solid, a salt of the same kind is the nucleus, and that such a nucleus is present in the air, I must leave the proof of the assertion to those who make it or defend it. I cannot imagine what can be the source of the alum nucleus, for example, in the above experiments, limited as they were by such well-defined conditions. M. Gernez can only account for the existence of alum in the air on the supposition that as a good deal of that salt is used in dye-works, it must escape into the air from such a source. Until it can be proved that on a wet day and while rain is still falling there is alum in the open air, I must continue to maintain my original statement that alcohol is, under proper conditions, capable of determining the solidification of these solutions.

I have several times noticed the persistence of nuclear action on the part of a dense charcoal, such as that made from box-wood. A small piece of such charcoal was boiled in a solution of potash alum (4 to 3). When cold, a large crystalline mass was found attached to the charcoal. The flask was reboiled five times in the course of a week, and each time the same result appeared when the flask had become cold.

I have referred to bread as a nucleus, and the action is curious. New bread is not nuclear; but if stale bread, such as a second day's loaf, be cut open with a clean knife, and bits of the crumb be dug out, they act powerfully as nuclei on solutions of sodic sulphate and alum. If such bread be slowly toasted before the fire, it becomes inactive; but if it contain alum, it is active on solutions of potash or ammonia alum (about 1 to 1), whether the bread be new or stale, toasted or not. Treated by this test, I have found the bread of Highgate to contain alum; but some bread from Drury Lane gave most decided evidence of its presence.

III. "On the Results of the Magnetical Observations made by the Officers of the Arctic Expedition, 1875–76." By Staff-Commander E. W. Creak, R.N., attached to the Admiralty Compass Department. Communicated by Captain F. J. O. Evans, C.B., F.R.S., Hydrographer of the Admiralty. Received April 25, 1879.

The following narrative and results form the sequel to the "Memorandum on Terrestrial Magnetism," prepared by Professor J. C. Adams, M.A., F.R.S., and Captain F. J. Evans, R.N., F.R.S., published in the "Manual and Instructions for the Arctic Expedition, 1875," suggested by the Arctic Committee of the Royal Society.

The "Alert" and "Discovery" left Portsmouth on the 29th May, 1875, and on arrival at Godhavn, in Disko, the first magnetic observations were made. The values of the declination and inclination

observed at various stations round the harbour of Godhavn, showed considerable differences, evidently caused by local magnetic disturbance.

Proceeding northward to winter quarters a few results in declination were obtained at intermediate stations.

On the 1st September, 1875, the "Alert" reached her winter quarters at Floeberg Beach, latitude 82° 27′ N., longitude 61° 22′ W. The magnetic observatory, constructed entirely of snow, was situated at a distance of 200 yards from the ship. It was divided into three distinct houses 27 feet apart, and in these the horizontal force magnetometer, Barrow's dip-circle, and the differential declination magnetometer were secured to snow pedestals. As no stove was used the range of the thermometer registered was from $-10°$ to $+4°$.

Here the series of observations, the results of which are given in the following pages, were made during the winter. The mean values of the several elements obtained are:—

Absolute declination.....	97° 57′ W.	
„ inclination.....	84 42 N.	
„ horizontal force (unifilar).....	1·137	Total force = 12·309
Total force (Lloyd's needles).....		= 12·258
Horizontal force (ditto)	1·134	

In his sledging journey to the extreme northerly position attained in the expedition (lat. 83° 20′ 26″ N.), Commander Markham made observations of the declination, and with the Fox circle.

The "Discovery" took up winter quarters at Discovery Bay, 53 miles S.W. of the "Alert," in latitude 81° 44′ N., longitude 65° 3′ W., on the 26th August, 1875.

The magnetic observatory house was constructed of wood, and stood on the shore 197 yards from the ship, and the pedestals formed of the ship's binnacles sunk into the ground were found to be very firm. For the differential declination magnetometer an ice-house was built on the ice-floe 90 yards from the ship, the magnetometer being frozen on to a pedestal of ice. The mean value of the several elements observed at this station are:—

Absolute declination.....	101° 44′ W.	
„ inclination.....	84 50 N.	
„ horizontal force (unifilar).....	1·131	Total force = 12·559
Total force (Lloyd's needles).....		= 12·225
Horizontal force (ditto)	1·107	

One of the chief subjects of interest in the magnetical results of the observations at the winter quarters observatories is that of the diurnal variation or inequality of the declination, and frequent magnetic disturbances, the latter especially, as the ships wintered in a region

remarkable, as it proved, for an absence of brilliant auroras, and in which no connexion was observed between the appearances of that phenomenon and movements of the declinometer magnet.

Hourly observations were made with the differential declination magnetometers, and on all occasions of great disturbance special observations at frequent intervals. At Floeberg Beach continuous hourly scale readings were taken during portions of December, 1875, and January and February, 1876—in all 37 days; and at Discovery Bay from the 23rd October, 1875, to the 28th March, 1876, with only a break of two days in November, and a few hours in February.

The greatest range of the declination was observed on the 19th February, 1876, about the same hours, at Floeberg Beach and Discovery Bay, reaching 5° 9′·4 and 5° 47′·9 respectively. The smallest range was observed on the 12th January, when only 0° 4′ was recorded at the first-named station, and 0° 6′·9 at the last. On an average, about every eighth day the higher values of the daily range were attained, and comparing the highest with the lowest scale reading during the whole period, it shows that the magnet moved over 8° of arc.

The mean daily ranges for the several months or the square root of the mean of the squares of the daily ranges for each month expressed in arc, are :—

Floeberg Beach.		*Discovery Bay.*	
1875. December	= 7′·4	1875. October	= 9′·3
1876. January	= 68·5	„ November	= 90·2
„ February	=110·9	„ December	= 69·6
		1876. January	= 72·3
		„ February	= 93·7
		„ March	=108·2

At Discovery Bay, therefore, the mean daily range gradually declined in value from October to December, when the minimum range was reached, but again increased during the subsequent months of observation.

Comparing the results of the mean daily range during the whole period with those obtained at Floeberg Beach and Van Rensselaer Harbour *—stations where the inclination and horizontal force differ so little from the same elements at Discovery Bay—it is found that the mean daily range at Van Rensselaer Harbour was 2° 28′·6; Floeberg Beach, 1° 31′·5; Discovery Bay, 1° 28′·0.

The hours of the greatest easterly and westerly deflection of the declinometer magnet in its mean daily departure from the normal, differed considerably from those of the middle northern latitudes, where 8 A.M. and 1 to 2 P.M. are the well-established hours.

* Van Rensselaer Harbour lies S. 17° W. 196 miles from Discovery Bay. See "Smithsonian Contributions to Knowledge," vol. x, 1858.

The extreme deflections of the magnet (always regarding the mean position of the north end as being the magnetic north) took place, at

Floeberg Beach.

Westerly extreme.	December, 10 A.M., January, noon, February, 1 P.M.	Easterly extreme.	December, 1 A.M., January, 9 P.M., February, midnight.

Discovery Bay.

Westerly extreme.	October, 11 A.M., November, 10 A.M., December, 10 A.M., January, 1 P.M., February, noon, March, noon.	Easterly extreme.	October, 11 P.M., November, 11 P.M. December, midnight, January, 10 P.M., February, 11 P.M., March, midnight.

As Van Rensselaer Harbour and Port Bowen, as well as Floeberg Beach and Discovery Bay, happen to lie in a region within which observers hitherto report their inability to discover any connexion between appearances of the aurora and magnetic disturbances, the mean hours of extreme deflection of the magnet for the whole period are here given for comparison:—

Westerly extreme.	Noon.....	Van Rensselaer Harbour..	2 A.M.	Easterly extreme.
	Noon.....	Floeberg Beach	Midnight	
	10 A.M.....	Discovery Bay	11 P.M.	
	11·49 A.M...	Port Bowen	10 P.M.	

As it is probable that magnetic disturbances have had a certain degree of control ever the determination of these hours of extreme deflection, it now becomes necessary to give results freed from such disturbance.

The method of eliminating disturbances adopted in the discussion of these observations, has been to select certain days of principal disturbance, and to reject the observations of the whole of such days from the mean.

The observing officers recorded 32 days of undoubted disturbance.

An examination of the hourly scale readings on these days shows that the motions of the magnet were very irregular from hour to hour, and that there were other occasions when similar movements took place and might likewise be considered days of disturbance. Thus from the 37 days of observation at Floeberg Beach, 18 days were rejected as disturbed, and at Discovery Bay 69 days out of 156.

But another method, which consists in deciding upon a separating value and rejecting all hourly observations exceeding that value, may also be said to have been satisfied, for out of 2,088 hourly scale readings at Discovery Bay, all those that exceeded the mean hourly value for the whole month by 30′ of arc have been rejected, with the exception of 15 which differed 40′ of arc.

A separating value of 30′ at a station where the absolute horizontal force is 1·13, and the inclination 84° 50′, may be considered sufficient, when compared with those adopted by Sir Edward Sabine, viz., at Point Barrow, 22′·87, with a horizontal force equal 1·88, and dip = 81° 36′, at Port Kennedy, 70′ with horizontal force equal 0·35, and dip = 88° 27′.*

After rejecting days of assumed disturbance the hours of extreme deflection are:—

Floeberg Beach.

Westerly extreme.	December, 1 P.M., January, 2 P.M., February, 3 P.M.	Easterly extreme.	December, 1 A.M., January, 10 P.M., February, 2 A.M.

Discovery Bay.

Westerly extreme.	October, 11 A.M., November, noon, December, 11 A.M., January, noon, February, 11 A.M., March, 2 P.M.	Easterly extreme.	October, 9 P.M., November, 3 A.M., December, midnight, January, 3·30 A.M., February, 4 A.M., March, 9 P.M.

The mean values for the whole period are:—

Westerly extreme.	1 P.M.	Van Rensselaer Harbour	2 A.M.	Easterly extreme.
	10 A.M. and 1 P.M.	Floeberg Beach	1 A.M.	
	11 A.M.	Discovery Bay	Midnight	

The general effect, therefore, of disturbance is to accelerate the arrival of the magnet at its points of extreme deflection by one hour, in addition to producing a much larger range in the diurnal variation. Thus, with disturbances included, the range is 35′·6; with their rejection it is only 16′·3 at Discovery Bay.

The erection of the declinometer houses of both ships on the ice-floe (which rose and fell with the tide), renders the observed motions of the magnet open to the suspicion of disturbances other than those produced by magnetical causes.

Chiefly for this reason no further analysis has been made of the disturbances at Floeberg Beach.

In the case of the "Discovery," comparisons were made between the declinometer on the floe and the unifilar magnetometer on shore during times of disturbances, and the magnets moved alike, with two exceptions. On February 2nd, the magnet on shore was much disturbed, that on the ice very steady; at midnight of February 28th, the reverse took place, the declinometer being disturbed in a peculiar manner, whilst the unifilar magnetometer remained nearly steady.

Analysis of Disturbances.

For computing the mean hourly values of the disturbances of the

* See "Phil. Trans.," 1863, p. 656.

declination, the formula used by Captain (now Sir J. H.) Lefroy, in the published volume of his "Magnetical and Meteorological Observations at Lake Athabasca,"* &c., was adopted. This renders the several results directly comparable with other series obtained at numerous stations on the North American continent, and Van Rensselaer Harbour, Greenland.

The formula for a whole month or longer period is,

$$\sqrt{\frac{\Sigma^1}{N}(\psi h - \overline{\psi h})^2}.$$

In this ψh represents the hourly scale readings, $\overline{\psi h}$ the monthly mean at the same hour, N the total number of the observations, Σ^1 the sum of all the squares.

From the values of the mean hourly disturbance without regard to sign, it is found that the disturbing force never ceases, and that in the mean monthly values it *decreases* as the winter solstice is approached, and *increases* rapidly towards the equinox. This points to an accordance with the investigations by Mr. Broun, F.R.S., of the disturbances of declination in high northern latitudes, "that there are maxima at the equinoxes and minima at the solstices."†

In the hourly values the maximum mean disturbance occurs between the hours of 9 A.M. and 3 P.M., and again from 9 P.M. to 2 A.M.; the minimum from 6 to 9 P.M. and 3 to 8 A.M. Comparing the results for the whole period at Van Rensselaer Harbour and Discovery Bay, a marked difference is apparent.

At the first-named place the disturbing force was greatest during the night and least during the day: at Discovery Bay the disturbing force was considerably greater during the day than the night.

Another result which also deserves attention is that of the mean maximum disturbance about noon, being preceded and followed by smaller values. This is in accordance with the results obtained at Van Rensselaer Harbour, Lake Athabasca, Toronto, and Sitka. At Discovery Bay there is also a very marked disturbance at 11 P.M.

Having considered the mean disturbance without regard to sign, it yet remains to be seen what was the *direction* of the disturbances during the several hours of the twenty-four. The computed values show that the easterly disturbances prevail over the westerly during the night from about 7 P.M. to 7 A.M., and during the remaining hours of the day the westerly disturbances predominate.

Taking the difference between the mean easterly and mean westerly disturbances, it is found that the easterly disturbance is both moderate in amount and monthly change when compared with the westerly.

Thus the ratio of the excess of westerly disturbance in December

* See "Irregular Fluctuations," &c., pages 74–75 of that work.

† See "Trans. Roy. Soc. Edinburgh," vol. xxvii, Part IV, page 586.

to that in March is 3·25, but the ratio of the easterly excess in the same months is 1·32; the mean actual values being −11·7 and −38·1; +8·5 and +11·2.

Among the peculiarities of the disturbances at Discovery Bay, are two which exhibit their semi-American, semi-Asiatic character.

At Pekin, Nertschinsk, and Discovery Bay the aggregate values of the westerly deflections decidedly predominate, the contrary obtains in America. In North America "the conical form (of the curves) characterizes the easterly deflections."* The same occurs at Discovery Bay, but the double maximum—which is observed in the easterly deflections at Pekin and Nertschinsk, and the westerly in North America—is common to both easterly and westerly deflections.

Objections may possibly be raised to a comparison being made between the observations of a few months with those of as many years. The period of observation, however, includes one solstice and the subsequent equinox; it is, therefore, considered that according to Mr. Broun's investigations in high latitudes, all the broad features of the disturbances have been rendered prominent.

Before concluding this analysis, the question of how far the observed and assumed days of disturbance at Discovery Bay coincided with those at Kew Observatory seems worthy of examination.

The period embraced by these observations was one of great disturbance, especially towards the end of February and the greater part of March, the declinometers at both stations being for the most part affected on the same days. At Kew Observatory, Mr. Whipple noted 57 days of principal disturbance, while at Discovery Bay there were 72.

The two greatest disturbances or "magnetic storms," occurred on the 19th February and the 25th March, and the time limits at the two stations agree fairly in "absolute time,"† thus: the principal disturbances—

	Kew.	*Discovery Bay.*
19th February, 1875.	Commenced at 4 to 5 P.M.	Commenced at 4 P.M.
	Ended at 2 P.M. of 20th	Ended between 1 and 2 P.M. of 20th.
25th to 26th March, 1875.	Commenced at 11·45 A.M.	About noon.
	Ended at 3·30 A.M., 26th	Indeterminate.

The hours of disturbance at Floeberg Beach were about the same (in February) as at Discovery Bay.

During the second storm of the 25–26th March at Discovery Bay, the magnet kept continuously to the westward of the normal from the commencement to 10.20 p.m. (absolute), and at 6.50 p.m. (absolute) it had deviated 4° 15′ from the mean hourly position, whilst at Kew it was often to the eastward as well as to the westward, 18′ being the

* See "Phil. Trans. Roy. Soc.," 1863, page 282.

† Or mean time at Greenwich.

greatest decrease in the declination; and at 6.50 p.m. it was 12′ to the eastward of the normal.

Finally, it may be stated that the comparison of the disturbances at Kew and the two winter quarters observatories of the Arctic Expedition, 1875–76, appear to confirm Gauss's conclusion, that "the synchronous disturbances of the same element not only differ widely in amount, but occasionally appear to be even *reversed* in direction."

Auroras.

The appearances of auroras and the synchronous movements of the declinometer magnet, were subjects of special observation during the stay of the "Alert" and "Discovery" at their winter quarters. On all occasions they were observed to be faint, with none of those brilliant manifestations which are described by our own officers as seen at Point Barrow,* and by the Austro-Hungarian Expedition in Franz Josef Land,† where the magnetical instruments were so sensibly disturbed.

These phenomena were not observed either in the "Alert" or "Discovery," especially no connexion between magnetical disturbances and the appearances of auroras could be traced.

This is quite in accordance with the remarks of previous observers within the region comprehended between the meridians of 60° and 90° W., and north of the parallel of 73° N. For examples, see the remarks of Captain Parry and Lieutenant Foster in the discussion of their magnetical observations at Port Bowen, in the "Phil. Trans.," 1826, Part IV, page 76. Also Mr. A. Schott's discussion of Dr. Kane's observations at Van Rensselaer Harbour, "Smithsonian Contributions," vol. x, 1858.

The following description of the aurora observed on 21st November, 1875, is given by Commander Markham and Lieutenant Giffard in their abstract of observations at Floeberg Beach :—

"Between 10 and 11 p.m. bright broad streamers of the aurora appeared 10° or 15° above the north horizon, stretching through the zenith, and terminating in an irregular curve about 25° above the south horizon, bearing S.S.W. During the aurora's greatest brilliancy the magnet was observed during five minutes to be undisturbed."

The aurora was visible on 49 days between the 22nd October, 1875, and the 27th February, 1876.

The observations from which the foregoing magnetical results have been obtained were made by Commander (now Captain) A. H. Markham and Lieutenant G. A. Giffard, of the "Alert," Lieutenants R. H. Archer and R. B. Fulford, of the "Discovery."

The results in greater detail will be found in a Parliamentary paper

* See "Phil. Trans. Roy. Soc.," 1857, page 498.

† See "Austrian Arctic Voyage," 1872–74, pages 327–328.

entitled "Arctic Expedition," "Results derived from the Arctic Expedition, 1875–76," presented to the Houses of Parliament in the session of 1879.

H.M.S. "Alert."

Declination.

Godhavn, Disko.

1875.				°	′	
9 July..	7.0 P.M...	(Flagstaff) Lat. 69° 13′ 56″ N. Long. 53° 42′ W.		67	12·8	W.
13 „	.....	(Macdougall Island)		68	7·9	„

Ritenbenk.

16 „ ..	6.40 P.M.	Lat. 69° 45′ 23″ N. Long. 51° 7′ 45″ W.....		69	8·5	„

*Proven.**

21 „ ..	4.20 P.M.	Lat. 72° 22′ N. Long. 55° 45′ W.		75	32·0	„

East Carey Islands.

27 „ ..	8.40 A.M.	Lat. 76° 42′ N. Long. 72° 25′ W.		105	20·7	„

Port Foulke.

28 „ ..	5.40 P.M.	Reindeer Point.....		110	4·0	„
		Lat. 78° 19′ N. Long. 72° 55½′ W.				
9 Aug...	5.40 P.M.	On ice		110	49·2	„
				109	14·5	„
11 „ ..	6.15 P.M.	Off East Cape of Pierce Franklin Bay.....		111	13·2	„
		Lat. 79° 25′ N. Long. 75° 8′ 15″ W.				

Dobbin Bay.

14 „ ..	6.30 P.M.	Lat. 79° 40′ N. Long. 73° 6′ 15″ W.....		107	25·2	„

On Ice off Hayes Point.

16 „ ..	10.40 A.M.	Lat. 79° 36′ N. Long. 72° 24′ W.		111	23·0	„

Winter Quarters Observatory.

10 Sep...	10·5 A.M...	Lat. 82° 27′ 2″ N. Long. 61° 22′ W.....		98	16·9	„
„ „ ..	4.15 P.M.			97	57·5	„
11 „ ..	5.30 P.M.			97	48·0	„
	December mean from Declinometer (for differential observations)			97	46·6	„
1876. January	„	„	„	98	01·8	„
February	„	„	„	97	51·7	„

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* On a small hill just left of Flagstaff. A rock at the place where the variation was observed had the marks cut into it—

xxi
July
1875
↑
H.M.S.
Alert.

Inclination.

1875.			
May	Kew Observatory (departure)	67° 47′·54	N.
	Godhavn, Disko.		
July.....	Lat. 69° 13′ 56″ N. Long. 53° 42′ W.....	81 43·7	„
	Winter Quarters Observatory.		
November	Lat. 82° 27′ 02″ N. Long. 61° 22′ W.....	84 43·4	„
December	„ „	84 44·4	„
1876.			
January.....	„ „	84 40·5	„
February	„ „	84 39·2	„
March.....	„ „	84 39·9	„
1877.			
2 Feb. ..2.30 P.M.	Kew Observatory (return)	67 43·9	„
3 „ ..11.30 A.M.	Kew Observatory	67 44·2	„

Horizontal Force.

1875.			
May.....	Kew Observatory (departure)..	X=3·8762	Values of m.
	Winter Quarters Observatory.		
November ..	Lat. 82° 27′ 02″ N. Long. 61° 22′ W. ..	„ =1·133	·6396
December ...	„ „	„ =1·1375..	·6374
1876.			
January	„ „	„ =1·140	·6370
February....	„ „	„ =1·140	·6371
March	„ „	„ =1·140	·6376
1877.			
January	Kew Observatory (return)	„ =3·888	·6264

At the Winter Quarters Observatory the mean values of P or coefficient of magnetic distribution for the unifilar magnetometer were at distances 1·1 to 1·3 feet—·0212; at distances 1·2 to 1·4 feet—·0161. With the temperature at + 4° F., log $\pi^2 k$=1·66177.

Assuming the mean inclination = 84° 42′ N. during the period when the horizontal force was observed as above, the total force = 12·309 at Winter Quarters Observatory.

Total Force.

(Observed with Lloyd's needles on Barrow's Circle.)

1875.			
July.....	Godhavn, Disko (Flagstaff Station)..... Lat. 69° 13′ 56″ N. Long. 53° 42′ W.	12·530.....	X=1·805
	Winter Quarters Observatory.		
November ..	Lat. 82° 27′ 02″ N. Long. 61° 22′ W.....	12·215.....	„ =1·122
December ..	„ „	12·198.....	„ =1·119

1876.				
January	Lat. 82° 27′ 02″ N.	Long. 61° 22′ W.....	12·303.....	X =1·143
February....	,,	,,	12·260.....	,, =1·142
March	,,	,,	12·316.....	,, =1·145
1877.				
February....	Kew Observatory (return)		10·273.....	,, =3·891

In computing the horizontal from the total force the values of the inclination have been taken from those observed at the time of the total force observations.

Observations of Declination made with Sledge Compass near the Extreme Northerly Position attained in the Expedition.

1876. 6 May	Lat. 83° 16½′ N.	Long. 62° 40½′ W.	102° W.
,, 8 ,, ...	Lat. 83° 17½′ N.	Long. 62° 40½′ W.	98° W.

Results of Observations made with Fox's Circles.

Inclination.

1875.				° ′
9 to 13 July..	Godhavn, Disko (Flagstaff Station)	Circle,	No. 28..	81 55 N.
	Lat. 69° 13′ 56″ N. Long. 53° 42′ W. ..	,,	No. 2 ..	81 44 ,,
16 July	Ritenbenk:			
	Lat. 69° 45′ N. Long. 51° 08′ W.	,,	No. 28..	82 00 ,,
21 ,, ...	Proven:			
	Lat. 72° 22′ N. Long. 55° 45′ W.	,,	,,	82 48 ,,
1876.				
8 May	Northern Journey.....	,,	No. 2.	
	Lat. 83° 17′ N. Long. 62° 40′ W.	,,	,,	84 39 ,, (Approx.
11 May.....	Lat. 83° 19′ N. Long. 62° 39′ W.	,,	,,	85 20 ,, (Approx.)

Intensity.

1875.				
9 to 13 July..	Godhavn, Disko (Flagstaff Station)	Circle,	No. 28..	12·561
	Lat. 69° 13′ 56″ N. Long. 53° 42′ W. ..	,,	,, ..	12·578

H.M.S. "Discovery."

Declination.

				° ′
1875. 8 July....	5 A.M...	Godhavn, Disko		68 7 W.
,, 9 ,, ...	10 A.M...	Opposite side of harbour to Flagstaff ..		68 8 ,,
,, 12 ,, ...	3.30 P.M.	Lat. 69° 14′ N. Long. 53° 42′ W.		68 45 ,,
		Carey Islands.		
,, 27 ,, ...	5.10 A.M.	Lat. 76° 43′ N. Long. 72° 25′ W.		105 7 ,,
		Cape Sabine.		
,, 31 ,, ...	4.0 P.M.	Lat. 78° 42′ N. Long. 74° 20′ W.		107 59 ,,

		On Ice.			
1875. 7 Aug.....	2.45 P.M.	Lat. 79° 16′ N. Long. 74° 10′ W.	110	18	W.
		Cape Prescott.			
„ 9 „	8.0 P.M.	Lat. 79° 26′ N. Long. 74° 45′ W.	110	59	„
„ 11 „	5.40 P.M.	„ „	109	33	„
		Dobbin Bay.			
„ 14 „	4.0 P.M.	Lat. 79° 41′ N. Long. 72° 53′ W.	108	14	„
		On Ice (near C. Collinson).			
„ 21 „	4.0 P.M.	Lat. 80° 3′ N. Long. 70° 22′ W.....	106	1	„
		Hannah Island.			
„ 24 „	0.45 P.M.	Lat. 81° 7′ N. Long. 63° 53′ W.....	97	46*	„
		Winter Quarters Observatory.			
„ 9 Nov.....	10.0 A.M.	Lat. 81° 44′ N. Long. 65° 3′ 14″ W.....	101	43	„
	5.45 P.M.	„ „	101	13	„
„ 23 Dec.....	5.30 P.M.	„ „	101	49	„
	6.30 P.M.	„ „	101	44	„
1876. 21 Jan. ..	5.30 P.M.	„ „	101	26	„
„ 17 Feb. ..	5.30 P.M.	„ „	101	14	„
„ 17 „ ..	7.0 P.M.	„ „	101	50	„
„ 22 „ ..	Noon ..	„ „	101	53	„
„ 1 March	4.30 P.M.	„ „	102	7	„
„ 22 „ ..	4.30 P.M.	„ „	101	33	„
„ 3 July		„ „	101	47	„
1875. October	Mean from Declinometer (for differential observations)		102	02·5	„
„ November	„ „ „		101	49·5	„
„ December	„ „ „		101	47·5	„
1876. January	„ „ „		101	44·4	„
„ February	„ „ „		101	40·2	„
„ March ..	„ „ „		101	40·7	„
		Cape Frazer.			
„ 24 Aug. ..	10.40 A.M.	Lat. 79° 47½′ N. Long. 71° 19′ W.....	108	59	„
		(Near) C. Louis Napoleon.			
„ 25 „ ..	10.30 A.M.	Lat. 79° 40′ N. Long. 72° 5′ W.....	109	46	„
		Dobbin Bay.			
„ 29 „ ..	10.4 A.M.	Lat. 79° 41′ N. Long. 72° 53′ W.	109	1	„
		Walrus Island (on Ice).			
„ 9 Sept. ..	0.50 P.M.	Lat. 79° 24′ N. Long. 74° 45′ W.	111	12	„
		Godhavn, Disko.			
„ 27 „ ..	11.45 A.M.	Lat. 69° 14′ Long. 53° 42′ W.....	68	20	„

* Doubtful result.

Egedesmunde.

1876. 29 Sept. ..	0.15 P.M.	Lat. 68° 43′ N. Long. 52° 54′ W.	67	2 W.

Inclination.

1875.			
May.....	Kew Observatory (departure)	67	47·5 N.
	Godhavn, Disko.		
July.....	Lat. 69° 14′ N. Long. 53° 42′ W.	81	48·2 „
	Winter Quarters Observatory.		
September	Lat. 81° 44′ N. Long. 65° 3′ 14″ W.	84	49·9 „
October	„ „	84	45·5 „
November	„ „	84	47·9 „
December	„ „	84	49·9 „
1876.			
January.....	„ „	84	50·2 „
February	„ „	84	50·8 „
March	„ „	84	53·7 „
April	„ „	84	48·2 „
June	„ „	84	55·9 „
July.....	„ „	84	53·6 „
	Rawlins Bay.		
21 Aug.. 9.0 P.M. ..	Lat. 80° 21′ 5″ N. Long. 70° 0′ W.....	85	6·5 „
	Dobbin Bay.		
29 „ .. 5.0 P.M. ..	Lat. 79° 41′ N. Long. 72° 53′ W.	85	14·9 „
	Egedesmunde.		
29 Sept. 1.0 P.M. ..	Lat. 68° 43′ N. Long. 52° 54′ W.	82	0·2 „
1877.			
14 Feb... 11.0 A.M. ..	Kew Observatory (return)	67	44·7 „

Horizontal Force.

1875.			
May.....	Kew Observatory (departure).....	X=3·878 ..	Value of *m*.
	Winter Quarters Observatory.		
October	Lat. 81° 44′ N. Long. 65° 3′ 14″ W.	„ =1·133	·6539
November ..	„ „	„ =1·132	·6686
December ..	„ „	„ =1·121	·6630
1876.			
January....	„ „	„ =1·117	·6581
February ..	„ „	„ =1·146	·6686
July	„ „	„ =1·128	·6546
1877.			
14 Feb. .... 3.5 P.M. to 4.24 P.M. ..	Kew Observatory (return)	„ =3.917	·6411

Assuming the mean inclination = 84° 50′ N. during the period when the horizontal force was observed as above at Winter Quarters Observatory, the total force = 12·559.

At Winter Quarters Observatory the mean values of P or coefficient of magnetic distribution for the unifilar magnetometer were at distances 1·3 to 1·6 feet + ·0515 from the observations in October, November, December, and + ·0270 during the last three months. With a mean temperature of + 25°, log $\pi^2 k$ = 1·656981.

Total Force.

(Observed with Lloyd's needles on Barrow's Dip Circle.)

1875.				
12 July....	12 to 1 P.M...	Godhavn, Disko (on opposite side of harbour to flagstaff.) Lat. 69° 14′ N. Long. 53° 42′ W.	12·387	X=1·770

Winter Quarters Observatory.

October	Lat. 81° 44′ N. Long. 65° 3′ 14″ W.	12·180 „	=1·108
November	„ „	12·269 „	=1·113
December	„ „	12·227 „	=1·101

In computing the horizontal from the total force the values of the inclination have been taken from those observed about the time of the force observations.

Results of Observations made with Fox's Circle.

Inclination.

1875.					
8 to 12 July	..... Godhavn, Disko (Station on opposite side of harbour to Flagstaff Station of "Alert.") Lat. 69° 14′ N. Long. 53° 42′ W.	.....	Circle No. 29..	81	56 N.
21 „	..... Proven..... Lat. 72° 22′ N. Long. 55° 45′ W. } Approximate.	.....	„ ..	83	4 „
22 „	..... Upernivick..... Lat. 72° 47′ N. Long. 56° 3′ N. } Approximate.	.....	„ ..	83	12 „

Intensity.

1 to 12 „	..... Godhavn, Disko (Station on opposite side of harbour to Flagstaff Station of "Alert.") Lat. 69° 14′ N. Long. 53° 42′ W.	.....	„ ..	12·514