4	1.2	0.2	0.6	0.8
	W.	3.7	1.1	1.1	3.9	5.0	3.6
Weather notations	b	1	1	1	—	—	—
	c	—	—	1	—	—	—
	o	2	2	1	3	3	3
	r	2	1	—	1	1	1
	m	1	1	1	1	1	1
	f	—	—	—	1	1	1

The temperature of the sea surface was 36° from one observation.

TABLE IX.—RESULTS of OBSERVATIONS made on board the “Fox,” 1860, October 2nd to 20th inclusive, in the HARBOUR of FREDERIKSHAAB.

Subjects of Observation.		Hours of Observation.					
		4 a.m.	9 a.m.	Noon.	3 p.m.	8 p.m.	Midnight.
Barometer - - - - -	Means	-	29° 55.2	29° 53.2	29° 53.0	29° 52.8	-
Temperature, dry bulb - - - - -	Means	30° 0	31° 8	33° 6	33° 4	31° 1	29° 9
“ wet bulb - - - - -	“	29° 2	30° 5	32° 2	31° 3	29° 8	28° 9
“ sea surface - - - - -	“	31° 0	31° 3	31° 9	31° 8	31° 6	30° 9
Sums of wind components	N. - - -	5.6	9.0	12.8	16.1	14.5	6.9
	S. - - -	9.5	6.5	4.6	5.4	6.7	9.6
	E. - - -	8.4	9.4	9.2	7.9	5.1	9.3
	W. - - -	2.7	6.2	9.1	8.6	8.1	7.2
	Calms - -	7	8	6	3	7	8
Weather notations -	State of the sky -	b - - -	6	7	7	6	8
	-	c - - -	3	5	3	4	5
	-	o - - -	10	7	9	9	6
	-	m - - -	-	1	1	1	-
	Aqueous phenomena	f - - -	1	-	-	1	-
	-	r - - -	3	3	1	3	2
	-	s - - -	4	4	3	3	3
	Stormy - -	q - - -	-	1	1	-	1
	Mean amount of cloud - - - - -	-	5.9	6.3	6.4	6.7	-
	Relative frequency of the descriptive clouds	cir. - - -	-	5	6	4	-
	-	cm.-str. - -	-	-	-	1	-
	-	str. - - -	-	3	4	5	-
	-	nim. - - -	-	9	9	9	-
Cloudless -		-	1	1	-	-	-

REMARKS.

2nd, 8 p.m. to Midnt. Coloured aurora, N.N.E. to S.S.W.
3rd, 8 p.m. to 3 a.m. Coloured aurora, N.N.E. to S.S.W.
4th, 8 p.m. to Midnt. Aurora to S.Ed., spiral in form, shooting beyond the zenith.
5th, 10 p.m. to Midnt. Aurora from N.N.E. to S.S.W., travelling W.
6th, 10 p.m. - - - Aurora with brilliant colours shooting up beyond the zenith, N.N.E. to S.S.W.
7th, 8th, 9th, at 10 p.m. Brilliant aurora.
10th - - - - - Much loose ice.
13th, 10 p.m. - - - Aurora from N.N.E. to S.S.W.
14th, 7.30 p.m. - - - Aurora radiating from N.N.W. forming an arch to S.S.E., through W., pitch 20° to 40°.
16th, 10 p.m. - - - Aurora in S.
17th, 7 p.m. to Midnt. Aurora bright.
18th, 9 p.m. - - - Aurora from N.N.E. to S.S.W.
19th, 10 p.m. - - - Aurora bright.
20th - - - - - Gulls, divers, ducks, two seals seen.

No. IV.
Results of Meteorological Observation, made at Julianeshaab.

RESULTS of METEOROLOGICAL OBSERVATIONS made in JULIANESHAAB, GREENLAND, on board the Exploring Yacht
“Fox,” Captain (now Sir) ALLEN YOUNG, in the Year 1860, October 21st to November 8th; and H.M.S.
“Bulldog,” Captain Sir F. L. MCCLINTOCK, 1860, October 1st to 3rd.

Hours.	Mean Pressure.	Temperature.			Sums of Wind Components.				Weather Notations.						Clouds.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		Mean Air.	Depress- sion of Wet Bulb.	Mean Air.	N.	S.	E.	W.	Sky.			Atmo- sphere.			Rain.		q.	Mean Amount	Characters.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
									b.	c.	o.	m.	f.	r.	s.	cir.-e.			cir.-str.	cum.- str.	cum.	str.	nim.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
Oct. 1-3 :	inches.	°	°	°	—	1.9	—	2.3	—	2	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

SUMMARY of the WINDS, grouped under Sixteen Points, with their Mean Force.

Month.	No. of Obsus.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.		S.S.E.		S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.		Calms.	No. cl
		O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.				
October -	84	4	1.5	5	1.7	3	1.5	5	1.8	7	1.8	4	1.9	3	2.0	2	1.7	2	1.5	3	1.8	2	2.2	3	2.2	10	2.3	8	2.6	4	1.9	17			
November	48	3	1.3	4	1.4	6	3.7	4	1.8	3	1.7	-	-	-	-	-	-	-	-	2	3.0	2	3.0	1	5.0	6	3.4	6	3.0	3	1.0	8			

1860.—OCTOBER.

- 1st - No ice in harbour.
- 2nd, 8 a.m. - Some ice came in.
- 3rd, noon - Steaming out; immense quantities of ice in sight. At 8 p.m., floe-ice and several bergs in sight. Midn., noticed aurora.
- 21st, 3 a.m. - Aurora from W.byS. to E.byN.
- 21st, 8 p.m. - Aurora from N.E.byN. to S.E.byE.
- 22nd, 8.30 a.m. - A double parhelion, right and left, 22° distant from the sun.
- 22nd, 8 p.m. - Barometer 28.353 inches, air 21°, wind N.byW., 1, b v.
- 23rd, 2 a.m. - Aurora W.byS. to E.byN.
- 23rd, 10 p.m. - Aurora bright in patches all over the sky, chiefly in E.by N.
- 24th, 10 p.m. - Aurora E.byN. to S.W.byW.
- 25th, noon - Steaming up Igalikko Fiord. Saw several seals. Sp. g. of water 1.0205, temperature 60°, from 2 observations. Both arms of the Fiord covered with pretty thick young ice (coated with snow), too thick to steam through; much pancake ice along the Fiord.
- 25th, 10 p.m. - Aurora E.byN. to W.byS., with rapid motions, varied and bright colours.
- 26th, to M. - In Fox Bay. Aurora E.byN. to W.byS., with variously coloured streaks.
- 27th - Steaming down Igalikko Fiord.
- 28th, 10 p.m. - Aurora E.byN. to W.byS.
- 29th, 10 p.m. - Aurora diffused over the sky.
- 30th, 2.30 p.m. - A bright parhelion, 22° from the sun, on each side.
- 31st, 8.30 to 10.30 p.m. Aurora from E.byS. to W.byN.

NOVEMBER.

- 1st, 9 p.m. - Aurora N.byW. to S.byE.
- 2nd, 10 to M. - A bright aurora on the face of the high land round Julianeshaab, seen by a boat party in Igalikko Fiord.
- 3rd, 2 a.m. - Aurora N.E.byN. to S.W.byS.
- 4th, 8 p.m. - Aurora radiating from zenith.
- 5th, 7.30 p.m. - A meteor shot across the sky, leaving a trail of white sparks like a rocket, passing over 80° in nearly a horizontal direction between S.E.byE. and N.E.byN.
- 5th, 10 p.m. - Aurora very brilliant.
- 6th, 9.30 p.m. - Aurora in streaks diffused over the sky.
- 7th, 9.30 p.m. - Aurora E.byS. to W.byS.
- 8th, 8 p.m. - Very brilliant aurora N.E.byN. to S.byE.
- 8th, 8 p.m. - Outside Julianeshaab, passing through stream ice, pack ice to S.Ed.

No. V.

Temperature of the Air at Batty Bay.

TEMPERATURE of the AIR at BATTY BAY, Lat. 73° 12' N., Long 91° 10' W., from Observations taken on board the ship "Prince Albert," Captain W. KENNEDY, September 1851–April 1852.

Year and Month.	Mean Temperature.				Extremes.					
	8 a.m.	Noon.	4 p.m.	8 p.m.	Maximum.	Day.	Hour.	Minimum.	Day.	Hour.
1851. September - -	22.7	25.9	25.3	22.5	37.0	13th	Noon	5.0	29th	8 p.m.
October - -	8.9	10.6	10.4	8.0	27.0	23rd	8 p.m.	-10.0	31st	8 a.m.
November - -	-5.9	-6.3	-7.2	-5.8	10.0	16th	Noon	-38.0	30th	8 p.m.
December - -	-16.2	-15.9	-16.3	-16.8	-5.0	31st	Noon	-34.0	1st	8 a.m.
1852. January - -	-20.7	-20.5	-20.3	-21.2	-1.0	11th	4 p.m.	-44.0	22nd	8 a.m.
February - -	-20.0	-17.2	-18.6	-18.4	11.0	28th	8 p.m.	-39.0	17th	8 p.m.
March - -	-18.3	-6.6	-12.6	-17.6	22.0	23rd	8 a.m.	-46.0	14th	8 p.m.
*April - -	4.2	20.3	3.7	0.1	46.0	25th	Noon	-18.0	5th	8 a.m.

* The observations in April appear to be somewhat doubtful.

No. VI.

Results of Meteorological Observations made at Repulse Bay.

THE meteorological data here reduced and brought together are the results of observations made at Fort Hope, on the north shore of Repulse Bay, by John Rae, M.D., F.R.G.S., during two winterings there, in 1846-7, and 1853-4. Fort Hope is in latitude 66° 32' 16" N., longitude 86° 55' 51" W., a few feet above the sea to which it is close. The original register, lent by Dr. Rae, has been used for 1846-7. A note in it states that the thermometer was not tested except at the freezing point of mercury. This gives a correction at -40° of +2°·6; and, assuming the correction at the freezing point of water as -0°·2; the following corrections have been assigned and allowed: at 25°, 0; 10°, +0·6; 0°, +1·0; -10°, +1·4; -20°, +1·8; -30°, +2·2; -40°, +2·6; -50°, +3·0. In Dr. Rae's "*Narrative of an Expedition to the Shores of the Arctic Sea*," an abstract of the observations is printed, and, at page 241, is the following note: "Newman's improved cistern barometer used, correction for capacity $\frac{1}{54}$, neutral point 30·302, capillary action +·042." It has been ascertained from Dr. Rae that the observations were not corrected for instrumental errors at the time. Accordingly they have now been corrected and reduced to 32° F. Interpolation has occasionally been practised to bring the barometrical observations to the time of the other observed phenomena. The true direction of the wind was recorded, its force, and the weather by Beaufort's scales.

The observations for 1853-4 were also furnished by Dr. Rae. The thermometer, tested by freezing mercury, read minus 36°; and accordingly the following corrections have been applied to all observations below 32°: at 20°, -0·3; 10° -0·6; 0°, -0·9; -10°, -1·2; -20°, -1·5; -30°, -1·8; -40°, -2·1; -50°, -2·3. The winds and weather were recorded in the same manner as in the former register. No barometer was taken.

It appears from the results that the coldest period is January or February, the warmest July; the observations in August were too few for discussion. Haze or mist was frequent in the winter, but foggy weather was most remarked in July. The highest monthly temperatures seem to be related to S.Ely. winds, snow, or rain, except in the short summer, when they appear to depend on fine clear weather. The lowest monthly temperatures were all accompanied by N.Wly. winds and clear weather; but it is probable that they depend on overcast rainy weather in summer. The lowest temperature recorded was -50° in February 1854, the highest 58°·5 in July the same year, giving an extreme range of 108°·5. The predominant wind throughout the year appears to be N., N.N.W., or N.W., and, unless the force has been overestimated, the mean force is exceptionally high, reaching 6 of Beaufort's scale, or a strong wind.

Counting the number of times that force 8 and upwards was recorded among the whole of the observations here discussed, beginning with 1846, September had 14, October 24, November 6, December 18, January 27, February 1, March 23, April 2, May 5, June 19, July 17; and beginning with 1853, September 12, October 20, November 3, December 22, January 13, February 8, March 20, April 13, May 21, June 10, July 19. Snowdrift may be considered as having occurred whenever the wind reached force 6 and upward, so as to be noteworthy, and registered accordingly, from October to March inclusive; in September, April, and May it was much less troublesome; and, of course, there was none in June and July.

The highest barometer readings seem to accompany clear weather, light winds, with usually low temperatures; the lowest, thick weather, high winds, and temperatures higher than the average. In March 30·74 inches was reached, and in June 29·20; giving a range of pressure of 1·54 inches.

When sufficient is known of the diurnal range of meteorological phenomena in these regions the results here given may be reduced to mean monthly values; at present it appears advisable to leave them as they are for the purposes of meteorology and physical geography.

TABLE I.—RESULTS OF METEOROLOGICAL OBSERVATIONS, made at REPULSE BAY.

Date and Hour.	Barometer.	Thermometer.	Wind Components, Sums.				Weather Notations.							
			N.	S.	E.	W.	b	c	o	m	f	r	s	q
1847.	Inches.	°												
Jan. 7 a.m.	29·804	-28·5	161·0	1·0	—	49·8	11	11	9	14	—	—	—	4
1 p.m.	·782	-26·9	156·3	—	2·4	50·7	12	11	8	13	—	—	—	4
7 "	·795	-27·4	154·8	—	5·0	45·8	16	8	7	13	—	—	3	4
Feb. 6 a.m.	30·143	-27·0	83·6	1·4	1·4	32·1	15	12	1	16	—	—	—	—
Noon	·146	-22·0	92·1	—	1·0	31·0	15	11	2	7	—	—	4	2
6 p.m.	·159	-26·3	70·0	1·6	1·1	26·7	18	10	—	7	—	—	2	—
Mar. 6 a.m.	30·172	-28·3	155·6	—	—	50·7	13	16	2	21	—	—	2	2
Noon	·178	-20·1	154·4	—	—	54·3	11	19	1	21	—	—	3	3
6 p.m.	·172	-24·2	145·5	—	—	64·2	13	13	5	17	—	—	2	1
April 6 a.m.	—	-10·8	—	—	—	—	2	1	2	2	—	—	1	—
Noon	—	+ 6·5	—	—	—	—	2	2	3	1	—	—	4	—
8 p.m.	—	- 3·9	—	—	—	—	2	1	1	—	—	—	1	—
May 6 a.m.	—	14·5	—	—	—	—	2	1	5	—	—	—	5	—
Noon	—	26·2	—	—	—	—	1	3	8	—	—	—	6	—
8 p.m.	—	15·2	—	—	—	—	2	2	3	—	—	—	2	—
June 6 a.m.	29·710*	27·4	—	—	—	—	3	4	10	—	—	2	6	3
Noon	·734*	36·5	112·3	5·2	16·6	66·3	4	10	8	—	1	3	7	5
9 p.m.	·752*	29·4	—	—	—	—	2	5	10	—	—	5	6	3
July 6 a.m.	29·891	37·9	99·3	5·1	29·0	44·7	8	10	13	—	2	5	3	2
Noon	·933	46·0	117·3	8·9	26·2	41·0	11	13	7	—	4	3	—	2
9 p.m.	·939	38·1	80·7	2·7	18·5	25·1	11	11	9	—	2	2	1	3

* Barometer was recorded on 11 days only, from 20th to 30th June.

Date and Hour.	Barometer.	Thermometer.	Wind Components, Sums of Force.				Weather Notations.									
			N.	S.	E.	W.	b	c	o	m	f	r	s	q		
1846.	Inches.	°														
Sept. 6 a.m.	—	25.8†	64.3	15.7	48.6	34.7	2	10	17	—	—	1	14	—		
Noon	—	32.9†	62.1	18.2	25.0	55.6	5	11	13	1	—	1	12	—		
6 p.m.	—	26.9†	60.5	23.2	51.6	33.8	3	8	18	1	—	1	10	—		
Oct. 6 a.m.	—	11.4	106.0	11.1	22.8	54.9	4	7	20	3	2	—	14	—		
Noon	29.852†	15.2	107.3	16.5	20.8	57.7	5	8	18	2	1	—	14	—		
6 p.m.	29.867†	12.3	115.1	3.1	27.6	62.5	5	6	20	—	1	1	13	—		
Nov. 6 a.m.	29.927	1.7	73.3	18.3	23.0	25.1	6	7	17	14	—	—	9	—		
Noon	29.930	2.6	77.0	22.1	26.0	45.0	7	10	13	12	1	—	6	—		
6 p.m.	29.937	1.3	89.5	8.7	35.0	34.3	10	5	15	8	1	—	10	—		
Dec. 8 a.m.	30.063	-17.2	108.7	5.0	9.5	16.0	10	13	8	16	—	—	4	—		
Noon	30.056	-17.2	105.8	5.9	13.0	8.4	11	13	7	12	—	—	3	—		
6 p.m.	30.060	-17.8	107.5	0.9	11.2	10.8	11	12	8	16	—	—	6	—		

† Barometer was recorded on 19 days only, from 13th to 31st October.

‡ Temperature observations missed on five days.

REMARKS.—In April, May, and June the weather was only noted occasionally. In July w. (*dew* or *wet*) was recorded on two days, both at noon and at 9 p.m. On September 30th, 6 a.m., h. (hail) was recorded; and in October hail was noted at 6 a.m., six times; at noon five times; and at 6 p.m. two times.

1854.																
Jan. 8 a.m.	—	-31.4	109.3	1.4	1.4	64.5	10	15	6	18	—	—	4	1		
2 p.m.	—	-29.7	121.4	2.1	2.1	72.1	8	16	7	18	—	—	5	1		
Feb. 8 a.m.	—	-31.2	135.2	2.1	2.1	78.0	8	14	9	18	—	—	8	1		
2 p.m.	—	-36.5	52.6	3.4	—	48.1	8	18	2	16	—	—	1	1		
Mar. 8 a.m.	—	-29.8	65.3	5.7	—	56.4	7	15	6	17	—	—	2	1		
2 p.m.	—	-36.8	79.6	9.0	—	57.5	7	15	6	14	—	—	5	1		
Apr. 8 a.m.	—	-21.8	117.3	8.7	5.1	29.4	13	15	3	14	—	—	2	—		
2 p.m.	—	-8.8	130.4	16.5	8.0	39.4	12	15	4	16	—	—	2	—		
May 8 a.m.	—	-17.9	144.2	20.8	9.2	44.1	12	15	4	14	—	—	4	—		
2 p.m.	—	-0.8	66.4	12.7	19.6	11.5	9	13	8	—	2	—	2	3		
June 8 a.m.	—	+15.0	66.9	21.3	25.3	11.2	9	12	8	—	2	—	4	2		
2 p.m.	—	-2.6	74.9	24.0	12.7	12.2	9	13	8	—	2	—	2	2		
July 8 a.m.	—	-22.8	86.2	10.5	18.1	33.6	14	13	4	—	—	—	1	—		
2 p.m.	—	32.7	83.8	10.3	18.1	31.0	13	13	5	—	1	—	2	—		
Aug. 8 a.m.	—	15.5	98.7	8.5	19.1	48.2	15	11	5	—	—	—	2	2		
2 p.m.	—	36.4	77.7	18.3	37.6	42.1	9	6	15	—	—	2	2	2		
Sept. 8 a.m.	—	34.8	89.0	11.2	35.6	37.5	4	7	19	—	—	12	6	2		
2 p.m.	—	41.6	101.2	9.8	17.1	46.9	13	5	13	—	—	3	—	—		
Oct. 8 a.m.	—	47.6	102.7	13.8	24.2	54.6	7	12	12	—	—	7	—	1		
2 p.m.	—	40.8	88.9	17.8	37.3	54.5	2	6	23	—	—	18	2	2		
1853.																
Sept. 8 a.m.	—	24.7	73.4	15.7	10.5	51.9	11	8	11	—	—	1	4	—		
2 p.m.	—	—	65.2	7.4	17.8	71.9	6	5	19	1	—	1	5	3		
Oct. 8 a.m.	—	23.5	83.9	13.3	23.1	66.3	5	7	18	—	—	3	12	2		
2 p.m.	—	9.9	112.3	19.8	18.5	59.8	9	8	14	1	—	—	11	4		
Nov. 8 a.m.	—	—	114.2	23.1	27.6	61.1	6	7	18	2	—	—	11	3		
2 p.m.	—	11.1	113.7	26.5	30.5	62.6	3	7	21	3	—	1	15	3		
Dec. 8 a.m.	—	-19.1	76.1	—	1.8	49.3	11	14	5	10	—	—	3	1		
2 p.m.	—	-16.0	89.0	—	1.8	57.5	9	12	9	13	—	—	5	1		
Jan. 8 a.m.	—	-19.9	97.3	1.1	3.6	61.8	7	14	9	11	—	—	7	1		
2 p.m.	—	-23.8	127.5	7.8	7.8	48.2	8	11	11	8	—	—	9	2		
Feb. 8 a.m.	—	-22.7	129.7	—	—	50.5	9	11	12	8	—	—	10	2		
2 p.m.	—	-28.2	132.5	0.8	5.0	51.7	8	11	12	8	—	—	10	2		

REMARKS.—June 9th, 8 p.m., weather recorded r t; no other notation of thunder.

TABLE II.—ABSOLUTE MAXIMUM and MINIMUM HEIGHT of BAROMETER, with simultaneous Weather, at REPULSE BAY.

Date and Hour.	Barometer. Max.	Tempera- ture.	Wind and Force.	Weather.	Date and Hour.	Barometer. Min.	Tempera- ture.	Wind and Force.	Weather.
1847.	Inches.	°				Inches.	°		
Jan. 2nd, 7 p.m.	30.255	-30.2	N.W. 2	b	10th 1 p.m.	29.215	-10.5	N.N.W. 11	o
Feb. 23rd, 6 "	30.561	-29.2	N. 1	b	13th 6 "	29.712	-35.5	N. by W. 2	b
Mar. 6th, 6 "	30.740	-30.7	N. by W. 4	b c m	21st Noon	29.450	-21.0	N.W. 9	o m
April "	—	—	—	—		—	—	—	—
May "	—	—	—	—		—	—	—	—
June 23rd, 9 p.m.	30.183	34.0	W.N.W. 2	b c	27th 6 a.m.	29.202	31.0	N.W. 10	o s
July 7th, 6 a.m.	30.252	42.0	E. by S. 2	b c	20th 6 p.m.	29.633	44.3	Calm	b c
1846.									
Sept. "	—	—	—	—		—	—	—	—
Oct. 31st, Noon	30.185	10.6	W.S.W. 4	b c	13th 6 p.m.	29.351	27.7	N. by W. 8	s
Nov. 25th, 6 a.m.	30.658	-19.1	N. by E. 1	b	20th Noon	29.390	7.7	S.S.E. 2	b c m
Dec. 1st, Noon	30.546	-22.5	N. 1	b c	6th Noon	29.492	-6.5	E. 4	b c

TABLE III.—ABSOLUTE MAXIMUM and MINIMUM TEMPERATURE in each Month, with simultaneous Weather, at REPULSE BAY.

Date and Hour.	Temperature. Max.	Barometer.	Wind and Force.	Weather.	Date and Hour.	Temperature. Min.	Baro- meter.	Wind and Force.	Weather.
1847.	°	Inches.				°	Inches.		
Jan. 23rd, 7 p.m.	-8.6	29.349	N.N.W. 9	o	8th 7 a.m.	-44.1	29.905	N.W. 2	b
Feb. 11th, Noon	-7.4	29.901	N. by W. 5	o s	16th 6 "	-39.4	29.961	N. by W. 7	b m
Mar. 16th, "	-6.4	29.643	N. by W. 5	b c s	1st 6 "	-42.2	30.200	N. by W. 1	b
April 13th, "	21.2	—	N.N.W.	—	19th 6 "	-23.0	—	N.N.W.	—
May 29th, "	45.0	—	S.	—	5th 6 "	-2.8	—	N.N.W.	—
June 24th, "	46.5	30.141	Variable 1	b c	1st 6 "	12.5	—	—	—
July 21st, "	57.0	29.740	"	b c	1st 9 p.m.	29.0	29.792	N. 5	b c
1846.									
Sept. 15th, "	44.8	—	S.S.E. 4	c p s	23rd 6 a.m.	16.4	—	W.N.W. 3	b
Oct. 4th, "	38.0	—	S.E. by E. 4	h p r	22nd 6 "	-13.4	29.874	N.W. 2	b c f
Nov. 3rd, 6 p.m.	27.0	29.613	E.S.E. 4	o m s	29th 6 p.m.	-23.3	30.006	W.N.W. 3	b
Dec. 10th, 8 a.m.	16.9	29.935	N.E. by N. 4	o s	26th 6 a.m.	-35.5	29.927	N. by W. 10	b c m
1854.									
Jan. 1st, 8 p.m.	17.6	—	S.E. 3	o s	31st 8 "	-48.2	—	N.N.W. 4	b m
Feb. 18th, 8 a.m.	-17.9	—	N.N.W. 6	b c m	7th 8 p.m.	-50.0	—	W. by N. 4	b
Mar. 29th, 8 p.m.	10.4	—	W. 5	o	8th 8 a.m.	-37.7	—	Variable 1	b c
April 29th, 2 "	43.0	—	N.W. 3	f	1st 8 a.m.	-31.8	—	S.E. 2	b c
May 29th, 2 "	45.0	—	S. 4	c	4th 8 p.m.	2.2	—	N. 10	b
June 10th, 2 "	54.0	—	N.N.W. 5	b c	13th 8 "	29.0	—	Calm	b c
July 16th, 2 "	58.5	—	S.W. 9	b c	1st 8 "	33.8	—	E. by N. 7	r
1853.									
Sept. 2nd, 8 a.m.	40.5	—	Calm	p s	24th 8 "	-2.0	—	Calm	p s
Oct. 13th, 8 p.m.	34.5	—	S.E. 6	r	29th 8 "	-16.9	—	S. E. 2	b c
Nov. 3rd, 2 "	13.0	—	N.W. 3	s	23rd 8 "	-40.2	—	N.N.E. 2	b
Dec. 31st, 2 "	22.2	—	N. 5	o s	5th 8 "	-44.2	—	Calm	b c

TABLE IV.—SUMMARY of the WINDS OBSERVED at REPULSE BAY, referred to sixteen points, with MEAN FORCE (0 to 12):—

Years 1846-7, 1853-4.	No. of observations.	N.		N.N.E.		N.E.		E.N.E.		E.		E.S.E.		S.E.		S.S.E.	
		O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.
January - - - -	186	40	5.7	1	1.0	—	—	—	—	2	3.5	—	—	3	2.7	—	—
February - - - -	168	29	4.7	—	—	1	1.0	—	—	1	1.0	—	—	2	1.0	1	1.0
March - - - -	186	57	6.9	3	6.3	3	3.7	—	—	—	—	—	—	2	2.0	3	5.0
April - - - -	126	32	6.2	—	—	7	2.9	—	—	4	3.5	—	—	21	2.3	1	5.0
May - - - -	139	40	6.3	5	9.3	6	2.0	3	8.0	14	3.6	1	2.0	4	2.5	1	2.0
June - - - -	152	28	6.1	2	5.5	9	5.7	1	6.0	9	4.2	12	3.9	12	3.4	3	2.3
July - - - -	186	36	6.8	10	6.7	10	7.0	2	5.5	11	3.0	9	5.0	5	3.2	1	2.0
September - - - -	177	18	5.4	—	—	—	—	7	5.6	11	5.8	13	5.8	5	3.2	8	3.3
October - - - -	186	14	7.4	2	7.0	8	2.9	—	—	10	6.3	4	5.5	10	4.4	7	4.1
November - - - -	180	24	5.6	6	3.0	4	4.5	1	3.0	10	3.4	4	3.5	6	3.3	4	4.5
December - - - -	186	76	5.5	4	5.0	6	3.3	1	1.0	5	5.0	1	5.0	—	—	2	1.0

(continued.)

Years 1846-7, 1853-4.	S.		S.S.W.		S.W.		W.S.W.		W.		W.N.W.		N.W.		N.N.W.		Variable.		Calms.
	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	O.	F.	
January - - - -	—	—	1	1.0	—	—	—	—	5	1.8	21	3.2	35	5.0	67	6.8	10	2.0	1
February - - - -	1	3.0	3	1.7	4	3.2	2	3.0	14	3.7	15	2.9	24	3.8	44	6.8	18	1.8	9
March - - - -	7	3.0	—	—	2	6.0	—	—	10	3.6	7	5.4	23	3.6	58	6.4	6	1.5	5
April - - - -	8	2.8	—	—	2	2.0	—	—	11	1.9	2	4.0	14	3.0	13	3.0	5	1.4	6
May - - - -	5	3.3	3	4.0	5	4.8	—	—	14	5.6	6	2.7	17	4.0	4	4.0	9	1.2	2
June - - - -	4	2.0	—	—	1	3.0	1	6.0	4	6.5	15	6.8	22	6.5	12	6.6	11	2.2	6
July - - - -	1	3.0	2	1.5	3	9.0	2	4.5	12	4.7	17	5.1	11	5.4	23	6.7	13	1.6	18
September - - - -	2	4.0	—	—	6	6.0	—	—	12	4.3	16	5.1	18	5.6	34	5.7	13	1.2	14
October - - - -	6	4.2	—	—	4	3.0	2	3.5	1	4.0	3	5.0	50	6.2	47	6.6	12	1.6	6
November - - - -	3	3.3	—	—	1	5.0	—	—	5	5.0	11	4.2	48	3.8	33	5.7	11	1.5	9
December - - - -	3	2.7	1	1.0	—	—	3	2.0	4	2.2	4	5.0	28	3.5	30	6.1	8	1.0	10

REMARKS by DR. RAE.

1846.—SEPTEMBER.

22nd, 8 p.m. - Aurora visible to Sd.

OCTOBER.

16th, Noon - Parhelia; 9 p.m., scaly snow; faint aurora to Sd., altitude 12°.

17th, between 6 & 9 p.m. Aurora to S.S.E. parallel to horizon, altitude 12°.

18th, 6 p.m. - Some faint streaks of aurora to W.

19th, 2 p.m. - Solar halo with prismatic colours and parhelia; temperature 2°, wind N.N.W. 7, b c; snow at 9 p.m.

21st, 8 p.m. - Several streaks of aurora across zenith in a N.W. and S.E. direction, many rays in different parts of the heavens.

27th, 6 p.m. - Some faint streaks of aurora in various parts of the sky, bearing for the most part N.N.W. and S.S.E.

28th, 9 p.m. - A very faint light yellow aurora to S.E. and S.W.

31st, 11 a.m. - Solar halo, temperature 10°·6, wind W.S.W. 4, b c.

31st, 7 p.m. - Lunar halo, diameter 40° or 50°, temperature 3°·8, wind N.N.W. 3, b c.

NOVEMBER.

5th, 9 p.m. - A faint ray of aurora to S.E. extending vertically towards the zenith.

6th, 6 p.m. - Some faint beams extending vertically from S.W. to N.W., altitude 16°; one ray to the S.E. pointing towards the zenith.

14th, 10 a.m. - Solar halo and parhelia with prismatic colours.

14th, 8 p.m. - A faint beam of aurora to E. directed towards the zenith.

17th, 6 p.m. - Three beams of aurora pointing towards the zenith, two of them bearing N.N.W. and the other S.E.

18th, 9 a.m. - A very red sky to N.W.; wind N.E. by N. 3, b c.

18th, 6 p.m. - Sound heard at a great distance; wind W. 2, f o.

20th, 7.30 p.m. - A faint aurora extending from W. to S.E., altitude 20°, motion rapid, no prismatic colours.

22nd, 4 p.m. - Some faint beams of aurora, mostly to S.E., pointed towards the horizon.

23rd, 5.30 a.m. - Some faint rays of aurora in different parts of the heavens.

25th, 6 a.m. - Two faint beams of aurora bearing W.N.W., and pointed towards the zenith, altitude of lower limb 30°.

DECEMBER.

2nd, 6 p.m. - Lunar halo; wind N. 1, b c.

5th, Noon - Parhelia with prismatic colours; wind S. by E. 3, b. m.

5th, 6 p.m. - Aurora visible to S. with two arches rising from near the horizon to the zenith.

13th - The sky to N. had a beautiful lake-colour tint at sunset. At 6 p.m., brilliant aurora, centre S., gradually rising from an altitude 12° to 80°, of a pale yellowish green.

14th, 6 a.m. - Some faint beams of aurora in different parts of the sky. At 4 p.m., a faint aurora to Sd.

15th, 4 p.m. - A faint aurora, centre S.

17th, 6 p.m. - Faint aurora, centre S.S.W., altitude 30°.

18th, 6 p.m. - Faint aurora S. by W.

21st, 6 a.m. - Arch of aurora across zenith, nearly E. and W.; bright at western extremity.

23rd, Noon - Spiculæ of show falling; wind N. by W. 1, b m; at 6 p.m., faint lunar halo; wind N. 1, b c s.

29th, 6 a.m. - A faint aurora, centre S., altitude 20°.

29th, 6 p.m. - Halo round the moon: wind N.N.W. 3, b c.

1847.—JANUARY.

- 2nd, 6 a.m. - Faint aurora, S.W.byS., altitude 15°. At 4 p.m., some streaks of aurora to Sd., pointing to zenith.
- 3rd, 6 p.m. - A beam of aurora to S., pointing to zenith.
- 4th, 6 p.m. - Faint aurora, centre of arch S.byW., altitude 10°. At 8 p.m., aurora in a narrow line, parallel to horizon, altitude 4°, extent 70°, centre S.
- 6th, 6 p.m. - Faint aurora, extending from S.S.E. across zenith.
- 11th, 6 p.m. - A beam of aurora, S.E., altitude 25°.
- 12th, 6 p.m. - Very faint aurora, centre W. by N., altitude 10°.
- 13th, 6 p.m. - A very faint auroral arch, centre S.S.W., altitude 16°, extent 65° or 70°.
- 14th, 6 p.m. - Faint arch of aurora, centre S.S.W., altitude 11°, extent 98°.
- 15th, Noon - A stream of bright light shooting up from Sun to altitude of 5°.
- 16th, 4 p.m. - Arch of faint aurora, centre S., altitude 18°, extent 60°. At 6 p.m., centre S.S.W., altitude 12°, extent 90°.
- 17th, 6 p.m. - Faint aurora, brightest to the W., centre S., altitude 60°.
- 18th, 6 p.m. - Very faint arch of aurora from N.W.byN., extending towards zenith.
- 25th, 10 to Noon - Solar halo with parhelia; wind N.N.W. 6, b m.
- 26th, 6 a.m. - Faint arch of aurora across zenith.
- 28th, Noon - Spiculæ of snow falling; wind N.byW. 7, b m, temperature 31°.
- 28th, 6 p.m. - A broad band of aurora, the lower edge having a reddish or lake tint, running parallel with the horizon, altitude 2°, centre S.W., extent 70°; some beams of aurora S.E. pointing towards the zenith.

FEBRUARY.

- 5th, Noon - Much refraction; wind N.W.byN. 5, b c q, temperature -13°.
- 8th, 6 a.m. - Spiculæ of snow, wind N.byW. 1, b m, temperature -28°3. Noon, much refraction; wind N.N.W. 3, b, -20°4.
- 9th, Noon - Solar halo with parhelia; wind N.W.byN. 6, b m.
- 9th, 6 p.m. - A faint arch of aurora, centre S.W.byS., altitude of centre 5°, extent 108°.
- 10th, 6 p.m. - Some faint beams of aurora S. and S.W.
- 19th, Noon - Solar halo with prismatic colours and parhelia; wind variable, 2, b c s.
- 25th, Noon - Much refraction; wind calm, b, temperature -15°3.

MARCH.

- 18th, 10 a.m. - Solar halo, with prismatic colours; wind W.byN. 3, b c m.
- 23rd, Noon - Speculæ; halo with prismatic colours; wind N.byW. 3, b c s.

APRIL.

- 3rd, 8 p.m. - Faint aurora of an orange colour, centre S., altitude 5°.
- 20th - - - Some partridges seen.

MAY.

- 3rd - - - A snow bird seen.
- 11th - - - Pools of water.

JULY.

- 6th - - - A great quantity of water coming down North Pole river.

1853.—SEPTEMBER.

- 1st - - - A white bear seen.
- 7th - - - Ice on pools. Killed during this month 96 deer, one hare, one seal, 96 partridges, 51 salmon three trout.

DECEMBER.

- 20th - - - Ice on bay, 4 feet 7 inches thick.
- 24th - - - Ice on lake, 4 feet 9 inches thick.

1854.—JANUARY.

- 24th - - - Ice in bay, 5 feet 9 inches thick, in lake 5 feet 7 inches.

FEBRUARY.

- 25th - - - Ice on bay, 7 feet 0¾ inch thick, on lake 6 feet 11½ inches. Deer frequently seen during the month, sometimes going north.

MARCH.

- 1st - - - A deer shot; 2nd, a number of deer seen.

MAY

- 27th - - - A blue-throated diver picked up dead, no water.
- 30th - - - Three laughing geese and a sandpiper seen.
- 31st - - - Small sand-piper, geese, gulls, and anthus aquaticus seen.

JUNE.

- 1st - - - Gull and sandpipers seen.
- 2nd - - - Swallows said to be seen; five cranes seen.
- 3rd - - - Saw two swans, five long-tailed ducks, an eider or king duck. A seal killed.
- 5th - - - Five jagers (*L. pomarisia*) and a snow-goose seen.
- 6th - - - Twelve Hutchin's geese seen for first time; two snow-geese and two swans seen.
- 7th - - - Swans and Hutchin's geese seen.
- 8th - - - Small streams running full of water. Hares and ptarmigans still white. Geese seen.
- 9th - - - Red-throated diver seen. Rain all night with thunder.
- 12th - - - Bees seen for first time.
- 13th - - - A deer killed by a wolf on the bay ice.
- 14th - - - Sandpiper of rare kind shot. King ducks shot for first time.
- 17th - - - *Lestris parasiticus* shot.
- 19th - - - Gray plover and red-throated phalarope seen for first time.
- 23rd - - - White bear shot.
- 24th - - - Much water coming down North Pole river for first time.
- 27th - - - The snow as much off the ground as on August 15th last.
- 28th - - - A net set in bay the last three days but no fish: only very little open water.
- 30th - - - Male *T. rupestris* still quite white, female in summer dress.

JULY.

- 1st - - - One small salmon from lake.
- 11th - - - Caught 155 salmon and many more might have been taken, 4 to 15 lbs. each.
- 12th - - - Musquitos seen. Caught 85 salmon. Butterflies seen.
- 13th - - - Esquimaux say the ice in the bay will soon break up now, as mosquitos have appeared.
- 14th - - - Musk ox tracks seen about ten miles to N.W.
- 18th - - - Musquitos. Laughing geese with five young ones seen.
- 20th - - - Esquimaux report ice moving with flood and ebb.
- 25th - - - Bay still covered with ice.
- 27th - - - Esquimaux's children killing many bull [heads (*Lota maculosa*) at low water near mouth of stream.
- 29th - - - A gale this day cleared the ice off to the nearest islands and the main body has moved a little.
- 30th - - - An Esquimaux killed two deer with bow and arrows. This month 501 salmon were killed; many large and many from 4 to 5 lbs.

LIST OF PUBLICATIONS, &c.

Issued under the Authority of the Meteorological Council.

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